|  |  |  |
| --- | --- | --- |
| Version | Date | Description of Revisions |
| 1 | August 30, 2006 | Approved final document. |
| 2 | September 27, 2007 | Minor revisions by Legal Services |
| 3 | December 29, 2009 | Modified ‘Related Sections’ and minor revisions |
| 4 | September 28, 2010 | Minor revisions and addition of Part 1.7.5 - Format |
| 5 | April 10, 2012 | Addition of References and Replacement Parts sections on this page. |
| 6 | July 6, 2012 | Change tab settings for page 1-7. |
| 7 | April 9, 2015 | Changed formatting |
| 8 | December 17, 2015 | Minor clarifications based on comments by Legal Department. AAM |
| 9 | April 4, 2017 | Updated reference to Design guidelines Section 30 Operations Manual Guideline. (AAM) |
| 10 | April 26, 2018 | 1.7.3.2.1 Removed ACCO binder P5436E, added performance requirements for binder.  (BM) |
| 11 | May 14, 2019 | Updated Related Section 01815 – Commissioning to 01810 – Equipment Testing and Facility Commissioning (AM) |
| 12 | January 20, 2020 | Replaced Record Drawings with As-Built Drawings (BM) |
| 13 | September 28, 2021 | Document rewritten (BM) |
|  |  |  |

NOTE:

This is a CONTROLLED Document. Any documents appearing in paper form are not controlled and should be checked against the on-line file version prior to use.

**Notice:** This Document hardcopy must be used for reference purpose only.

**The on-line copy is the current version of the document.**

# GENERAL

## Summary

### This Section provides guidance to the Contractor for the purpose of developing the equipment or system Operations and Maintenance Manual and is applicable to the designs of new linear works and facilities, upgrades, expansions and retrofits of existing linear and facilities water and wastewater infrastructure. Detailed information is included regarding the preparation and submission of operations and maintenance (O&M) data for the Consultant’s review, as required by the individual specification Sections.

## Related Sections

### [Under "Related Sections", identify other Sections that are related to, and/or dependent on, the work results or information specified elsewhere. The list should be limited to Sections with specific information that the reader might expect to find in this Section but is specified elsewhere. For example, if hardware for aluminum entrances is specified in the aluminum entrance Section, a cross-reference would be appropriate in the finish hardware Section. The purpose of this cross-referencing is for information only, to aid in finding those other requirements—not to define the scope of the Section.

### Cross-referencing here may also be used to coordinate assemblies or systems whose components may span multiple Sections and which must meet certain performance requirements as an assembly or system.

### Contractor is responsible for coordination of the Work.

### This Section is to be completed/updated during the design development by the Consultant. If it is not applicable to the section for the specific project it may be deleted.]

### [List Sections specifying related requirements.]

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: [Optional short phrase indicating relationship].

### Section 01300 – Submittals

### Section 01351 – Health and Safety

### Section 01425 – Computerized Maintenance Management System Data Requirements

### Section 01780 – Contract Closeout

### Section 01810 – Equipment Testing and Facility Commissioning

## Measurement and Payment

### All costs associated with the work of this Section shall be included in the price for Item No. [ ] in the Bid Form.

## Quality Assurance

### Manuals for equipment and systems shall be prepared by the equipment manufacturer or system supplier.

## Submittals

### The Contractor shall submit the following information in accordance with this Section and Section 01300 – Submittals.

### Preliminary Operations and Maintenance Manuals

#### Submit one (1) digital copy of the preliminary Operations and Maintenance Manual to the Consultant a minimum of 30 Days prior to equipment or system field functional testing.

#### Maintain one (1) digital working copy of the Operations and Maintenance Manual including all equipment information, Shop Drawings, calibration information, start-up reports etc. onsite during the commissioning period, and until the final Operations and Maintenance Manual is received by the Region.

### Final Operations and Maintenance Manuals

#### Submit one (1) digital copy of the final Operations and Maintenance Manual for the Consultant’s review prior to Substantial Performance of the Work.

#### Following acceptance of the final digital Operations and Maintenance Manual by the Consultant, submit one (1) hard copy of the final, complete Operations and Maintenance Manual for the Consultant’s review and acceptance.

## Digital Copies of Operations and Maintenance Manuals

### Provide a separate PDF for each volume identified in section 1.9 below unless directed otherwise by the Consultant.

### The size of a PDF file should not exceed 500MB. For manual volumes larger than 500MB (text and graphics), each subsection should be a separate PDF file with bookmarks created with the section number and full name description as defined by the manual table of contents.

### The electronic form of the manual shall be provided with a linked Table of Contents, and bookmarks created for each section and subsections which will serve as the primary navigational aid for the user.

### Scans shall be in high resolution, minimum 400 dpi.

### Files are to be fully functional, text searchable with no unique fonts and viewable in the most recent version of Adobe Reader or Acrobat, and should not require additional software or plug-ins to be read and navigated.

### Each PDF file shall have keywords assigned to it, based on its individual subject material, to ensure that searching for a particular subsection would be successful.

### No security settings or password protection for PDF files should be included.

## Hard Copies of Operations and Maintenance Manuals

### Provide black expanding three ring catalogue binders suitably labelled on both the spine and cover.

### Provide a separate binder for each volume in section 1.9 below unless directed otherwise by the Consultant. Where more than one binder is required to accommodate the documentation for a volume, increase the number of volumes and renumber as necessary.

### The binders for final submission shall be hot stamped in gold lettering on the spine to accommodate the Project information in the binder spine template, included as a supplement to this Section.

### The front face is to be lettered with the information contained in the manual cover template, included as a supplement to this Section.

### Use colour coded laminated plastic divider tabs according to the section. Colours will be as follows:

#### Division – white

#### Systems – orange

#### Certification and Testing – green

#### Shop Drawings and Maintenance Bulletins – yellow

#### Safety and Maintenance – red

### Each section of the hard copy manual shall be separated by a tab divider.

## Maintenance Summary Form

### Compile an individual Maintenance Summary Form for each applicable item of equipment, respective unit or system, and for any components or sub-units. Use a copy of the Maintenance Summary Form included as a supplement to this Section. Each Maintenance Summary may take as many pages as required.

### The completed Maintenance Summary Forms are to be submitted with the manual, but should not form part of the manual.

## Manual Organization and Contents

### Arrange the material in volumes as described below.

[Consultant Note: The number of volumes should reflect the size and complexity of the project; suggested volumes are included below. The Consultant shall revise the required number of volumes based on the project specific requirements.]

#### Volume 1 – Architectural/Structural

#### Volume 2 – Mechanical Operations and Maintenance

#### Volume 3 – Electrical and Instrumentation

### For each volume, provide the following:

#### **Cover Page** – A cover page template is included as a supplement to this Section.

#### **Table of Contents** – A sample table of contents is included as a supplement to this Section.

#### **Introduction to Manual** – A written explanation of the layout of the manual and its intended use.

#### **List of Subcontractors** – For each Division in the volume, include the name and contact information for all Subcontractors.

#### **List of Suppliers** – For each Division in the volume, include the name and contact information of all Suppliers.

#### **Warranty Summary Form** – For each Division in the volume, the Contractor shall provide a list of all equipment warranties and special warranties required by the Contract Documents. This list shall include the information in the Warranty Summary Form included as a supplement to this Section.

#### **Divisions** –This section shall be arranged according to the MasterFormat specifications using the Divisions and section numbers from the contract specifications.

#### For each Division/system include:

##### Tab with Division number (e.g. division 15) and Division name (e.g. Mechanical).

##### **Index** - List of all sections under the applicable Division, in the order of appearance.

#### For each specification Section include:

##### **Equipment Information**

##### **Certification and Testing**

##### **Shop Drawings and Maintenance Bulletins**

##### **Safety and Maintenance**

### The following information shall be provided for each system and major piece of equipment. Each piece of equipment will be referenced by its tag number. Where manufacturer’s literature covers several models or options, the applicable information will be highlighted, or redundant information crossed out.

#### Description of systems, components and technical data. Include interfaces, sequences, operational characteristic changes for seasonal operation. Include name plate information including equipment number, make, size, capacity, model number and serial number.

#### Maintenance and operating instructions including:

##### Installation instructions: Including alignment, adjusting, calibrating, and checking

##### Procedure for starting

##### Proper adjustment

##### Test procedures

##### Procedure for operating

##### Procedure for shutdown

##### Safety precautions

##### List of relay settings and control and alarm contact settings

##### Repair or replacement procedures/details for all items of equipment that have operating components

##### Maintenance instructions for equipment

##### Maintenance instructions for finishes

#### Troubleshooting data

#### Preventative maintenance program complete with:

##### Suggested check list sheets

##### List of points to be greased or oiled

##### Detailed lubrication instructions and diagrams showing the points to be greased or oiled; recommend the type, grade, and temperature range of lubricants and the frequency of lubrication

##### List of wear points to be inspected and/or adjusted regularly

##### Suggested schedule for lubrication and inspection

##### Schematic, single line and wiring diagrams

##### Electrical interconnection wiring diagram for equipment furnished, including all control systems

##### Valve tag list

##### Warranty certificates, certifications and guarantees

##### Service representatives – name, address and telephone number

##### Suppliers for replacement parts – name, address, service depot and telephone number

##### Test results, witness testing commissioning

##### Test data for piping systems (degreasing, flushing, pressure testing and disinfection)

##### Hydrostatic or air test performance

##### Equipment alignment certificates

##### Balancing data for air and water systems

##### Inspection approval certificates for all types of systems; plumbing and piping, hot air and ventilation, electrical and supervisory systems

# PRODUCTS (NOT USED)

# EXECUTION

## Supplements

### The supplements listed below, attached following “END OF SECTION”, form part of this Section.

#### Maintenance Summary Form

#### Warranty Summary Form

#### Sample Table of Contents

#### Manual Cover Template

#### Binder Spine Template

**END OF SECTION**

MAINTENANCE SUMMARY FORM

PROJECT: CONTRACT NO.:

1. EQUIPMENT ITEM

2. SPECIFICATION DIVISION/SECTION

3. ASSET ID(S)

4. EQUIPMENT/TAG NUMBER(S)

5. NAMEPLATE DATA (hp, voltage, speed, etc.)

6. MANUFACTURER’S LOCAL REPRESENTATIVE

a. Name Telephone No.

b. Address

7. MAINTENANCE REQUIREMENTS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Operation and Maintenance Recommendations | Frequency | Special Tools Required | Known Work Hazards | Consumables |
| List briefly each maintenance operation required and refer to specific information in the manufacturer’s standard maintenance manual, if applicable. (Reference to the manufacturer’s catalog or sales literature is not acceptable) | List required frequency of each maintenance operation. | List any special tools required to perform the maintenance operation. | List any known work hazards associated with the maintenance operation (eg. confined space entry, chemical use, seasonal conditions). | List any consumables required to perform the maintenance operation (i.e. lubricants, filters, V-belts, oil, etc.) and quantity of each. |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

8. RECOMMENDED SPARE PARTS AND SPECIAL TOOLS FOR REGION’S INVENTORY

|  |  |  |  |
| --- | --- | --- | --- |
| **Part No.** | **Description** | **Unit** | **Quantity** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Note: Identify parts provided by this Contract with two asterisks. | | | |

WARRANTY SUMMARY FORM

PROJECT: CONTRACT NO.:

1. FACILITY

2. CONSULTANT

3. CONTRACTOR

4. DATE PREPARED LATEST REVISION DATE

5. EQUIPMENT WARRANTY SUMMARY

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Specification Section** | **Asset ID** | **Description** | **Manufacturer Name** | **Model Number** | **Serial Number** | **Equipment Warranty Start Date** | **Equipment Warranty Expiration Date** |
| 15XXX | 00012345 | Main Isolation, Butterfly Valve, Motorized | Valmatic | VM-12-34-S | 1234567 | 1-Jan-21 | 1-Jan-24 |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

SAMPLE TABLE OF CONTENTS

VOLUME 1 – ARCHITECTURAL/STRUCTURAL

Table of Contents

Introduction to Manual

List of Subcontractors

List of Suppliers

Warranty Information

**1 – General Requirements**

1 – Index

**2 – Site Works**

2 – Index

02511 – Watermains

2 – Certification and Testing

2 – Shop Drawings and Maintenance Bulletins

2 – Safety and Maintenance

02XXX

**3 – Concrete**

3 – Index

03100 – Concrete Forms and Accessories

– Certification and Testing

– Shop Drawings and Maintenance Bulletins

– Safety and Maintenance

03300 – Cast in Place Concrete

– Certification and Testing

– Shop Drawings and Maintenance Bulletins

– Safety and Maintenance

03XXX

**4 – Masonry**

**5 – Metals**

**6 – Wood and Plastics**

**7 – Thermal and Moisture Protection**

**8 – Doors and Windows**

**9 – Finishes**

**10 – Specialities**

**12 – Furnishings**

VOLUME 2 – MECHANICAL OPERATIONS AND MAINTENANCE

Table of Contents

Introduction to Manual

List of Subcontractors

List of Suppliers

Warranty Information

**11 – Equipment**

11 – Index

11280 – Fabricated Sluice Gates

– Certification and Testing

– Shop Drawings and Maintenance Bulletins

– Safety and Maintenance

11XXX

**14 – Conveying Systems**

14 – Index

14620 – Hoist Monorail and Lifting Davit System

– Certification and Testing

– Shop Drawings and Maintenance Bulletins

– Safety and Maintenance

14XXX

**15 – Mechanical**

15 – Index

15080 – Process Piping Insulation

– Certification and Testing

– Shop Drawings and Maintenance Bulletins

– Safety and Maintenance

15XXX

VOLUME 3 – ELECTRICAL AND INSTRUMENTATION

Table of Contents

Introduction to Manual

List of Subcontractors

List of Suppliers

Warranty Information

**16 – Electrical**

16 – Index

16010 – Basic Electrical Requirements

– Certification and Testing

– Shop Drawings and Maintenance Bulletins

– Safety and Maintenance

16080 – Electrical Testing

– Certification and Testing

**40 – Process Interconnections**

40 – Index

40 61 13 – Process Control System General Requirements

– Certification and Testing

– Shop Drawings and Maintenance Bulletins

– Safety and Maintenance

40 71 13 – Magnetic Flow Meters

– Certification and Testing

– Shop Drawings and Maintenance Bulletins

– Safety and Maintenance

40 XX XX

MANUAL COVER TEMPLATE

**Operation and Maintenance Manual**



Environmental Services Department,

17250 Yonge Street, Box 147, Newmarket, ON, L3Y 6Z1

**PROJECT TITLE**

**FACILITY ADDRESS**

**Contract # T-XX-XX**

**Completion: Month, Year**

**VOLUME 1:**

**ARCHITECTURAL/STRUCTURAL**

**VOLUME 2:**

**PROCESS EQUIPMENT OPERATIONS AND MAINTENANCE**

**VOLUME 3:**

**ELECTRICAL AND INSTRUMENTATION**

|  |  |
| --- | --- |
| Consulting Engineer Logo  Name  Address  Telephone Number  Project Manager Name | General Contractor Logo  Name  Address  Telephone Number  Project Manager Name |

**Set X of X**

BINDER SPINE TEMPLATE

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Operation and**  **Maintenance Manual**  **PROJECT TITLE**  **FACILITY ADDRESS**  **Contract # T-XX-XX**  **Completion: Month Year**  **VOLUME X of X**        **f York**  **Environmental Services Department,**  **17250 Yonge Street, Box 147,**  **Newmarket, ON, L3Y 6Z1**   |  | | --- | | **General Contractor Logo** | | **General Contractor Name**  **Address**  **Telephone Number** | | **Consulting Engineer Logo** | | **Consulting Engineer Name**  **Address**  **Telephone Number** |   **Set X of X** |