

1.1 SECTION INCLUDES

- .1 Project Record Documents.
- .2 Operations and Maintenance data.

1.2 RELATED SECTIONS

- .1 N/A

1.3 PROJECT RECORD DOCUMENTS

- .1 Departmental Representative will provide 2 white print sets of contract drawings and 2 copies of Specifications Manual specifically for "As-Built" purposes.
- .2 Maintain at site one set of the contract drawings and specifications to record actual As-Built site conditions.
- .3 Maintain up-to-date, real time as-built drawings and specifications in good condition and make available for inspection by the Departmental Representative upon request.
- .4 As-Built Drawings:
  - .1 Record changes in red ink on the prints. Mark only on one set of prints and at completion of work, neatly transfer notations to second set (also by use of red ink).
  - .2 Submit both sets to Departmental Representative prior to application for Certificate of Substantial Performance.
  - .3 Stamp all drawings with "As-Built". Label and place Contractor's signature and date.
  - .4 Show all modifications, substitutions and deviations from what is shown on the contract drawings.
  - .5 Record following information:
    - .1 Depths of various elements of foundation in relation to basement level, first floor level, survey datum.
    - .2 Horizontal and vertical location of exterior underground utilities and appurtenances referenced to permanent surface improvements.
    - .3 Horizontal and vertical location of various elements in relation to Geodetic Datum;
    - .4 Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure;
    - .5 Field changes of dimension and detail;
    - .6 Location of all capped or terminated services and utilities.
    - .7 Chases for mechanical, electrical and other services;

- .8 Ceiling and floor elevations;
  - .9 Reflected ceiling plan condition showing finished layout of all ceiling-mounted services and devices;
  - .10 Plumbing, heating, air conditioning and ventilation, sprinkler and electrical service installation locations; all to be dimensioned and referenced to building columns or load bearing walls;
  - .11 All structural steel installations to be fully dimensioned;
  - .12 All design elevations, sections, floor plans and details dimensioned and marked-up to consistently report finished installation conditions;
  - .13 Any details produced in the course of the contract by the Departmental Representative to supplement or to change existing design drawings;
  - .14 All change orders issued over the course of the contract must be documented on the finished As-Built documents, accurately and consistently depicting the changed condition as it applies to all affected drawing details.
- .5 As-Built Specifications: legibly mark in red each item to record actual construction, including:
- .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly items substituted from that specified.
  - .2 Changes made by Addenda and Change Orders.
  - .3 Mark up both copies of specifications; stamp "As-Built", sign and date similarly to drawings as per above clause.
- .6 Maintain As-Built documents current as the contract progresses. Departmental Representative will conduct reviews and inspections of the documents on a regular basis. Failure to maintain as-builts current and complete to satisfaction of the Departmental Representative shall be subject to financial penalties in the form of progress payment reductions and holdback assessments.
- .7 Submit on paper and in electronic format as pdf files. Forward pdf and in the native program format, NMSEdit Professional spp, MS Word, MS Excel, MS Project and Autocad dwg and photograph jpg files on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

#### 1.4 REVIEWED SHOP DRAWINGS

- .1 Provide a complete set of all shop drawings reviewed for project to incorporate into each copy of the Operations and Maintenance Manuals.

- .2 Submit full sets at same time and as part of the contents of the Operation and Maintenance Manuals specified.

#### 1.5 UPDATING OF DIGITAL DRAWINGS

- .1 Obtain and pay for the services of a qualified drafting firm to update the digital files which were used to produce the contract drawings.
  - .1 Update the digital drawing files with the same As-Built information as specified for the paper As-Built drawings.
  - .2 Supply of digital documents does not replace the requirement to provide marked-up white prints specified above.
- .2 The Departmental Representative will provide a copy of the digital drawing files.
- .3 Incorporate the as-built changes to the digital drawings by following the standards specified in the latest version of the PWGSC National CADD Standard. A copy of this manual will be provided by the Departmental Representative.
- .4 Make revisions to electronic files found to be in non-conformance with the PWGSC National CADD Standard as directed by Departmental Representative.
- .5 In regards to updating the digital files to reflect changes resulting from Change Orders, the change in cost of completing the As-Built documentation of changes is to be included in the amount for each Change Order issued. The amount included will constitute only the increase or decrease in CADD related costs resulting directly from the change. In determining the cost difference, full consideration will be given to the fact that other clauses of this section require As-Built CADD updates to the drawings irrespective of any Change Orders.
- .6 Deliver the digital As-Built information in same format and sequence as the contract drawings and specifications.
  - .1 Submit on PWGSC encrypted USB.
  - .2 Provide 1 full set of paper plots.
  - .3 Submit the digital As-Built at the same time as the marked-up paper white prints.

#### 1.6 OPERATIONS & MAINTENANCE MANUAL

- .1 O&M Manual - Definition: an organized compilation of operating and maintenance data including detailed technical information, documents and records describing operation and maintenance of individual products or systems as specified in individual sections of the specifications.

- .2 Manual Language: final manuals to be in [English] [French] [both English and French] languages.
- .3 Number of copies required:
  - .1 Submit [2] interim copies of the manual for review and inspection by Departmental Representative. Make revisions and additions as directed and resubmit.
  - .2 Upon review and acceptance by Departmental Representative, submit [3] final copies. Interim copies are not to be considered as part of the final copies unless they have been fully revised and are identical to the final approved version.
- .4 Submission Date: submit complete operation and maintenance manual to Departmental Representative 3 weeks prior to application for Certificate of Substantial Performance of the work.
- .5 Binding:
  - .1 Assemble, coordinate, bind and index required data into Operation and Maintenance Manual.
  - .2 Use vinyl, hard covered, 3 "D" ring binders, loose leaf, sized for 215 x 280 mm paper, with spine pocket.
  - .3 Where multiple binders are needed, correlate data into related consistent groupings.
  - .4 Identify contents of each binder on spine.
  - .5 Organize and divide data following same numerical system as the section numbers of the Specification Manual.
  - .6 Dividers: separate each section by use of cardboard dividers and labels. Provide tabbed fly leaf for each individual product and system and give description of product or component.
  - .7 Type lists and notes. Do not hand write.
  - .8 Drawings, diagrams and manufacturers' literature must be legible. Provide with reinforced, punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- .6 Manual Contents:
  - .1 Cover sheet containing:
    - .1 Date submitted.
    - .2 Project title, location and project number.
    - .3 Names and addresses of Contractor, and all Sub-Contractors.
  - .2 Table of Contents: provide full table of contents in each binder(s), clearly indicate which contents are in each binder.
  - .3 List of maintenance materials.
  - .4 List of spare parts.
  - .5 List of special tools.
  - .6 Original or certified copy of warranties and product guarantees.
  - .7 Copy of approval documents and certificates issued by Inspection Authorities.
  - .8 Copy of reports and test results performed by Contractor as

specified.

.9 Product Information (PI Data) on materials, equipment and systems as specified in various sections of the specifications.

Data to include:

.1 List of equipment including manufacturer's name, supplier, local source of supplies and service depot(s). Provide full addresses and telephone numbers.

.2 Nameplate information including equipment number, make, size, capacity, model number and serial number.

.3 Parts list.

.4 Installation details.

.5 Operating instructions.

.6 Maintenance instructions for equipment.

.7 Maintenance instructions for finishes.

.7 Shop drawings:

.1 Include complete set of reviewed shop drawings into each copy of the operations and maintenance manual.

.2 Fold and bind material professionally in a manner that corresponds with the specification section numbering system.

.3 When large quantity of data is submitted, place into separate binders of same size as O&M binders.

.8 Equipment and Systems Data: the following list indicates the type of data and extent of information required to be included for each item of equipment and for each system:

.1 Description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 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 any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Servicing and lubrication schedule, and list of lubricants required.

.7 Manufacturer's printed operation and maintenance instructions.

.8 Sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

- .11 Provide Contractor's coordination drawings, with installed colour coded piping diagrams.
  - .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
  - .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
  - .14 Include test and balancing reports.
  - .15 Additional requirements as specified in individual specification sections.
- .9 Materials and Finishes Maintenance Data:
- .1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations. [Provide information for re-ordering custom manufactured products.]
  - .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
  - .3 Moisture-protection and Weather-exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
  - .4 Additional Requirements: as specified in individual specifications sections.

#### 1.7 SPARE PARTS, TOOLS AND MAINTENANCE MATERIALS

- .1 Provide spare parts, special tools and extra materials for maintenance purposes in quantities specified in individual specification sections.
- .2 Tag all items with associated function or equipment.
- .3 Provide items of same manufacture and quality as items in Work.
- .4 Deliver to site in well packaged condition. Store in location as directed by Departmental Representative.
- .5 Clearly mark as to contents indicating:
  - .1 Part number.
  - .2 Identification of equipment or system for which parts are applicable.
  - .3 Installation instructions or intended use as applicable.
  - .4 Name, address and telephone number of nearest supplier.
- .6 Prepare and submit complete inventory list of items supplied. Include list within Maintenance Manual.

END OF SECTION