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SECTION 01100

SUMMARY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Contract description.
- B. Contractor's use of site.
- C. Coordination.
- D. Work sequence.
- E. Owner occupancy.
- F. Specification conventions.

1.2 CONTRACT DESCRIPTION

- A. Scope:
 - 1. This Specification covers the construction and completion of the project as shown on the Drawings, Bill of Quantities, and as detailed in the Contract Documents and directed by the Engineer.
 - 2. The Contract comprises execution, completion of the works and remedying any defects therein including the provision of all labor, materials, constructional plant, temporary works and everything whether of a temporary or permanent nature required for the execution and completion of the works.
 - 3. Perform Work in accordance with the Contract Documents.
 - 4. The requirements of this Section do not supersede or take precedence over any provision of the "General Conditions of Contract" and the "Conditions of Particular Applications", and should any discrepancy become apparent between the requirements of this Section and the "General Conditions of Contract" and the "Conditions of Particular Applications", the Contractor shall notify the Engineer, in writing, with a copy to the Employer, and the Engineer shall interpret and decide such matters in accordance with the applicable provisions of the Tender Documents.
 - 5. The organization of the Specifications into Divisions, Sections and paragraphs and the arrangement of Drawings shall not necessarily control the Contractor in dividing the Work among sub-contractors or in establishing the extent of Work to be performed by any trade.
 - 6. In examining the requirements of any section of the Specifications, the Contractor shall examine all other sections of the Specifications and the other Documents and Drawings which affect the Work of that section.
 - 7. It is the responsibility of the Contractor, to inform the Engineer of any discrepancies in the drawings and specifications before signing the Contract, default of which will make him responsible for any errors or omissions even though they have been approved by the Engineer.
- B. Description of the Project:
 - 1. The project location is as shown on the drawings.
 - 2. The project comprises the construction and completion of the subject works with all related siteworks, civil and architectural works, and electromechanical works.

- C. The performance required of materials and products and the standards to be complied with shall be as specified in subsequent sections of these Specifications and in accordance with local relevant authorities' standards
- D. Cross References:
 - 1. The specifications are prepared based on the Construction Specifications Institute (CSI) master format.
 - 2. The specifications section numbers and titles are used in the Bill of Quantities as cross-references to help define the part or parts of the Specification which apply to particular kinds of work or parts of the Work. If the references are to specific clauses or kinds or types of work within a section of the Specifications, they shall be taken as applying to the section as a whole, with all related sections and other relevant information. Cross references should not be taken as excluding other relevant information and requirements stated in other parts or sections of the Specifications. The Specifications as a whole shall be taken as applying to the Work as a whole.

1.3 CONTRACTOR'S USE OF SITE

- A. All construction operations and site establishment facilities shall be confined to within the site boundaries unless otherwise agreed with the Engineer and Employer.
- B. The Contractor shall be responsible for safeguarding all existing structures.
- C. The Contractor shall be responsible for arranging his own working space, storage of materials, setting of all temporary accommodations, utilities, services, facilities, etc.
- D. The Contractor shall be responsible for keeping driveways and entrances serving the site clear and available to the Employer, the Employer's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- E. The Contractor shall be responsible for not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to the areas proposed by the Contractor at Tender stage, after having received the approval of the Engineer. If additional storage is necessary, obtain and pay for such storage off site.
- F. The Contractor shall be responsible for locking automotive type vehicles, such as passenger cars & trucks and other mechanized or motorized construction equipment, when parked and unattended, so as to prevent unauthorized use. Do not leave such vehicles or equipment unattended with the motor running or the ignition key in place.

1.4 COORDINATION

- A. The Contractor shall be responsible to coordinate all the works related to the project.
- B. The Contractor shall ensure that the Works are carried out in proper sequence having regard to the works progress, and that all necessary provisions are made for locating, routing, supporting and fixing the engineering services, providing necessary holes, chases and access for them, and in all respects fully integrating them with the works.

1.5 WORK SEQUENCE

- A. Construct Work in approved stages and phases.
- B. Coordinate construction schedule and operations with Engineer.

1.6 OWNER OCCUPANCY

- A. Owner will occupy the site and premises at the date stated in the Contract Document.
- B. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.
- C. Schedule the Work with the Engineer to accommodate Owner occupancy.

1.7 SPECIFICATION CONVENTIONS

- A. These specifications are written in imperative mood and streamlined form. This imperative language is directed to the Contractor, unless specifically noted otherwise. The words "shall be" are included by inference where a colon ":" or semi-colon ";" is used within sentences or phrases.
- B. Related Sections: All "Division 1" specifications sections are general requirement sections and are applicable to all other specifications sections and no need to mention them in the "Related Sections" of each specifications section; In general, "Related Sections" are only the "Technical Related Sections".

END OF SECTION

SECTION 01300

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Coordination and project conditions.
- B. Field engineering.
- C. Regulatory Requirements.
- D. Management and Administration Procedures.
- E. Progress meetings.
- F. Pre-installation meetings.

1.2 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals and Work of various sections of the Project to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Verify utility requirements and characteristics of operating equipment are compatible with project utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, operating equipment.
- C. Coordinate space requirements, supports and execution of all trades and works. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance and for repairs.
- D. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion.

1.3 FIELD ENGINEERING

- A. Scope:
 - 1. This section covers:
 - a. Survey and field engineering, quality control, submittals and project record documents of the works.
 - b. The Contractor's responsibility for the accurate setting out of the Works both on drawings and on Site.
- B. Related Items:
 - 1. General Requirements: Execution requirements for project record documents.
- C. Performance and Standards:
 - 1. Employ a Certified Land Surveyor acceptable to the Engineer to perform survey work of this section.
 - 2. All setting out, including the setting out and marking of builder's work requirements shall be measured from agreed data.

- D. Submittals:
1. Submit name, address, and telephone number of Surveyor before starting survey work.
 2. On request, submit documentation verifying accuracy of survey work.
 3. Submit a copy of site drawing signed by the Certified Land Surveyor, that the elevations and locations of the Work are in conformance with Contract Documents.
 4. Maintain a complete and accurate log of control and survey work as it progresses.
- E. Examination:
1. Verify locations of survey control points prior to starting work.
 2. Promptly notify Engineer of any discrepancies discovered.
- F. Survey Reference Points:
1. Contractor will locate and protect survey control and reference points.
 2. Control datum for survey is that indicated on Drawings or as given by the Engineer.
 3. Verify set-backs and easements; confirm drawing dimensions and elevations.
 4. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
 5. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer.
- G. Survey Requirements:
1. Provide field engineering services. Utilize recognized engineering survey practices.
 2. Establish a minimum of four permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.
 3. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
 - a. Site improvements including pavements; stakes for grading; utility locations, slopes, and invert elevations.
 - b. Grid or axis for structures of existing and new structures.
 - c. Column locations, ground floor elevations, and roof elevation of existing and new structure.
 4. Periodically verify layouts by same means.
- H. Existing Levels:
1. The Contractor shall satisfy himself that the levels as shown on the drawings are correct. Should the Contractor wish to dispute any levels he shall submit to the Engineer a schedule of the position of the levels considered to be in error and a set of revised levels. Levels shall not be disturbed during execution without the approval of the Engineer.
 2. Claims brought on discrepancies due to non compliance by the Contractor of the aforementioned shall not be considered.
- I. Tolerances:
1. Survey tolerance shall be to agreed recognized standards in addition to the local relevant authorities' regulations and standards.

1.4 REGULATORY REQUIREMENTS

- A. Scope: This Specification calls attention to the regulations to be observed by the Contractor and the Standards and Codes of Practice to which reference shall be made.
- B. Regulations:
 - 1. The Contractor shall carry out the Works in full observance of the local authorities. Special attendance shall be also given to:
 - a. General Requirements, Site Administration, Safety, Health and Environmental Regulations.
 - b. Regulations and planning of the Municipality or local authority.
 - 2. All agencies involved to which a notice of intent should be declared and from which approvals should be obtained.
- C. Standards:
 - 1. Notwithstanding the Specifications of certain Standards and Codes of Practice, all Materials, Products and Workmanship shall comply with the requirements of the latest edition of all relevant and current Standards, Standard Codes of Practice and all current amendments thereto.
 - 2. Compliance shall be understood to mean that the standard attained shall not be less than that specified in the Standard or Code of Practice and may well be higher. In particular, where a higher standard is called for in the Specification that higher standard shall take precedence over the relevant Standard and Code of Practice, even if these are referred to in the text of the Specification.
 - 3. In the case of materials and products which have been produced or manufactured in accordance with a published Standard or Code, that fact shall be brought to the attention of the Engineer together with full particulars of the standard in question which will be accepted by the Engineer if he is satisfied as to its provisions.

1.5 MANAGEMENT AND ADMINISTRATION PROCEDURES

- A. General: Management shall be to agreed recognized standards or manuals.
- B. Superintendence:
 - 1. Accept responsibility for coordination, superintendence and administration of the Work including all sub-contracts.
 - 2. Arrange and monitor a programme with each sub-Contractor, supplier and local authority, obtain and supply information as necessary for coordination of Works.
- C. Sub-Contractor's Site Meeting: Hold meetings with appropriate sub-contractors and suppliers shortly before main site meetings to facilitate accurate reporting of progress.
- D. Weather Record: Keep an accurate record of:
 - 1. Daily maximum and minimum air temperature (including overnight)
 - 2. Number of hours per day in which Work is prevented by inclement weather.

1.6 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals unless otherwise directed by the Engineer.

- B. Make arrangements for meetings in full coordination with the Engineer; prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required: Job superintendent, major subcontractors and suppliers, Owner, and Engineer, as appropriate to agenda topics for each meeting.

D. Agenda:

1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems and decisions.
4. Identification of problems impeding planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to Work.

- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer, Owner and those affected by decisions made.

1.7 PRE-INSTALLATION MEETINGS

- A. When required in individual specification sections, convene pre-installation meetings at Project site prior to commencing work of specific section.
- B. Require attendance of parties directly affecting, or affected by, Work of specific section.
- C. Notify the Engineer minimum four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 1. Review conditions of installation, preparation and installation procedures.
 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer, Owner and those affected by decisions made.

END OF SECTION

SECTION 01323

NETWORK ANALYSIS SCHEDULES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. References.
- B. Quality assurance.
- C. Format.
- D. Construction Program.
- E. Submittals.
- F. Distribution.

1.2 REFERENCES

- A. The Use of CPM in Construction: A Manual for General Contractors and the Construction Industry, Washington, D.C., The Associated General Contractors of America (AGC).
- B. CPM in Construction Management: Project Management with CPM, O'Brien, McGraw-Hill Book Company, New York.

1.3 QUALITY ASSURANCE

- A. Scheduler: Contractor's personnel or Specialist Consultant specializing in CPM scheduling with ten years minimum experience in scheduling construction work of complexity comparable to this Project, and having use of computer facilities capable of delivering detailed graphic printout within 48 hours of request.
- B. Contractor's Administrative Personnel: Ten years minimum experience in using and monitoring CPM schedules on comparable projects.

1.4 FORMAT

- A. Listings: Reading from left to right, in ascending order for each activity. Identify each activity with applicable specification section number.
- B. Diagram Sheet Size: 600 mm high x 900 mm wide or by the required width.
- C. Scale and Spacing: To allow for notations and revisions.

1.5 CONSTRUCTION PROGRAM

- A. The Contractor shall prepare a Construction Program showing the order and method in which he proposes to execute the works and the dates upon which the various elements, trades and sections of the works will be started and completed, including dates for submittal and approval of shop drawings and samples, for procurement and delivery of materials and equipment; for construction, installation, inspection, testing and commissioning.

- B. The construction program shall be in the form of Computerized Network Precedence Diagrams incorporating activities for all work to be performed by the Contractor, his Sub-Contractors and other Contractors to be employed in or about the site, supported by computer analysis and schedules and prepared in accordance with the principles of Critical Path Method (CPM) programming.
- C. The construction program shall be prepared by a qualified Network Analysis Consultant in collaboration with the Contractor. The Network Analysis Consultant shall be approved by Engineer and shall be skilled and experienced in construction programming of the kind specified for this project. The Network Analysis Consultant shall provide the Engineer access to his database for loading into the Engineer's computer system, whether by means of floppy diskettes or data-line communications.
- D. The network diagrams shall be clearly and accurately presented with work activities relating to specific locations or levels grouped for ease of reference. Each work activity shall have the following information shown in the diagram:
 - 1. Activity Number.
 - 2. Concise Description of the Work.
 - 3. Specification Reference or Trade Code.
 - 4. Location of Work or Area Code.
 - 5. Duration in Calendar day.
- E. Computer Analysis:
 - 1. In addition to the network diagrams the Contractor shall submit the following computer analysis output:
 - a. Activity Status Report.
 - b. Master Working Report: Chronological listing by early start of all activities and milestones.
 - c. Milestone Report: Chronological listing by early start of all milestones.
 - d. Contractor Reports: Individual report, sorted chronologically by early start, for each Sub-Contractor. These reports will only have the early start and early finish dates for distribution to Sub-Contractors.
 - e. Material Procurement Report: Based on the early start Construction Program, for all material items. This report shall include dates for submittal, approval release for ordering/fabrication, shipping and delivery to site.
 - f. Shop Drawings and Samples Reports: This schedule shall detail the dates for submission and approval of shop drawings and samples required by the Contract Documents, including those required from Sub-Contractors, and shall make due allowance for reasonable time of processing of shop drawings by the Engineer.
 - g. Man Power Report: A listing of all activities displaying estimated crew sizes and manpower requirements for each activity.
 - h. Current Status Report: A listing of actual start and finish dates, activities already started and completed and percentage completion of activities still in progress.
 - i. Cash Flow Report: Showing projected monthly and cumulative expenditure.
 - 2. The activity status report shall have the following minimum data for each activity
 - a. Activity Number.
 - b. Concise description of the work.

- c. Specification reference or trade code.
- d. Location of work or trade code.
- e. Duration in calendar days.
- f. Early start date (calendar).
- g. Early finish date (calendar).
- h. Late start date (calendar).
- i. Late finish date (calendar).
- j. Total float (calendar days).
- k. Estimate crew size.
- l. Percentage completion.
- m. Remaining duration in calendar days.

F. Supporting Data:

- 1. The Contractor shall also prepare and submit in narrative form the supporting data noted below with the submittal of his Construction Program. Any changes in this information shall be submitted with successive updates and revision.
 - a. The proposed number of working days per week.
 - b. The holidays, and other non-working days observed during the duration of the Contract (by date).
 - c. The planned number of shifts per day.
 - d. The number of hours per shift.
 - e. The planned usage of major construction plant and equipment on the site, on a monthly basis.
 - f. The planned procurement and delivery of local and imported materials.
 - g. The average weekly manpower usage for each trade to be employed for the works.
 - h. The productivity rates for each major work sequence or for any specific activities required by the Engineer.
 - i. Explanation of all changes in logic, durations, manpower, plant and equipment.
 - j. Actual start and finish dates of activities already completed, and percentage completion of activities still in progress.

G. Forty Five (45) Day Program: At monthly intervals, the Contractor shall submit a separate program developed from the approved Construction Program covering a period of forty five calendar days and denoting the Contractor's and Sub-Contractor's daily work activities and their interrelationship with the work of other Contractors, if any.

H. Construction Program Revisions and Updates

- 1. Once the initial Construction Program is submitted and approved by the Engineer, the Network Analysis Consultant shall perform monthly updates in collaboration with the Contractor. The update will follow a visit to the jobsite where in the presence of the Engineer, the Network Analysis Consultant and the Contractor will record the actual starts and percentages complete and, using this data, update the computer analysis. The updated analysis will be accompanied by a narrative report containing the supporting data referred to herein before, which shall indicate the necessary action dates and requirements for material, labour and plant acquisition. The narrative report shall also focus upon the construction progress and shall particularly note conditions that may delay progress of the work. In the event of such delays, the Contractor shall describe actions proposed to overcome the delay and to maintain the planned construction program.

2. Site Progress meetings attended by the Engineer, the Contractor, the Network Analysis Consultant and the principal Sub-Contractors, will be held monthly, immediately following the monthly site visit referred to in the previous paragraph, specifically to review the progress of the work. At this meeting the latest update of the last approved Construction Program will be examined with reference to the records made during the said site visit in order to verify the following:
 - a. Actual start and finish dates of activities completed during the period since the previous update or revision.
 - b. Remaining durations and percentage of completion for all activities in progress.
 - c. Logic, time and cost data for variation order work that will be incorporated into the Construction Program.
 - d. Contractor's measures to rectify delays from the planned dates.
3. The Contractor shall perform the work in accordance with the latest approved Construction Program. If any work is found not to be on program during any regular review of the work, the Contractor shall immediately advise the Engineer in writing of action proposed to bring the work back on program. The Contractor shall thereupon prepare and submit a revised Construction Program indicating such action, together with a list of revisions to program logic. Correction and updating of the program will be done as often as necessary until the project is back on program.
4. Within 5 working days after receipt of a notice from Engineer, the Contractor shall submit a revised Construction Program for any of the following reasons:
 - a. When delays in completion of any activity or group of activities indicates a slippage of the Contract completion date or a milestone date by fourteen (14) calendar days or ten percent (10%) of the remaining duration of the Contract period, whichever is less.
 - b. When delays in submittals or deliveries or work stoppage are encountered which make re-planning of the work necessary.
 - c. When the program does not represent the actual execution and progress of the work being performed in the field.
 - d. Where a change in the work sequence is proposed or has been instituted by the Contractor. Any such change should not, in any case, be made without the Engineer's approval.
 - e. Where the issue of a change order or other instruction would significantly affect the program and/or progress of the works.
5. In the event the Contractor requests an extension of time for completion of the works or requests an extension to the specified milestone dates, he shall furnish such justification and supporting data as the Engineer may deem necessary for the evaluation thereof. Submission of proper substantiation based on revised activity logic, durations and costs is obligatory with any such request.
6. Float belongs to the project and must be used in the best interest of completing the project on time. Accordingly, any existing float shall be used to the maximum extent possible to offset unexpected delays which occur in connection with the Contractor's work, acts of God (Force Majeur), and authorized variations in the scope of the work.

I. Programming Costs:

1. All costs in establishing, maintaining, revising and updating the construction program shall be borne by the Contractor.

1.6 SUBMITTALS

A. General Requirements: Submittal procedures.

1.7 DISTRIBUTION

- A. Following revisions and/or monthly updates to the Construction Program, distribute copies of updated schedules to Contractor's project site file, to Subcontractors, suppliers, Engineer, Owner, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

END OF SECTION

SECTION 01330

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Scope.
- B. Definitions.
- C. Submittal Procedures.
- D. Engineer's Representative Review of Submittals.

1.2 SCOPE

- A. This section generally specifies procedures regarding submittals and the required submittals for the Contract. However, additional procedures and requirements for submittals are specified in individual sections of the specifications.
- B. Submittals shall include but not limited to the following:
 - 1. Submittal schedule.
 - 2. Coordination and sequencing.
 - 3. Submittal preparation and procedure.
 - 4. Product data.
 - 5. Construction program.
 - 6. Design by Contractor.
 - 7. Shop drawings and samples.
 - 8. Design data.
 - 9. Certificates.
 - 10. Test and inspection reports.
 - 11. Manufacturer's instructions.
 - 12. Manufacturer's field reports.
 - 13. Miscellaneous submittals.
 - 14. Site layout organization chart.
 - 15. Progress reports.
 - 16. Correspondence.
 - 17. CAD produced drawings.
 - 18. Photographs of construction progress.
- C. The list and schedule of all submittals and approvals should be compatible with the project schedule.
- D. The requirements of this section do not supersede or take precedence over any provision of the Conditions of Contract. Should any discrepancy become apparent between these requirements and the conditions of contract, the requirements of the conditions of contract shall prevail.

1.3 DEFINITIONS

- A. The work related to submittals of this section, in addition to the definitions of the conditions of Contract and elsewhere in the contract documents, are further

categorized for convenience as follows:

1. Product data shall include manufacturer's latest standard printed literature such as manufacturer's installation instructions, catalog cuts, colour charts, roughing diagrams, wiring diagrams, and performance curves on materials, equipment and systems for this project. Product data shall include references to applicable specification section and item number. Product data shall be in addition to the required shop drawing submittals.
2. Any design required by the Contractor, where called for in the Contract Documents, shall include all necessary calculations, working drawings and shop drawings.
3. Construction Program shall be in the form of Computerized Network Precedence Diagrams incorporating activities for all work to be performed by the Contractor, his Sub-Contractors and other Sub-Contractors to be employed in or about the Site, supported by computer analysis and schedules and prepared in accordance with the principles of Critical Path Method Programming.
4. Shop drawings shall include specially prepared technical data with diagrams, performance curves, data sheets, schedules, templates, patterns, reports, calculations, plans, sections, details and measurements in standard printed form (size A0 for drawings and Schedules, and size A4 for others). Shop drawings shall be in addition to the required product data and shall indicate applicable specification section and item numbers.
5. Samples shall include physical examples of materials, both fabricated and unfabricated, in complete units and as smaller portions of units, for visual inspection and where stated, for more detailed testing and analysis. Samples shall indicate applicable section and item numbers within that section.
6. Certificates shall include statements of suitability, certifying reports from governing agencies, industry standards and testing agencies and applicable certificates specified in each section of the specification.
7. Test and inspection reports shall include reports specified to be required in each section of the specifications.
8. Schedules shall include schedule of required submittals organized by related specification section number and sequence of submission, schedule of sequence of work and time schedule, schedule of sequence of application of specific units of work and schedule of materials, equipment and systems as listed in applicable sections of the specifications.
9. Miscellaneous submittals shall include submittals related directly to the work (non-administrative) including warranties, maintenance agreements, workmanship bonds, survey data and reports, physical work records, copies of industry standards, record drawings, field measurement data, operating and maintenance materials, overrun stock, security/protection/safety keys and similar information, devices and materials applicable to the work and not processed as shop drawings, product data, samples or certificates.

1.4 SUBMITTAL PROCEDURES

A. General:

1. Transmit each submittal with Engineer accepted form.
2. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.
3. Identify Project, Contractor, Sub-Contractor and Supplier; pertinent drawing and detail number, and specification section number, appropriate to submittal.

4. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information are in accordance with requirements of the Work and Contract Documents.
5. Schedule submittals to expedite Project, and deliver to Engineer at business address. Coordinate submission of related items.
6. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.
7. Allow space on submittals for Contractor and Engineer review stamps.
8. When revised for resubmission, identify changes made since previous submission.
9. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.
10. Submittals not requested will not be recognized or processed.

B. Submittal Schedule:

1. All submittals and correspondence shall be submitted to the Engineer.
2. Any design required by the Contractor, where called for, shall be submitted to the Engineer for approval.
3. All shop drawings, material and samples submittal schedules shall be submitted to the Engineer for approval. In addition the Contractor shall submit Material delivery schedule for Engineer's approval. The Contractor shall adhere to the approved schedules.
4. Schedule submissions to ensure that the Engineer is allowed a reasonable time to review each submission within the scheduled period of time.
5. Certify that each submittal has been checked and approved by Sub-Contractors, installers, manufacturers and suppliers. Note any deviations from drawings or specifications.
6. No submissions shall be processed without signed & approved certification of Contractor.

C. Coordination and Sequencing:

1. Coordinate preparation and processing of submittals with the Construction Program and progress so that the work will not be delayed.
2. Coordinate and sequence submittals for work and work interfaced with other work so that the processing of submittals will not be delayed by the lack of required coordination between submittals.
3. The obligation to coordinate the work indicated on any submittal material with other trades and with field conditions is the responsibility of the Contractor. No claim will be allowed for work that may have to be moved or replaced based on a claim that the work was placed in accordance with dimensions indicated on an approved submittal.
4. No claim for an extension of Contract Time will be granted because of Contractor's failure to coordinate submissions.

D. Submittal Preparation and Procedure:

1. The Contractor shall prepare and submit to the Engineer for approval any design required by the Contractor where called for, shop drawings including method statements, coordination drawings and final construction details, samples of materials, product data including data sheet and manufacturer's data, catalogues and specifications, and all other submittals stated hereinafter

- and required in each individual specification section.
2. Each submittal shall be accompanied by a "Transmittal" form whose format shall be to the approval of the Engineer and shall indicate the following:
 - a. Contract №: Contractor's name and job number.
 - b. Specification Section: The specification section number of items specified. (Do not submit items from more than one specification on the same form).
 - c. Submitted by: Name of Contractor's employee responsible for Contractor's review.
 - d. Contract Works Title: Name of Contract.
 - e. Transmittal №: Numbers shall be consecutive for the Works.
 - f. Date Submitted: Date on which any design by the Contractor where called for, shop drawings and sample leave Contractor's office.
 - g. Contractor: Name of firm preparing (and/or Supplier) original documents (any Design required by the Contractor where called for, Shop Drawings or Samples).
 - h. Submission №: 1st, 2nd, 3rd, etc., depending on previous submission for same items (see re-submittal procedure).
 - i. Bill of Quantities: Bill or division, item and description.
 - j. Specification Section Paragraph: Specific paragraph under which item is specified.
 - k. Copies and Type: Number of copies submitted and type of material submitted (print, brochure or sample, etc.).
 - l. Drawing №, Description and Date: Number of the Drawing. Title on the submission (where possible) and date on the submission. Where a group of related drawings are submitted as one unit, only one entry need to be made with a general description of what is included. (Drawings should then be numbered consecutively and have the same date).
 - m. Contractor's Remarks: Clearly note any exceptions or deviations from the Contract Documents and state reasons for them.
 3. The Contractor shall plan the submission process in good time to meet the requirements of the program allowing for twenty one (21) days for engineering review and approval and for extra time for resubmission in the case of rejection. In all case he should plan to get the approval minimum thirty (30) days prior to the scheduled activity early start or the material purchase order.
 4. Resubmission: Re-submittal procedures shall follow the same procedures as the initial submittal with the following exceptions:
 - a. Transmittal shall contain the same information as the first transmittal except that transmittal numbers shall run consecutively and the submission number shall indicate 2nd, 3rd, etc. submission. The drawing number/description shall be identical to the initial submission and the date shall be the revised date for that submission.
 - b. No new material shall be included on the same transmittal for a resubmission.
 - c. Once a sample, whether material or other, is submitted and approved then no alternative shall be submitted unless a valid and necessary reason is given to substantiate the submission of this alternative. Such reason shall be acceptable to the Engineer.
 5. Engineer's and Engineer's Representative Action on Transmittal Form:

Incomplete or erroneous transmittals will be returned with directives indicated.

6. Submittal Procedures by Contractor:

- a. All correspondence and attachments thereto shall be submitted to the Engineer in one original and five copies and one digital/soft copy.
- b. Six prints and one digital/soft copy of each shop drawing with transmittal forms shall be submitted to the Engineer's Representative.
- c. Two samples of each material or prefabricated component with transmittal forms to the Engineer.
- d. Six copies of brochures, one of which must be original, with transmittal forms to the Engineer.

E. Product Data:

1. Within 15 days after Contract implementation commencement date, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product called for under "Submittals" in each individual specification section.
2. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.
3. Submit product data in triplicate for review. Indicate the actual materials being submitted for review when literature contains selections.
4. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

F. Construction Program (Specified in "Network Analysis Schedules" Section):

1. Program Submittal Procedures and Requirements:

- a. The Contractor shall submit his initial Construction Program for approval, in four copies and one digital, within 3 weeks of the Contract implementation commencement date, unless otherwise stated in the Conditions of Contract. Such initial Construction Program shall include the following completed documents:
 - 1) Network Precedence Diagram showing the sequence and interdependence of all items of work required under the Contract and milestone dates.
 - 2) All the computer analysis report required under this Contract.
- b. After approval of the Contractor's initial Construction Program, all subsequent revision and monthly update submittals shall comprise the following:
 - 1) Four (4) prints of the Network Diagrams from the last approved Construction Program, suitably marked up in red ink to show all revisions, and signed by the Contractor and all Sub-Contractors.
 - 2) Four (4) copies of the updated Activity Status Report.
 - 3) Four (4) copies of all supporting data.
 - 4) Four (4) copies of the master working report.
- c. Revisions and monthly updates to the Construction Program shall be submitted within five (5) working days of the data date for inputting revised/updated information to create the revision/updated computer analysis. The data date for the first monthly update shall be one month after approval by the Engineer of the Contractor's initial Construction Program, and successive data dates shall be at monthly intervals. The said data date should coincide with the date of the site

- d. progress meeting at which time the records of progress are verified. Each program submitted shall be signed by all principal Sub-Contractors including Nominated (if any) before being submitted to the Engineer thereby confirming that they have reviewed the said program. If any Sub-Contractor has reservations regarding his ability to comply with the program requirements to which he has appended his signature, the Contractor shall instruct the Sub-Contractor to list such reservations in writing and a copy thereof shall be submitted to the Engineer with the program submittal for his information. No reservation by any Sub-Contractor, nor the fact of informing the Engineer in respect thereof, shall relieve the Contractor of his responsibilities under the Contract in the time prescribed therein.
 - e. Submit a bi-weekly report detailing the preparation, submittal and approval status of shop drawings, materials and equipment, samples and mock-ups and the status of materials and equipment procurement, order placed, delivery periods and site delivery dates.
- 2. Programming Costs:
 - a. All costs in establishing, maintaining, revising and updating the construction program shall be borne by the Contractor.

G. Design by Contractor:

- 1. Any design required by the Contractor, where called for, together with all necessary calculations, working and shop drawings, shall be submitted to the Engineer within 15 days after Contract implementation commencement date.
- 2. The design by Contractor, together with all necessary calculations, working drawings and shop drawings shall be prepared by the Contractor and by his principal Sub-Contractors for structural, architectural and electro-mechanical works, proper liaison and coordination between trades shall be attended to and ensured. Contractor shall also allow the Engineer's access for review and approval during the preparation process.
- 3. The design by Contractor shall be prepared after site dimensions have been taken. Shop drawings shall be prepared on reproducible transparencies, and using metric units of measurement.
- 4. The Engineer's review and approval of any design required by the Contractor, is for general conformance with the design concept and specifications and shall not relieve the Contractor from responsibility for errors or omissions in respect of the requirements of any standards and codes.
- 5. The Contractor shall make any corrections or amendments required by the Engineer's review of the design required by Contractor including calculations, working drawings and shop drawings, and shall resubmit until the "APPROVED" status is achieved. All such corrections or amendments shall be clearly indicated on the resubmitted design with all necessary calculations, working drawings and shop drawings, by the use of revision numbers in circles or triangles, or other method approved by the Engineer.
- 6. No acceptance or approval by the Engineer of any design made by the Contractor, nor any notes, comments, stipulations, requests for clarifications, etc., made by the Engineer upon such submissions during his review and approval thereof, shall constitute an authorization to any variation in the Contract price or to any extra time for completion of the works.

H. Shop Drawings and Samples: Shop drawings shall establish actual details of

manufactured or fabricated items and of work to be executed; they shall clearly identify materials, dimensions, thicknesses, components, attachments, relation with adjoining work and spaces, and all other pertinent information. Shop drawings shall clarify and amplify the design drawings and other design requirements and shall, subject to the Engineer's approval, incorporate minor changes in design or construction as may be necessary or otherwise desirable to suit the requirements of the work. Where the Contract Documents require the Contractor to submit samples, the same shall satisfactorily establish that the quality, construction, workmanship, finish, color, pattern and any other characteristics of the material or equipment to be provided, are in conformance with the Contract requirements and to the Engineer's reasonable satisfaction.

1. The Contractor shall prepare, review, coordinate and submit to the Engineer for his approval such shop drawings and samples as are required by the Contract Documents or as may be required by the Engineer during the course of the works.
2. At the time of making his submission, the Contractor shall inform the Engineer in writing of any deviation between shop drawings/samples being submitted and the requirements stipulated or reasonably implied by the Contract Documents.
3. By submitting shop drawings and samples, the Contractor thereby represents that he has determined and verified all dimensions, relation to existing work, coordination with the work to be installed later, coordination with information in previously submitted shop drawings and has verified their compliance with all the requirements of the Contract Documents. The accuracy of all such information is the responsibility of the Contractor and in reviewing shop drawings and samples, the Engineer shall be entitled to rely upon the Contractor's representation that such information is correct and accurate. The Contractor shall be responsible for and shall make any alterations in the work due to discrepancies, errors or omissions are not due to inaccurate the Engineer. The Contractor shall be responsible for the correct locations of his work, irrespective of approval by the Engineer, and shall pay all costs and expenses incurred by others due to improper location of his work.
4. Sub-Contractors shall submit their shop drawings and samples through the Contractor who shall review and coordinate with his own and other Sub-Contractor's drawings and/or samples before submitting to the Engineer. The Contractor shall be responsible in all respects for his Sub-Contractor's shop drawings and samples as if they were his own.
5. Neither the fabrication of prefabricated items, nor the ordering of any work, materials or equipment, nor the execution of any work on site, shall commence until shop drawings and samples, relevant to the said items, work, etc., and required by the specifications, have been submitted and approved in writing by the Engineer.
6. Shop drawings shall be prepared by the Contractor and by his principal Sub-Contractors for structural, architectural and electro-mechanical works, proper liaison and coordination between trades shall be attended to and ensured. Contractor shall also allow the Engineer's access for review and approval during the preparation process.
7. Shop drawings and samples shall be prepared after site dimensions have, if possible, been taken. Shop drawings shall be prepared on reproducible transparencies, and using metric units of measurement.

8. Shop drawings shall describe accurately the method of fabrication, installation, applied finishes, types and sizes of all members and fixings, and shall, where applicable, indicate methods of marking components for site erection. Shop drawings shall be to scales approved by the Engineer.
9. The Contractor shall verify all dimensions and field conditions and shall check and coordinate the shop drawings and samples required in connection with a particular trade or section of the works with the requirements of other trades or section related thereto.
10. In order to ensure proper coordination, shop drawings and samples for each system or element of work shall be submitted in a single package. The Engineer may require in writing that all relevant parts of a system or element be submitted before any component item is approved.
11. Except for finish, pattern, colour and other matters in respect of which the Engineer's decision is required in accordance with the Contract Documents, the Engineer's review and approval of shop drawings and samples submitted by the Contractor is for general conformance with the design concept and specifications and shall not relieve the Contractor from responsibility for any deviation from, or errors or omissions in respect of the requirements of the Contract Documents, unless the Contractor has informed the Engineer in writing of specific deviations and the Engineer has given written approval thereto.
12. The Contractor shall make any corrections or amendments required by the Engineer's review of shop drawings and samples, and shall resubmit until the "APPROVED" status is achieved. All such corrections or amendments shall be clearly indicated on the resubmitted drawings and samples by the use of revision numbers in circles or triangles, or other method approved by the Engineer.
13. The Contractor shall direct specific attention in writing or resubmitted shop drawings and samples to revisions other than the corrections requested by the Engineer or previous submissions. Unless such written notice has been given, approval of a resubmitted shop drawing or sample shall not constitute approval of any changes not requested on the prior submission.
14. In the event of written rejection by the Engineer to a particular sample of material, the Contractor shall submit within fourteen (14) days of such rejection, samples of three alternative materials for the Engineer's approval and the Engineer shall reject or approve all or any of these materials within fourteen (14) days of their submission. This procedure shall be repeated until such time as a sample of material is approved by the Engineer. Failure on the part of the Contractor to obtain the Engineer's approval, which shall not be withheld unreasonably, to all or any one sample or material shall in no way relieve the Contractor of his liabilities and obligations under the Contract.
15. The Engineer may at any time call upon the Contractor to submit samples of any material used or to be used in the work, including those specified in the Contract by "Brand Name", for comparison with the specification and/or approved sample. Should any such sample fail to meet the requirements of the specification and/or standard of the accepted sample, then all materials from which the sample has been taken shall be removed from the site immediately and all work executed incorporating such material shall be removed and made good to the satisfaction of the Engineer all at the expense of the Contractor.
16. No acceptance or approval by the Engineer of any shop drawing or sample

submission made by the Contractor, nor any notes, comments, stipulations, requests for clarifications, etc., made by the Engineer upon such submissions during his review and approval thereof, shall constitute an authorization to any variation in the Contract price or to any extra time for completion of the works.

- I. Design Data:
 - 1. Submit for Engineer's knowledge as contract administrator or for Owner.
 - 2. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.
- J. Certificates:
 - 1. When specified in any specification section under "Submittals", submit certification by manufacturer, installation or application sub-contractor, or Contractor to Engineer, in quantities specified for Product Data.
 - 2. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 - 3. Certificates may be recent or previous test results on material or Product, but must be acceptable to the Engineer.
 - 4. Submit certificates in triplicate for review.
- K. Test and Inspection Reports:
 - 1. Submit test and inspection reports called for in each specification section.
 - 2. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.
- L. Manufacturer's Instructions:
 - 1. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Engineer for delivery to Owner in quantities specified for Product Data.
 - 2. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- M. Manufacturer's Field Reports:
 - 1. Submit reports for Engineer's benefit as contract administrator or for Owner.
 - 2. Submit report in duplicate within 14 days of observation to Engineer for information.
 - 3. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.
- N. Miscellaneous Submittals:
 - 1. Refer to each individual specification section and the Contract Documents for additional submittal requirements.
- O. Site Layout Organization Chart:
 - 1. The Contractor shall prepare and submit to the Engineer's Representative for his approval, a site layout organization plan, and any modifications thereafter showing the Contractor's proposed layout of his temporary construction facilities and controls, and his plant and equipment on site.

- P. Progress Reports:
1. Monthly Progress Reports: The Contractor shall submit to the Engineer each month a progress report showing the actual progress of work by identifying activities and works commenced and/or completed during the previous month with progress photographs, activities and works to be carried out during the following month, and the estimated time required to complete all activities and works in relation to the programme of works. Such reports shall be to the satisfaction of the Engineer.
 2. Daily/Weekly Progress Reports: To be provided for the work required, if any, where expressly stated in its related specification section.
- Q. Correspondence: Except where more are required by the contract, all correspondence shall be through the Engineer, and shall be submitted as follows:
1. One original and two photocopies of transmittals and letters including attachments/enclosures.
- R. CAD Produced Drawings:
1. The Contractor shall prepare his shop drawings, progress record drawings, and final as-built drawings using computer aided design and drafting techniques (CAD).
 2. All computer hardware, software and computer room necessary for the preparation of drawings using CAD shall be provided by the Contractor at no additional cost.
 3. Data indicating inappropriate or unacceptable Work may be subject to action by Engineer or Owner.
- S. Photographs of Construction Progress:
1. During the progress of the work, submit in triplicate, colored photographs taken one a month by an approved professional photographer consisting of 20 views, all taken where directed by the Engineer. Prints shall be 130 x 180 mm matt finish, unless otherwise stated in the Conditions of Contract.
 2. At the completion of all work final photographs shall be taken as directed by the Engineer.
 3. Identify each print on back. Identify Name of Project, Contract Number, orientation of view, date and time of view, name and address of photographer, and photographer's numbered identification of exposure.
 4. All negatives or soft copies in case of digital camera shall be delivered to the Employer in their proper order, and shall become the Employer's property. Include typed table of contents of all photographs in chronological sequence.
 5. The Contractor shall submit photographs for all works to be covered before covering such works to the approval of the Engineer.
- T. Penalty for Delays in Submittal of any Document or Schedule: The Engineer may, following written notice to the Contractor, deduct from payments to the Contractor an amount of money as a penalty for each delay in Submittal of any Document or Schedule (minimum 200 US \$ per calendar day per document or per schedule).

1.5 ENGINEER'S REPRESENTATIVE REVIEW OF SUBMITTALS

- A. The Engineer's Representative will process the submission and indicate the appropriate action on the submission and the transmittal, and will note major

deviations from the Engineer's Contract Documents or reasons for resubmit if there are not notes on the material submitted.

END OF SECTION

SECTION 01400

QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Quality control and control of installation.
- B. Tolerances.
- C. References.
- D. Mock-up requirements.
- E. Testing and inspection services.
- F. Manufacturers' field services.
- G. Examination.
- H. Preparation.

1.2 QUALITY CONTROL AND CONTROL OF INSTALLATION

- A. The Contractor shall submit Quality Assurance Program consisting of the Quality Assurance Manual, Project Quality Assurance Plan. Such program shall be subject to the Engineer's approval.
- B. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- C. Comply with manufacturers' instructions, including each step in sequence. When manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify field measurements are as indicated on shop drawings or as instructed by manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.3 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. Adjust products to appropriate dimensions; locate before securing products in place.

1.4 REFERENCES

- A. Whenever specific standards, brands, trades, etc. are mentioned, equivalent equal are acceptable without stating "or equivalent" each time.
- B. For products or workmanship specified by association, trades, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- C. Conform to reference standard by date of issue current on date of Contract Documents, except where a specific date is established by code.
- D. Obtain copies of standards where required by product specification sections.
- E. When specified reference standards conflict with Contract Documents, request clarification from the Engineer before proceeding.
- F. Neither the contractual relationships, duties, responsibilities of the parties in Contract, nor those of the Engineer shall be altered from the Contract Documents by mention or inference otherwise in any reference documents.

1.5 MOCK-UP REQUIREMENTS

- A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals and finishes.
- C. Accepted mock-ups shall be comparison standard for the remaining Work.
- D. Where mock-up has been accepted by Engineer and is specified in productspecification sections to be removed; remove mock-up and clear area when directedto do so by Engineer.
- E. Submit drawings showing location and details of Mockup plus a description report of Mockup.
- F. Submit test certificates for tests to be undertaken.
- G. Testing operations may include, but not limited to, weather tests, seismic, water, air, wind resistance, permeability and load safety.
- H. Submit test reports for Visual and Tests of Mockups: Indicate substantiating engineering data, test results of previous tests by independent laboratory which purport to meet performance criteria and other supportive data.

1.6 TESTING AND INSPECTION SERVICES

- A. Scope:
 - 1. This section covers testing services including selection and payment, contractor submittals, agency responsibilities, agency reports, limits on testing authority, Contractor responsibilities and schedule of tests.
 - 2. Employment and payment for services of an independent testing agency or laboratory to perform specified testing shall be borne by the Contractor.
 - 3. Employment of testing agency or laboratory in no way relieves Contractor's obligation to perform Work to the requirements of the Contract Documents.
- B. Performance and Standards:
 - 1. ASTM C802: Practice for Conducting an Inter-laboratory Test Program to Determine the Precision of Test Methods for Construction.
 - 2. ASTM C1021: Practice for Laboratories Engaged in the Testing of Building Sealants.
 - 3. ASTM C1077: Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
 - 4. ASTM C1093: Practice for Accreditation of Testing Agencies for Unit Masonry.
 - 5. ASTM E329: Practice for Use in the Evaluation of Inspection and Testing Agencies as Used in Construction.
 - 6. ASTM E543: Practice for Determining the Qualification of Nondestructive Testing Agencies.
 - 7. ASTM E548: Practice for Preparation of Criteria for Use in the Evaluation of Testing Laboratories and Inspection Bodies.
 - 8. ASTM E699: Practice for Criteria for Evaluation of Agencies Involved in Testing, and Evaluating Building Components in Accordance with Test Methods Promulgated by ASTM Committee E6.
 - 9. ASTM E779: Standard Test Method for Determining Air Leakage Rate by Fan Pressurization.
- C. Submittals:
 - 1. Prior to start of Work, submit testing laboratory name, address, and telephone number and names of full time specialist and responsible officer to the Engineer for approval.
 - 2. Submit copy of report of laboratory facilities inspection made, with memorandum of remedies of any deficiencies reported by the inspection.
- D. The independent firm will perform tests, inspections and other services specified in individual specification sections and as required by the Engineer.
 - 1. Laboratory: Authorized to operate at Project location.
 - 2. Laboratory Staff: Maintain full time registered Engineer or specialist on staff to review services.
 - 3. Testing Equipment: Calibrated at reasonable intervals with devices of accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.
- E. Testing, inspections and source quality control may occur on or off project site. Perform off-site testing as required by the Engineer or Owner.
- F. Reports will be submitted by independent firm to the Engineer and Contractor, in

duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.

- G. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
 - 1. Notify the Engineer and the independent firm 24 hours prior to expected time for operations requiring services.
 - 2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.
- H. Testing and employment of testing agency or laboratory shall not relieve the Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- I. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by same independent firm on instructions by the Engineer. Payment for re-testing or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.
- J. Agency Responsibilities:
 - 1. Test samples of mixes submitted by Contractor.
 - 2. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
 - 3. Perform specified sampling and testing of Products in accordance with specified standards.
 - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 5. Promptly notify Engineer and Contractor of observed irregularities or nonconformance of Work or Products.
 - 6. Perform additional tests required by Engineer.
 - 7. Attend preconstruction meetings and progress meetings.
- K. Agency Reports:
 - 1. After each test, promptly submit four copies of report to Engineer and to Contractor.
 - 2. Include the following:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.
 - e. Identification of product and specifications section.
 - f. Location in Project.
 - g. Type of inspection or test.
 - h. Date of test.
 - i. Results of tests.
 - j. Conformance with Contract Documents.
 - 3. When requested by Engineer, provide interpretation of test results.
- L. Limits on Testing Authority:
 - 1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

2. Agency or laboratory may not approve or accept any portion of the Work.
 3. Agency or laboratory may not assume duties of Contractor.
 4. Agency or laboratory has no authority to stop the Work.
- M. Contractor's Responsibilities:
1. Deliver to agency or laboratory at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.
 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturer's facilities.
 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested.
 - b. To obtain and handle samples at the site or at source of Products to be tested.
 - c. To facilitate tests.
 - d. To provide storage and curing of test samples.
 4. Notify Engineer and laboratory 36 hours prior to expected time for operations requiring testing services.
- N. Schedule of Tests:
1. Individual Specification Section: Tests required and standards for testing.

1.7 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test and adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications with CV of observer to the Engineer, thirty (30) days in advance of required observations. The Observer shall be subject to the approval of the Engineer.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning any new Work, means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Verify that utility services are available, of correct characteristics and in the correct locations.

3.2 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.1 SCOPE

- A. Section includes provision, maintenance during Contract implementation and removal at the end of the entire project of the following:
 - 1. Temporary Utilities: Electricity, lighting for construction purposes, site lighting, heating, cooling, ventilation, telephone service, facsimile service, water service, and sanitary facilities.
 - 2. Temporary Controls: Barriers, enclosures, fences and gates, security, traffic safety and regulation, water control, dust control, erosion and sediment control, noise control, pest control, pollution control, rodent control, and first aid facilities.
 - 3. Construction Facilities: Parking, progress cleaning and waste removal, project identification, field offices and sheds, vehicular access, plant and small tools, and scaffolding and hoisting.

1.2 PERFORMANCE AND STANDARDS

- A. The Contractor shall abide fully by the provisions and requirements of all regulations imposed by relevant authorities having jurisdiction, which include, but not limited to, all requirements, site administration and regulations, safety, health and environmental regulations, and regulation and planning of the project location with its sectors.
- B. The Contractor shall take all precautions necessary to protect persons and property on or off site from injury or damage resulting from work under this Contract.
- C. Failure to comply with any of the regulations or requirements shall be considered a breach of Contract by the Contractor and may result in termination of the Contract by the Employer. Nevertheless, should the Contractor fail to comply with such:
 - 1. The Engineer may suspend the Works or part of the Works until the Contractor has taken necessary steps, to the satisfaction of the Engineer, to comply with the regulations or requirements.
 - 2. The Engineer may suspend any interim payment certificate until such time as the Contractor has rectified the breach or breaches to the satisfaction of the Engineer. No interest shall be paid on the suspended payments.
 - 3. The Employer may, following written notice to the Contractor, carry out himself or arrange for another contractor to carry out such measures as he considers appropriate on behalf of the Contractor. Any such actions by the Employer shall not affect or diminish the Contractor's obligations or responsibilities under the Contract.
 - 4. The Engineer may, following written notice to the Contractor, deduct from payments to the Contractor an amount of money as a penalty for each breach of any regulation or requirement. Such notice shall specify the nature of the failure or failures, and the period after the date of the notice within which the Contractor shall remedy each failure.
- D. In the event of the Employer or Engineer taking action based on the above, the

Contractor shall not be entitled to any additional costs or extension to the Contract Completion Date.

- E. All costs incurred by the Employer pursuant to the above, and the deductions from payments imposed on the Contractor by the Engineer shall be deducted from amounts otherwise due to the Contractor.

1.3 RELATED ITEMS

- A. General Requirements: Contractor's use of site, administrative requirements for field engineering, and execution requirements for cleaning.

1.4 STANDARDS AND REGULATIONS

- A. In addition to what is stated in this specification section, all temporary utilities, temporary controls and construction facilities shall comply with relevant authorities' standards and regulations for "Site Administration and Rules", "Safety, Health and Environmental Regulations", and all other local authorities' standards and regulations.
- B. Moreover, the Contractor is responsible to perform all the necessary process, regarding all temporary services, with all relevant authorities, and shall pay all installation and maintenance fees.

1.5 ELECTRICITY

- A. Provide, maintain and pay for power service required for the works from time of project mobilization until handing over.
- B. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required.
- C. Provide main service disconnect and over-current protection at convenient location.
- D. Permanent convenience receptacles may not be utilized during construction.
- E. Provide adequate distribution equipment, wiring and outlets to provide single phase branch circuits for power and lighting.
 - 1. Provide 20 ampere duplex outlets, single phase circuits for power tools for each active work area.
 - 2. Provide 20 ampere, single phase branch circuits for lighting.

1.6 LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain incandescent lighting for construction operations to achieve acceptable lighting level.
- B. Provide and maintain lighting to exterior staging and storage areas after dark for security purposes.
- C. Provide and maintain lighting to interior work areas after dark for security purposes.

- D. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails and lamps as required.
- E. Maintain lighting and provide routine repairs.
- F. Permanent lighting shall not be utilized during construction.

1.7 SITE LIGHTING

- A. The Contractor shall install temporary site lighting including but not restricted to perimeter fence, name boards, parking areas and for site safety to the satisfaction of the Engineer and the approval of Statutory Authorities.

1.8 HEATING

- A. Existing facilities, if any, shall not be used, unless otherwise directed by the Engineer.
- B. Provide and pay for heating devices and heat as needed to maintain specified conditions for construction operations.
- C. Prior to operation of permanent equipment for temporary heating purposes, verify installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.
- D. Unless otherwise directed by the Engineer or indicated in "Product" part in each individual specification sections, maintain minimum ambient temperature of 10°C in areas where construction is in progress.

1.9 COOLING

- A. Existing facilities, if any, shall not be used, unless otherwise directed by the Engineer.
- B. Provide and pay for cooling devices and cooling as needed to maintain specified conditions for construction operations.
- C. Prior to operation of permanent equipment for temporary cooling purposes, verify installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

1.10 VENTILATION

- A. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.11 TELEPHONE SERVICE

- A. Provide, maintain and pay for telephone service to field office and Engineer's field office from time of project mobilization until completion of the works.

1.12 FACSIMILE SERVICE

- A. Provide, maintain and pay for facsimile service and dedicated telephone line to field office and Engineer's field office from time of project mobilization until completion of the works.

1.13 WATER SERVICE

- A. Provide, maintain and pay for suitable quality water service required for construction operations and all purposes from time of project mobilization until completion of the works.
- B. Extend branch piping with outlets located so water is available by hoses with threaded connections.
- C. Make available clean and hygiene potable water for the use of personnel on site.
- D. Test to BS 3148 when instructed.

1.14 SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide from time of project mobilization until completion of the works.
- B. Sanitary facilities include temporary well aerated toilets, wash facilities and drinkingwaterfixtures. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities.
 - 1. Provide toilet tissue, paper towels, paper cups and similar disposable materials for each facility.
 - 2. Provide covered waste containers for used material.
 - 3. Use of the Owner's toilet facilities will not be permitted.
 - 4. Install self-contained toilet units. Shield toilets to ensure privacy Use of pittype privies will not be permitted.
 - 5. Provide separate facilities for male and female personnel.
 - 6. Provide proper sanitation by connecting to the main sewage system.

1.15 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and to protect facilities and adjacent properties from damage from construction operations.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to any existing adjacent property.
- C. Protect non-owned vehicular traffic, stored materials, site and structures from damage.
- D. Provide protection for plants designated to remain. Replace damaged plants.

1.16 ENCLOSURES

- A. Exterior Enclosures:
 - 1. Provide temporary scaffolding with approved screens to safeguard the public from dust and fallout as per Engineer Requirement.
 - 2. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.
 - 3. Provide temporary roofing to the satisfaction of the Engineer.
- B. Interior Enclosures:
 - 1. Provide temporary partitions and ceilings as directed and to the satisfaction of the Engineer, to separate work areas from Owner occupied areas, to prevent penetration of dust and moisture into Owner occupied areas, and to prevent damage to finished and completed work.
 - 2. Construction: Framing and reinforced polyethylene, plywood or gypsum board sheet materials with closed joints and sealed edges at intersections with existing surfaces:
 - a. Insulated to RSI Standards.
 - b. STC rating of 35 in accordance with ASTM E90.
 - c. Maximum flame spread rating of 25 in accordance with ASTM E84.
 - 3. Paint surfaces exposed to view from Owner occupied areas.

1.17 FENCES AND GATES

- A. Maintain the site from unauthorized entrant by maintaining all necessary temporary fences and gates around and within the site provided by the Employer.
- B. Maintain fencing, gates and other temporary items as long as required for safe and proper completion of work, promptly repair or replace in the event of loss or damage.
- C. Maintain electrical fixtures including wires, boxes, lamps and switches as directed by the Engineer.
- D. All materials shall be of adequate strength and suitable for use intended and shall be non-staining and non-corrosive.
- E. Upon completion of the works, remove fences and gates to areas indicated by the Employer and make good the area to the satisfaction of the Engineer.

1.18 SECURITY

- A. Security Program:
 - 1. Protect Work, existing premises and Owner's operations from theft, vandalism and unauthorized entry.
 - 2. Initiate program at project mobilization.
 - 3. Maintain program throughout construction period until Owner occupancy or when directed by the Engineer.

- B. Entry Control:
 - 1. Restrict entrance of persons and vehicles into Project site and facilities.
 - 2. Allow entrance only to authorized persons with proper identification.
 - 3. Maintain log of workers and visitors, make available to Owner on request.
 - 4. Control entrance of persons and vehicles related to Owner's operations.
- C. Personnel Identification:
 - 1. Provide identification badge to each person authorized to enter premises.
 - 2. Badge to Include: Personal photograph, name and assigned number, Contractor name, and Sub-Contractor name (if any).
 - 3. Maintain list of accredited persons, submit copy to Owner on request.
 - 4. Require return of badges at expiration of their employment on the Work.
- D. Security Service: Employ uniformed guard service to provide watchpersons at site twenty four hours a day, seven days a week.
- E. Restrictions: Do not allow cameras on site or photographs taken except by written approval of Owner.

1.19 TRAFFIC SAFETY AND REGULATION

- A. General:
 - 1. The Contractor shall provide, erect and maintain such traffic signs, traffic control signals and such other measures as may be required by the Construction of the Works to the satisfaction of the Engineer.
 - 2. The Contractor shall not commence any work which affects public roads until all the traffic safety measures necessitated by the work are fully operational.
 - 3. The Contractor shall keep clean and legible at all times all traffic signs, lamps, barriers and traffic control signals and he shall position, cover or remove them as required by the progress of the Works.
- B. Signs, Signals and Devices:
 - 1. Post Mounted and Wall Mounted Traffic Control and Informational Signs: As approved by authority having jurisdiction.
 - 2. Traffic Control Signals: As approved by local jurisdictions.
 - 3. Traffic Cones and Drums, Flares and Lights: As approved by authority having jurisdiction.
 - 4. Flag Person Equipment: As required by authority having jurisdiction.
- C. Traffic Signs and Signals:
 - 1. Provide signs at approaches to site, on site, at crossroads, detours, parking areas and elsewhere as needed to direct construction and affected public traffic.
 - 2. Provide, operate and maintain traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control and areas affected by Contractor's operations.
 - 3. Relocate as Work progresses, to maintain effective traffic control.
- D. Flag Persons: Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

- E. Flares and Lights: Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.
- F. Haul Routes:
 - 1. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.
 - 2. Confine construction traffic to designated haul routes.
 - 3. Provide traffic control at critical areas of haul routes to regulate traffic and to minimize interference with public traffic.
- G. Mud:
 - 1. The wheels of all vehicles shall be well washed before being allowed to leave the Site; lay-down area or any other area which the Contractor is utilizing for the purposes of this Contract.
 - 2. Any mud, which is deposited outside the site boundary, is to be removed immediately, and the whole area shall be thoroughly cleaned.
- H. Removal:
 - 1. Remove equipment and devices at Substantial Completion or when directed by the Engineer.
 - 2. Remove post settings to depth of 600 mm.
 - 3. Repair damage caused by installation.

1.20 WATER CONTROL

- A. Grade site to drain. Maintain excavations free of water. Provide, operate and maintain pumping equipment.
- B. Protect site from puddling or running water.

1.21 DUST CONTROL

- A. Execute Work by methods to minimize raising dust from construction operations.
- B. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

1.22 EROSION AND SEDIMENT CONTROL

- A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
- B. Minimize surface area of bare soil exposed at one time.
- C. Provide temporary measures including berms, dikes and drains, and other devices to prevent water flow.
- D. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
- E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

1.23 NOISE CONTROL

- A. Provide methods, means and facilities to minimize noise produced by construction operations.

1.24 PEST CONTROL

- A. Provide methods, means and facilities to prevent pests and insects from damaging the Work and entering facility.

1.25 POLLUTION CONTROL

- A. Provide methods, means and facilities to prevent contamination of soil, water and atmosphere from discharge of noxious, toxic substances and pollutants produced by construction operations.
- B. Comply with pollution and environmental control requirements of authorities having jurisdiction.

1.26 RODENT CONTROL

- A. Provide methods, means and facilities to prevent rodents from accessing or invading premises.

1.27 FIRST AID FACILITIES

- A. The Contractor shall provide and maintain on site first aid facilities throughout the Contract period to the approval of the Engineer.

1.28 PARKING

- A. Construct temporary paved surface covered parking areas to accommodate Employer, Engineer and Supervision Consultant personnel. Do not use these designated areas of parking facilities used by Employer, Engineer and Supervision Consultant personnel.
- B. Locate as indicated on Drawings or as approved by the Engineer.
- C. When site space is not adequate, provide additional off-site parking.
- D. Use of designated existing on-site streets and driveways used for construction traffic is not permitted. Tracked vehicles not allowed on paved areas.
- E. Do not allow heavy vehicles or construction equipment in parking areas.
- F. Do not allow vehicle parking on existing pavement.
- G. Permanent Pavements and Parking Facilities:
 - 1. Prior to Substantial Completion, bases for permanent roads and parking areas may be used for construction traffic.
 - 2. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.

3. Use of permanent parking structures is not permitted.
- H. Maintenance:
1. Maintain traffic and parking areas in sound condition free of excavated material, construction equipment, products, mud, etc.
 2. Maintain paved areas used for construction; promptly repair breaks, potholes, low areas, standing water and other deficiencies, to maintain paving and drainage in original or specified condition.
- I. Removal and Repair:
1. Remove temporary materials and construction at Substantial Completion.
 2. Remove underground work and compacted materials to depth of 600 mm; fill and grade site as specified.
 3. Repair existing and permanent facilities damaged by use, to original and specified condition respectively.

1.29 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris and rubbish; periodically collect, remove and dispose them off-site. Maintain site in clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces and other closed or remote spaces, prior to enclosing spaces.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.30 PROJECT IDENTIFICATION

- A. Project Identification Sign:
1. Painted sign of construction, design and location as shown on the Drawings or as directed by the Engineer.
 2. Unless otherwise indicated on drawings or directed by the Engineer, the content of the Project Identification Sign shall include the following:
 - a. Project number and title, logo and name of Owner as indicated on Contract Documents.
 - b. Names and titles of authorities.
 - c. Names and titles of Engineer and Supervision Consultants.
 - d. Name of Prime Contractor and major Sub-Contractors.
- B. Project Informational Signs: Of same colors and lettering as Project Identification Sign, or standard products; size lettering for legibility at 30 m distance.
1. Provide sign at each field office, storage shed and directional signs to direct traffic into and within site. Relocate as Work progress requires.
 2. Provide local relevant authorities' directional traffic signs to and within site.
 3. No other signs are allowed without Owner permission, except those required by law.

- C. Design sign and structure to withstand 160 km/hr wind velocity.
- D. Sign Painter: Experienced as professional sign painter for minimum five years.
- E. Finishes and Painting: Adequate to withstand weathering, fading and chipping for duration of construction.
- F. Submit for Engineer's approval, shop drawings showing content, layout, lettering, color, foundation, structure and all sizes and dimensions.
- G. Sign Materials: Unless otherwise indicated on drawings, or directed by the Engineer:
 - 1. Structure and Framing: Wood or metal, structurally adequate.
 - 2. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum 19 mm thick, standard large sizes to minimize joints.
 - 3. Rough Hardware: Galvanized.
 - 4. Paint and Primers: Exterior quality, two coats; sign background of color as selected by the Engineer.
 - 5. Lettering: Exterior quality paint, colors as selected by the Engineer.
- H. Installation:
 - 1. Install project identification sign at designated location within 15 days after Contract implementation commencement date.
 - 2. Erect supports and framing on secure foundation, rigidly braced and framed To resist wind loadings.
 - 3. Install sign surface plumb and level, with butt joints. Anchor securely.
 - 4. Paint exposed surfaces of sign, supports and framing.
- I. Maintenance: Maintain signs and supports clean, repair deterioration and damage.
- J. Removal: Remove signs, framing, supports and foundations at completion of Project and restore area.

1.31 FIELD OFFICES AND SHEDS

- A. Scope:
 - 1. This section specifies the temporary field offices and sheds, services and facilities required in the construction, completion and maintenance of works.
 - 2. Any proposed change in location or relocation of offices must be preceded by submission for Engineer's approval of a drawing, indicating such change.
- B. Offices: Weather tight, with lighting, electrical outlets, heating, cooling and ventilating equipment, and equipped with sturdy furniture, drawing rack and drawing display table.
- C. Provide separate private offices with security fencing around the perimeter, similarly equipped and furnished, for use of the Engineer.
- D. Offices shall include the main structure, sheltered car park, temporary water tanks and temporary sewage collection and treatment systems.
- E. Locate offices and sheds at minimum required distance from structures.

- F. Prepare and submit for Engineer's approval an architectural layout plan of site offices.
- G. Do not use permanent or existing facilities for field offices or for storage unless otherwise agreed with Owner.
- H. Construction: Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations with steps and landings at entrance doors.
1. Construction: Structurally sound, secure and weathertight enclosures. Maintain during progress of Work; remove at completion of Work.
 2. Temperature Transmission Resistance of Floors, Walls and Ceilings: Compatible with occupancy and storage requirements.
 3. Exterior Materials: Weather resistant; color as selected by the Engineer.
 4. Interior Materials in Offices: Sheet type materials for walls and ceilings, prefinished or painted; resilient floors and bases.
 5. Lighting for Offices: 538 lx at desktop height, exterior lighting at each entrance door.
 6. Fire Extinguishers: Appropriate type fire extinguisher at each office and each storage area.
 7. Interior Materials in Storage Sheds: As required to provide specified conditions for storage of products.
- I. Environmental Control:
1. Heating, Cooling and Ventilating for Offices: Heat pump split unit systems to maintain 20°C heating and 23°C cooling.
 2. Storage Spaces: Heating and ventilation as needed to maintain products in accordance with Contract Documents; and lighting for maintenance and inspection of products.
- J. Contractor's Site Office Schedule:
1. The site area is limited. The Contractor shall make arrangement to provide and maintain throughout the period of construction in a convenient location approved by the Engineer, adequate heated and air conditioned office accommodation for the Contractor's use and the use of his Sub-Contractors. Such accommodation shall include proper messing and sanitary facilities and shall be provided with suitable fire fighting facilities and adequate means of escape in case of fire, all to the approval of the Engineer.
 2. The Contractor shall not allow any of his employees or those of his Sub-Contractors to maintain any temporary or permanent living quarters within the construction site.
- K. Engineer's and Employer's Site Offices Accommodation and Equipment Schedule: The Contractor shall erect, equip, furnish, maintain, service and ensure for the entire construction period until at least the issue of the Taking Over Certificate, or such time as the Engineer may direct, the Engineer's and Employer Site Offices with the following characteristics, tools, instruments, fire means, equipment and furniture, all to the satisfaction of the Engineer:
1. Site Offices:
 - a. 1 general reception and secretary's room, approximate size [3 x 3m].
 - b. 1 conference room, approximate size [3 x 6m].
 - c. 2 office rooms, approximate size [3 x 4m] each.
 - d. 1 store room, approximate size [3 x 3m].

- e. 1 kitchen and pantry, approximate size [3 x 3m].
 - f. 2 toilets and lavatories, approximate size [1.5 x 1.5m] each.
2. Site Offices Furniture and Equipment:
- a. General Reception and Secretary's Room:
 - 1) 1 secretary's desk and swivel chair.
 - 2) 2 large lockable sheet filing cabinets.
 - 3) 1 reference table.
 - 4) 6 office chairs.
 - 5) 2 armchairs with 1 circular table in between.
 - 6) 6 calculators.
 - 7) 2 pin boards.
 - 8) 2 shelves.
 - 9) 2 waste baskets.
 - 10) 1 digital camera, Canon or similar, minimum 10 mega pixels, with 1 GB memory stick and USB cable.
 - 11) 1 plain paper modern fax machine including all consumables throughout the Contract duration.
 - 12) 1 computer (as defined hereinafter).
 - 13) 1 HP Laser Jet printer with A4 papers.
 - 14) 1 colored photocopying machine with built-in scanner, size A3 & A4 similar to Xerox Work Center 7132, including all consumables and photocopying papers throughout the Contract duration.
 - b. Conference Room:
 - 1) 1 conference table for 10 people.
 - 2) 10 chairs.
 - 3) 2 pin boards.
 - 4) 2 shelves.
 - 5) 2 waste baskets.
 - 6) 1 reference table.
 - 7) 1 projector with projection screen.
 - c. Office Rooms: Each office room shall comprise:
 - 1) 2 desks with lockable drawers and swivel chairs.
 - 2) 2 lockable steel filing cabinets.
 - 3) 4 office chairs.
 - 4) 1 drawing hanger for 10 sets.
 - 5) 2 shelves.
 - 6) 2 pin boards.
 - 7) 2 waste paper baskets.
 - 8) 1 reference table.
 - 9) 1 computer (as defined hereinafter).
 - d. Store Room:
 - 1) Shelving units.
 - 2) Drawing hangers and racks.
 - 3) 1 reference table.
 - e. Kitchen and Pantry:
 - 1) 1 table for 6 people.
 - 2) 6 polypropylene chairs.
 - 3) 1 refrigerator 14 cu. ft. capacity.
 - 4) 1 coffee machine.
 - 5) 1 water filter and 20 liters water cooler/hot/cold.

- 6) 2 electric boiling rings.
- 7) 1 microwave.
- 8) 1 stainless steel sink and drainer.
- 9) 1 heat resistant worktop.
- 10) 1 set of storage cupboards.
- 11) 1 set of crockery and cutlery for each member of the staff.
- 12) 1 large wastebasket with cover.
- 13) All necessary consumables throughout the Contract duration.
- f. Toilets and Lavatories: Each toilet and lavatory shall comprise:
 - 1) 1 w.c. suite.
 - 2) 1 hose bib.
 - 3) 1 toilet roll holder.
 - 4) 1 wash hand basin.
 - 5) 1 mirror with shelf.
 - 6) 1 soap dispenser.
 - 7) 1 automatic electric hand dryer or 1 paper towel holder.
 - 8) 1 wastebasket with cover.
 - 9) All necessary consumables throughout the Contract duration.
3. Site Offices Services: The Contractor shall provide and maintain throughout the whole Contract duration, the following minimum services:
 - a. Heating and air-conditioning.
 - b. Electric power supply and lighting installations.
 - c. Water supply.
 - d. Drainage system.
 - e. Fire fighting and fire alarm systems.
 - f. Cleaning facilities and general attendance with necessary personnel.
 - g. Telephone Service: Four telephone lines (two mobile cellular lines with devices, and two fixed telephone lines linked by a PBX with telephone answering machine and 20 internal extensions) including cost of installation, maintenance and all rental and local call charges.
 - h. Facsimile Service: One fixed telephone line shall be dedicated to facsimile machine and shall include direct dialing facility.
 - i. Computer System:
 - 1) 1 NT server, latest version, with three linked computers, each equipped with the latest Processor Intel, minimum 3.2 GHz, 2.0 GB of Ram, and 150 GB hard disk capacity; video local bus; 256 MB VGA; 56x CD drive (Read/Write); 16x DVD drive (Read/Write); internet and e-mail service modem; English-Arabic keyboard; SVGA Flat, non-interlaced, low power, low radiation 19 inch rotating colored monitor; necessary ports; optical mouse; and antistatic dust covers.
 - 2) One latest laptop.
 - 3) Software: License for latest version of the following:
 - a) Windows XP and Microsoft Office XP.
 - b) AutoCAD.
 - c) Primavera.
 - d) Adobe Acrobat Reader/Writer Professional.
 - 4) Internet Connection: Minimum speed 512k.
 - 5) Uninterruptible power supply (UPS) for all above equipment with minimum one-hour backup batteries.
 - 6) Computer table and chair;

- 7) All required and necessary cabling.
 - 8) All consumables with all stationery and offices supplies throughout the Contract duration.
 - 9) Maintenance for all equipment throughout Contract duration.
- j. At the end of the project, all the above equipment shall remain the property of the Contractor.
- L. Storage Areas and Sheds: The Contractor shall provide on site weatherproof sheds and storage facilities for the materials intended for the Works. The Contractor shall maintain and remove the same on completion of the Works.
 - 1. Size to storage requirements for products of individual specification sections, allowing for access, and orderly provision for maintenance and for inspection of products.
- M. Preparation:
 - 1. Fill and grade sites for temporary structures, facilities and controls.
 - 2. Slope for drainage away from site offices.
- N. Installation:
 - 1. Install office spaces ready for occupancy 15 days after Contract implementation commencement date.
 - 2. Parking: Six hard surfaced covered parking spaces for use by Engineer, connected to office by hard surfaced walk.
 - 3. Employee Residential Occupancy: Not allowed on Owner's property.
- O. Maintenance, Cleaning and Attendance upon Offices Accommodation:
 - 1. Provide daily cleaning and maintenance for offices and storage areas.
 - 2. Provide full time attendance of the Engineer's site office accommodation including one cleaner, one tea boy and one messenger. All to attend upon the requirements of the staff. The cost of cleaning materials and consumable such as, paper towels, paper tissues, toilet rolls, cookery and cutlery, tea, coffee, sugar, etc. shall be paid for by the Contractor. The services of the tea boy and messenger, the provision of consumables and cleaning materials and the maintenance of the site office shall be extended to cover the construction duration until completion. Consumables shall be supplied and delivered to the site at regular intervals as directed by the Engineer.
 - 3. Maintain approach walks free of mud, dust, water, etc.

1.32 VEHICLES

- A. Not Applicable.

1.33 VEHICULAR ACCESS

- A. Construct temporary access roads from public thoroughfares to serve construction area, of width and load bearing capacity to accommodate unimpeded traffic for construction purposes.
- B. Construct temporary ditches and culverts to allow unimpeded drainage.
- C. Extend and relocate vehicular access as Work progress requires, provide detours as

necessary for unimpeded traffic flow.

- D. Locate as indicated on Drawings, or where directed by the Engineer.
- E. Provide unimpeded access for emergency vehicles. Maintain 6 m wide driveways with turning space between and around combustible materials.
- F. Provide and maintain access to fire hydrants and control valves free of obstructions.
- G. Unless otherwise directed by the Engineer, do not use existing on-site roads for construction traffic.

1.34 PLANT AND SMALL TOOLS

- A. The Contractor shall provide all constructional plant and small tools necessary for the proper execution of the Works.

1.35 SCAFFOLDING AND HOISTING

- A. The Contractor shall provide, erect and maintain proper and adequate scaffolding, staging, stairs, ladders, chutes, materials hoist, special rigging and the like required for the Work and shall comply with all requests, safety instructions, etc., issued by the Engineer relating thereto. The Contractor shall provide all necessary guards, signals, safety devices and the like required for safety of operations including suitable runways from the hoists to each level and roof.
- B. The Contractor shall also provide, erect and maintain personnel hoist adequate to transport all personnel of Employer, Engineer/Supervision Consultant and Contractor.
- C. Material hoists shall not be used for transporting personnel and only skilled personnel shall be used for the operation and maintenance of hoists. The construction, maintenance and operation of hoists shall conform to the applicable requirements of the applicable Codes in force. Use of permanent lifts equipment (if any) for transporting materials or personnel will not be allowed except with prior written permission of the Engineer.
- D. Location and means of operation of hoist shall be subject to the Engineer's approval and shall in no way hinder the progress of the work and shall not relieve the Contractor from his duties and obligations under the Contract.
- E. Scaffolding shall be of tubular steel construction and designed in accordance with the requirements of BS 5973 and BS 5974.
- F. Hoists, chute, scaffolding and the like shall be so constructed as to prevent damage, staining or marring of the Permanent Work. No materials, rubbish or debris shall be permitted to drop free, but shall be removed by use of hoists or fully enclosed rubbish chutes.
- G. Provide suitable safety railings for stairs, ladders, ramps, etc.
- H. On completion of the Work, clear away and remove all scaffolding and hoisting.

1.36 REMOVAL OF UTILITIES, FACILITIES AND CONTROLS

- A. At the end of the entire project, remove temporary utilities, materials, equipment, facilities and controls.
 - 1. Remove offices with foundations, utility services and debris.
 - 2. Remove underground installations to minimum depth of 600 mm, unless otherwise indicated on Drawings.
 - 3. Restore areas and make good all disturbed surfaces.
 - 4. Restore existing facilities used during construction to original condition.
Restore permanent facilities used during construction to specified condition.
 - 5. Clean and repair damage caused by installation or use of temporary work.

END OF SECTION

SECTION 01600

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SCOPE

- A. This section specifies the General Requirements for:
 - 1. Products.
 - 2. Product delivery requirements.
 - 3. Product storage and handling requirements.
 - 4. Product options.
 - 5. Product substitution procedures.
 - 6. Protection.
 - 7. Equipment electrical characteristics and components.
- B. The requirements of this section are augmented by specific clauses specifying quality throughout all sections of the Specification.

1.2 PERFORMANCE AND STANDARDS

- A. Neither asbestos containing materials (ACM) nor chromate copper arsenate (CCA) treated timber shall be used in the project.
- B. All products shall perform as specified and the handling, transportation and storage thereof shall be as specified and such that the ultimate performance of the products shall in no way be impaired.
- C. The quality of products and reference to Standards and Codes of Practice is covered in the "Administrative Requirements" Section.
- D. Where, in the course of the Project, materials, products, assemblies, equipment or techniques, are required which are not named, definitively described or implied in the Specification, they shall nonetheless conform to all relevant both as regards Materials and Workmanship and quality, suitability and performance which are not less than implicit in this Specification to the satisfaction of the Engineer.
- E. The Contractor shall at all time use his best endeavors to produce materials and work of a consistent and high quality and standard, whether or not such standard is identifiable in the Specification.
- F. The Contractor shall abide by the Engineer's interpretation of the Specification and shall comply with his decisions regarding the quality of Materials and Workmanship.

1.3 RELATED ITEMS

- A. General Requirements: Administrative regulatory requirements, submittal procedures, and execution requirements for warranties and bonds.

1.4 SUBMITTALS

- A. General Requirements: Submittal procedures.

1.5 PRODUCTS

- A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
- C. Furnish interchangeable components from same manufacturer for components being replaced.

1.6 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.7 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- A. Store and protect products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- D. For exterior storage of fabricated products, place on sloped supports above ground.
- E. Provide off-site storage and protection when site does not permit on-site storage or protection.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.8 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards, equivalent standards, or description.
- B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit request for substitution for any manufacturer not named in accordance with the following article.

1.9 PRODUCT SUBSTITUTION PROCEDURES

- A. The Engineer will consider requests for Substitutions only within 30 days after Contract implementation commencement date.
- B. Substitutions may be considered when a product becomes unavailable through no fault of Contractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A request constitutes a representation that Contractor:
 - 1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
 - 2. Will provide same warranty for Substitution as for specified product.
 - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 - 5. Will reimburse Owner and Engineer for review or redesign services associated with re-approval by authorities having jurisdiction.
- E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to Contract Documents.
- F. Substitution Submittal Procedure:
 - 1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
 - 2. Submit Shop Drawings, Product Data, and certified test results attesting to proposed product equivalence. Burden of proof is on proposer.
 - 3. Engineer will notify Contractor in writing of decision to accept or reject request.

1.10 PROTECTION

- A. The Contractor shall provide and maintain until practical completion all necessary protection to be installed to the work and equipment to prevent damage or deterioration.

PART 2 PRODUCTS

2.1 EQUIPMENT ELECTRICAL CHARACTERISTICS AND COMPONENTS

- A. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Include lugs for terminal box.
- B. Cord and Plug: Furnish minimum 2 m cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

END OF SECTION

SECTION 01700

EXECUTION REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Closeout procedures.
- B. Cleaning.
- C. Starting of systems.
- D. Demonstration and instructions.
- E. Testing, adjusting and balancing.
- F. Protecting installed construction.
- G. Project record documents.
- H. Operation and maintenance data.
- I. Manual for materials and finishes.
- J. Manual for equipment and systems.
- K. Instruction of Employer personnel.
- L. Spare parts and maintenance products.
- M. Product warranties and product bonds.
- N. Maintenance service.
- O. Protection and making good.

1.2 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's review.
- B. Provide submittals to the Engineer required by authorities having jurisdiction.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments and sum remaining due.
- D. Owner will occupy all or portions of the completed works as directed.

1.3 CLEANING

- A. General:
 - 1. Execute cleaning during progress of the work and at completion of the work.
 - 2. If the Contractor fails to clean up during or at completion of work, the Employer may do so, and the cost thereof shall be charged to the Contractor.
 - 3. Conduct cleaning and disposal operations to comply with codes, ordinances, and anti-pollution laws.
 - 4. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.
 - 5. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.

- B. Cleaning during Construction:
 - 1. Execute periodic cleaning to keep the work, the site and adjacent properties free from accumulations of waste material, rubbish and windblown debris, resulting from construction operations.
 - 2. Provide on-site containers for the collection of waste materials, debris, etc.
 - 3. Remove waste materials, debris and rubbish from the site periodically and dispose off at legal disposal areas away from the site.
- C. Dust Control:
 - 1. Clean interior spaces to the start of finish painting and continue cleaning on and as-needed basis until painting is finished.
 - 2. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.
- D. Final Cleaning:
 - 1. Employ skilled workmen or specialized firm for final cleaning.
 - 2. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels and other foreign materials from sight-exposed interior and exterior surfaces.
 - 3. Clean interior and exterior glass, and surfaces exposed to view; remove temporary labels, stains and foreign substances, wash and shine glazing, and polish transparent and glossy surfaces.
 - 4. Wax and polish finish floors.
 - 5. Clean all hardware with cleaning materials appropriate to surface and material being cleaned.
 - 6. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.
 - 7. Ventilating System: Replace filters of operating equipment; clean ducts, blowers and coils if units were operated without filters during construction.
 - 8. Clean debris from roofs, gutters, downspouts, and drainage systems.
 - 9. Clean site; sweep paved areas, rake clean landscaped surfaces.
 - 10. Comply with all special cleaning instructions contained in the specifications.
 - 11. Remove temporary services, construction equipment, tools and construction facilities, mock-ups, temporary structures, surplus materials, debris, waste, and rubbish from site.
 - 12. Put site in neat, orderly condition, ready for use. Leave all spaces clean and free from debris.
 - 13. Prior to final completion, conduct an inspection of sight-exposed interior and exterior surfaces, and all work areas, to verify that the entire work is clean.

1.4 STARTING OF SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify the Engineer seven days prior to start-up of each item, unless otherwise specified in individual specification sections.
- C. Verify each piece of equipment/system has been checked for proper lubrication, drive rotation, belt tension, control sequence and for conditions which may cause damage.
- D. Verify tests, meter readings and specified electrical characteristics agree with those required by equipment or system manufacturer.

- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable manufacturer's representative and Contractors' personnel in accordance with manufacturers' instructions.
- G. When specified in individual specification sections, require manufacturer to provide authorized representative to be present at site to inspect, check and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report as specified in the "Submittal Procedures" Section of the General Requirements, that equipment or system has been properly installed and is functioning correctly.

1.5 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of substantial completion and/or final inspection.
- B. Demonstrate Project equipment and instruct in a classroom environment located at site and instructed by qualified applicable personnel or manufacturer's representative who is knowledgeable about the Project.
- C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
- E. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed time and at equipment location.
- F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- G. Required instruction time for each item of equipment and system is specified in individual sections.

1.6 TESTING, ADJUSTING AND BALANCING

- A. Contractor will appoint, employ and pay for services of an independent firm approved by the Engineer, to perform testing, adjusting and balancing.
- B. The independent firm will perform services stated in the Specifications
- C. Reports will be submitted by the independent firm to the Engineer indicating observations and results of tests and indicating compliance or non-compliance with requirements of Contract Documents.

1.7 PROTECTING INSTALLED CONSTRUCTION

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- C. Provide protective coverings at walls, projections, jambs, sills and soffit of openings.
- D. Protect floors, stairs and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects by protecting with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Prohibit traffic from landscaped areas.

1.8 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed Shop Drawings, Product Data and Samples.
 - 6. Manufacturer's instruction for assembly, installation and adjusting.
- B. Ensure entries are complete and accurate enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress, not less than weekly.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured depths of foundations in relation to finish floor datum.
 - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 4. Field changes of dimension and detail.
 - 5. Details not on original Contract drawings.

- G. Submit documents to the Engineer with claim for final Application for Payment.

1.9 OPERATION AND MAINTENANCE DATA

A. Format:

1. Prepare instructions and data by personnel experienced in maintenance and operation of described projects.
2. Prepare data in the form of an instructional manual.
3. Submit data bound in A4 text pages.
4. Binders: Commercial quality binders with durable plastic covers. When multiple binders are used, correlate data into related consistent groupings.
5. Cover: Identify each binder with printed title "Operation and Maintenance Instructions", title of project and subject matter of binder when multiple binders are required.
6. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
7. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
8. Contents: Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:
 - a. Part 1: Directory, listing names, addresses and telephone numbers of Engineer, Contractor, Subcontractors and major equipment suppliers.
 - b. Part 2: Operation and maintenance instructions arranged by system and subdivided by specification section. For each category, identify names, addresses and telephone numbers of Subcontractors and suppliers. Identify the following:
 - 1) Significant design criteria.
 - 2) List of equipment.
 - 3) Parts list for each component.
 - 4) Operating instructions.
 - 5) Maintenance instructions for equipment and systems.
 - 6) Maintenance instructions for special finishes including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 - c. Part 3: Project documents and certificates, including the following:
 - 1) Shop drawings and product data.
 - 2) Air and water balance reports.
 - 3) Certificates.
 - 4) Photocopies of warranties
 - 5) Originals of bonds.

B. Contents, Each Volume:

1. Table of Contents: Provide title of Project; names, addresses and telephone numbers of Engineer and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.
2. For each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
3. Product Data: Mark each sheet to clearly identify specific products and

- components parts, and data applicable to installation. Delete inapplicable information.
4. Drawings: Supplement product data to illustrate relations of components parts of equipment and systems, to show control and flow diagrams.
 5. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in the "Quality Requirements" Section of the General Requirements.
 6. Warranties: Bind in copy of each.
 7. Bonds: Bind in original of each.

1.10 MANUAL FOR MATERIALS AND FINISHES

- A. Submit four copies of preliminary draft or proposed formats and outlines of contents before start of Work. The Engineer will review draft and return one copy with comments.
- B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.
- C. Submit one copy of completed volumes 15 days prior to final inspection. Draft copy will be reviewed and returned after final inspection, with the Engineer's comments. Revise content of document sets as required prior to final submission.
- D. Submit four sets of revised final volumes in final form within 10 days after final inspection.
- E. Products, Applied Materials and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Include information for reordering custom manufactured products.
- F. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- G. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition and details of installation. Include recommendations for inspections, maintenance and repair.
- H. Additional Requirements: As specified in individual product specification sections.
- I. Include listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.11 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Submit four copies of preliminary draft or proposed formats and outlines of contents before start of Work. The Engineer will review draft and return one copy with comments.
- B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.

- C. Submit one copy of completed volumes 15 days prior to final inspection. Draft copy will be reviewed and returned after final inspection, with the Engineer's comments. Revise content of document sets as required prior to final submission.
- D. Submit four sets of revised final volumes in final form within 10 days after final inspection.
- E. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.
- F. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications.
- G. Include color coded wiring diagrams as installed.
- H. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and special operating instructions.
- I. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- J. Include servicing and lubrication schedule, and list of lubricants required.
- K. Include manufacturer's printed operation and maintenance instructions.
- L. Include sequence of operation by controls manufacturer.
- M. Include original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- N. Include control diagrams by controls manufacturer as installed.
- O. Include Contractor's coordination drawings, with color coded piping diagrams as installed.
- P. Include charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- Q. Include list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- R. Include test and balancing reports as specified in the "Quality Requirements" Section of the General Requirements.
- S. Additional Requirements: As specified in individual product specification sections.
- T. Include listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

1.12 INSTRUCTION OF EMPLOYER PERSONNEL

- A. Before final inspection, instruct Employer's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times.
- B. For equipment requiring seasonal operation, perform instructions for other seasons within six months.
- C. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- D. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instructions.

1.13 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Furnish spare parts, maintenance and extra products in quantities specified in individual specification sections.
- B. Deliver to Project site and place in location as directed by Owner; obtain receipt prior to final payment.

1.14 PRODUCT WARRANTIES AND PRODUCT BONDS

- A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers and manufacturers, within ten days after completion of applicable item of work.
- B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.
- C. Verify documents are in proper form, contain full information and are notarized.
- D. Co-execute submittals when required.
- E. Include Table of Contents and assemble in binder with durable plastic cover.
- F. Submit prior to final Application for Payment.
- G. Time of Submittals:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
 - 2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

1.15 MAINTENANCE SERVICE

- A. Furnish service and maintenance of components indicated in specification sections.
- B. Examine system components at frequency consistent with reliable operation. Clean, adjust and lubricate as required.
- C. Include systematic examination, adjustment and lubrication of components. Repair or replace parts whenever required. Use parts produced by manufacturer of original component.
- D. Do not assign or transfer maintenance service to agent or Subcontractor without prior written consent of the Owner.

1.16 PROTECTION AND MAKING GOOD

- A. The Contractor shall protect all completed Works from damage until the completion and handing over of the Works to the approval of the Engineer.
- B. Should any Works be damaged before handing over of the Works, the Contractor shall at his expense make good or replace as required, to the satisfaction of the Engineer.

END OF SECTION