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| Version | Date | Description of Revisions |
| 1 | November 5, 2007 | Approved final document. |
| 2 | April 21, 2008 | Addition of Part 3 |
| 3 | December 29, 2009 | Modified ‘Related Sections’ |
| 4 | March 15, 2011 | Minor revision |
| 5 | April 10, 2012 | Addition of References and Replacement Parts sections on this page. |
| 6 | July 6, 2012 | Change tab settings for page 1-4. |
| 7 | April 9, 2015 | Changed Formatting |
| 8 | December 14, 2015 | Minor clarifications based on comments by Legal. Moved portions of Record Drawings from Spec 01780 Contract Closeout into this Section and provided cross-reference. AAM |
| 9 | March 16, 2016 | Phase 2 Review AAM |
| 10 | January 20, 2020 | Changed title of specification from Record Drawings to As-Built Drawings. Modifications to References, Definitions, Measurement & Payment, Level of Detail, Global Positioning System, Submittals and Execution. DRB |

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

## Section Includes:

### This Specification includes information on the requirements for As-Built Drawings. The purpose of the As-Built Drawings is to provide the Region with factual information regarding all aspects of the Work, both concealed and visible.

## Related Sections

### [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 01780 – Contract Closeout

#### Section 01810 – Equipment Testing and Facility Commissioning

#### Section 01450A – Declaration of Complete and Accurate As-Built Documentation

## Definitions

### As-Built drawings: As-built drawings are prepared by the Contractor. They show, in red ink, on-site changes to the original Issued For Construction Contract documents. The As-Built drawings produced by the Consultant are the Contractor’s As-Builts translated into electronic CAD format.

### As-Built drawings serve as the Region’s record of the details in which Works were constructed both visible and concealed. The As-Builts will provide the level of detail necessary to enable future modification of the Work to proceed without lengthy and costly Site investigation.

* 1. Measurement and Payment
     1. The Work outlined in this Section shall be included in the fixed lump sum price (the “Fixed LS Price”) for Section 01450 – As-Built Drawings as indicated in Schedule ‘A’ of the Bid Form. Any additional costs incurred by the Contractor in excess of the Fixed LS Price shall be included in the Contract Price and the Contractor shall not be entitled to any additional payment for the Work outlined in this Section in excess of the Fixed LS Price.
     2. [*Consultant Note: This fixed value is to be entered in the bid form. In order to determine the fixed value, the following table may be used as a guideline. Remove this table from the final specification. Any deviation from the values in the table must be approved by the Region’s Project Manager.]*

|  |  |  |
| --- | --- | --- |
| *Total Contract Amount ($)* | *Percentage* | *Value based on maximum Contract amount in the range* |
| *0 – 100K* | *5%* | *5K* |
| *>100K – 500K* | *2%* | *10K* |
| *>500K – 3M* | *1.25%* | *37.5K* |
| *>3M – 10M* | *1%* | *100K* |
| *>10M – 100M* | *0.75%* | *750K* |
| *>100M – 500M* | *0.5%* | *2.5M* |

### The Work shall include all labour, equipment and materials necessary to complete As-Built drawings for all work completed under the Contract, to the satisfaction of the Consultant. No payments will be made for incomplete or unacceptable submissions based on the criteria outlined in sections 1.5 and 1.6.

### The Contractor shall submit the current status of As-Built drawings on a monthly basis for the Consultant’s review and approval. A declaration that As-Built information is accurate and current (01450A – Declaration of Complete and Accurate As-Built Documentation) shall be submitted with each month. Failure to properly maintain, update and submit As-Built drawings may result in the withholding of the whole or any part of the Contractor’s Application for Payment until such time as the Contractor has met the requirements of this specification.

### Notwithstanding any other provision in the Contract, payments under the Fixed LS Price, payment for the As-Built drawings shall be made as follows:

#### Payment will be prorated monthly from the commencement of construction over the remaining Contract time, including any extensions to the Contract time and each monthly prorated amount will be paid to a maximum of 85% upon acceptance of the reviewed preliminary As-Built drawings by the Region prior to Substantial Performance of the Work.

#### The remaining 15% is to be paid upon acceptance of the reviewed final As-Built drawings by the Region at Total Performance of the Work.

## Level of Detail

### The As-Built Drawings shall be submitted, in full size scanned digital format, with sufficient detail for the Consultant to modify the Contract Drawings without referring to separate information such as RFIs, RFQs, or Shop Drawings.

### Document all changes made by Field Orders, Work Change Directives, Change Orders, and the Consultant’s written interpretation and clarification using consistent symbols for each and showing the appropriate document tracking number (examples: CO#1, FO#2, etc.)

### Record details related to the Work not included on the original Contract Drawings.

### Include references to related shop drawings and modifications.

### The following details shall be submitted with the As-Built drawings as a minimum, but are not inclusive of all information to be captured to record all aspects of the work:

#### Linear projects, external plant yard piping and utilities:

##### Record specific pipeline materials, buried couplings, transitions, closures, bends, points of inflection, additional chambers or maintenance holes, limits of concrete encasement, waterproofing product details, bedding or backfill materials, slope, mechanical joint restraint, thrust blocking, casing materials and installation details, direct buried valves, lining materials or protective coatings.

##### For all piping, include the pipe class, dimension ratio (DR), gauge steel or schedule based on piping material. Diameters shall be recorded as nominal inside diameter, iron pipe standard (IPS), ductile iron pipe size (DIPS) or outside diameter depending on pipe material.

##### Provide a minimum of two offset measurements from physical permanent features to points of inflection on plan drawings. A permanent feature could be the property line or centre line of road.

##### Record all abandoned infrastructure with specific details on the method of abandonment including chambers, pipelines and limits of removals.

##### Cross out and mark as “Deleted” any proposed or temporary infrastructure removed during or after construction.

##### Record all details on size, depth and material for all permanent or temporary support structures which are not removed during or after construction. This includes partial removals and backfilling. Any such structures shall have horizontal and vertical coordinates recorded at all corners or four (4) points for circular or elliptical shapes.

##### Record any changes to cross sections with actual pipeline location, elevations, materials, horizontal or vertical alignment, utility crossings and clearances. Insert cross sections for any pipelines whether branch watermain, sewer or yard piping added during the course of construction.

##### Update all valve chamber schematic details with any changes and record new schematics for any chambers added through the course of construction.

##### Record all changes to valve chamber drawings. This includes As-Built elevations of the chamber base, transitions, roof slab, horizontal and vertical coordinates of all four corners of the main chamber, top of pipe, pipe invert, platforms, top of frame and grade (if different than top of frame). Include any changes to piping, materials, couplings, fittings, offsets both horizontal and vertical, valves and all appurtenances.

##### Provide details of the specific diameter, manufacturer, make, model number and type of all valves, sluice gates and meters 100mm and greater on the relevant drawings or in a valve schedule table.

##### Record invert elevations for all sewers at maintenance holes and chambers which includes trunk sewers, overflow, connections, drop structures, spillways and siphons.

##### Record elevations for top of base slab, top of covers, hatches, platforms, diameter transitions, top of benching and grade (if different than top of cover).

##### Provide specific details in schematic format at all connections outside of chambers for clarity where required. Schematics are to include dimensions, diameters, materials, bends, fittings and mechanical restraints.

##### Update any linear projects which include electrical or instrumentation and controls with any changes from the original design on the corresponding electrical drawings, P&ID, electrical site plans and electrical single line drawing. As Built AutoCAD drawings for all electrical, instrumentation or equipment panels are to be submitted to the Consultant.

#### Trenchless, Tunnel or Microtunnel:

##### Update the drawings with the actual line and grade of the installation using bore path data.

##### Update typical tunnel cross sections and details with the casing type, gauge, inside diameter, panel type, spacers, grout details, dimensions, pipe material, rails, carriers, spacers and offsets.

##### Update the drawings to include the trenchless installation method, length, slope, casing type and material.

##### Provide coordinates for the ends of the tunnel casing, pipe installed by tunnel or trenchless method.

##### Include details on the shaft construction methodology, depth, dimensions, As-Built GPS coordinates, materials, permanent reinforcement and piping arrangement.

### *[****Consultant Note:*** *For tunnels, microtunnels or other trenchless installations, the Consultant shall specify the appropriate means to capture As-Built data for line and grade. As-Built coordinates must be provided at a minimum of every ten metres of straight tunnel and every five metres for radius pipe at the centre line invert of the carrier pipe. Methodology to be finalized after consultation with the Region. Adjust the value of As-Builts accordingly or under separate bid form item.]*

#### Facilities:

##### Record As-built information for all disciplines, including but not limited to architectural, structural, civil, mechanical, electrical, process, instrumentation and control, security, utility coordination and site servicing. The contractor is responsible for consolidation and inclusion of all As-built information from Subcontractors and trades.

##### Record changes to the site plans, electrical site plans, exterior grounding grids, yard piping, utilities, overhead hydro, exterior equipment, fuel tanks, containment, chambers, pipe diameters, pipe materials, encasement, retaining structures and equipment slabs.

##### Include depths of various elements of foundation in relation to finished first floor datum if not shown or where the depth differs from that shown on the construction drawings.

##### Reference the location of internal utilities and appurtenances concealed in the construction to visible and accessible features of the structure.

##### Locate existing facilities, piping, equipment, and items which are critical to the interface between existing physical conditions of construction and new construction.

##### Show, by symbol or note, the vertical location of the item (“under slab,” “in ceiling plenum,” “exposed,” etc).

## Global Positioning System (GPS):

### Record horizontal and vertical coordinates with survey grade Global Positioning System (GPS) equipment to within 10cm accuracy or better for all horizontal coordinates and 3cm accuracy or better for vertical coordinates. Provide coordinates for all pipe points of inflection, bends, couplings, transitions, repairs, fittings, direct bury valves, valve boxes, casing ends, centre of chamber covers, centre of all circular structures, all four corners of rectangular structures, branch connections, overflow locations and effluent discharge points. Coordinates shall be taken every 20m or third pipe joint (whichever is the lesser) for straight pipe and at all deflected, beveled or radius pipe joints installed by open cut method.

### Provide GPS X,Y,Z coordinates in UTM Zone 17 NAD83 coordinates format.

### Where vegetation, terrain, depth or building structures interfere with GPS data collection, traverse from the nearest GPS position that meets specifications with Total Station or other survey grade equipment.

### Record coordinates for any utilities, process piping or other existing buried infrastructure that are exposed within the limits of the Work.

### Record coordinates in tabular format and submit to the Consultant monthly, 10 Working Days in advance of an application for payment.

### Include a comprehensive table with all coordinates with the Preliminary As-Built drawing package in advance of commissioning. The table must have:

#### A unique number with reference on the plan and profile drawings for location.

#### X, Y, Z coordinates in UTM Zone 17 NAD83.

#### Description of the attribute or point.

## Submittals:

### The following table outlines the tasks and timelines for submittal of As-Built documentation:

|  |  |
| --- | --- |
| **Task** | **Timeline** |
| Consultant to provide full set of IFC drawings for the purpose of recording As-Built entries | Pre-Construction Meeting |
| Contractor makes entries on As-Built drawings and captures GPS coordinates | From commencement of construction until completion of all Works.  At a minimum record all As-Built entries weekly and GPS coordinates continuously as Work progresses |
| Contractor submits GPS coordinates in tabular format to the Consultant and declaration that the As-Built documentation is complete and accurate | Monthly or as directed |
| Consultant and Region to review As-Built documentation for approval of Payment Application | Monthly or as required based on Payment Application submission |
| Interim milestone or phased Work require interim As-Built documentation | Interim As-Built documentation to be submitted for review and approval by Consultant a minimum of 10 Working Days in advance of commissioning of the completed Work |
| Contractor submits full Preliminary As-Built drawings to the Consultant for review and approval prior to commissioning | Preliminary As-Built Drawings to be submitted a minimum of 10 Working Days prior to commissioning.  Make any corrections and re-submit. |
| Contractor submits full Final As-Built drawing package to the Consultant for review and approval prior to Substantial Performance | Minimum of 10 Working Days prior to Substantial Performance.  Make any corrections and re-submit |
| Consultant to update IFC drawings with all Final As-Built documentation submitted by the Contractor for Region review | Consultant to submit for Region review within 60 Working Days from Substantial Performance |
| Provide As-Built documentation for any changes made from Substantial Performance of the Work to the end of the Warranty period | As-Built documentation to be submitted within 14 calendar days following completion of the Works |

### The Consultant will provide one (1) full size set of Contract Drawings at the beginning of the Contract for use in producing As-Built Drawings. The Consultant shall provide additional sets of Contract Drawings, as required, for each phase of the Work. Mark thereon in red ink all changes as the Work progresses and as changes occur.

### Prior to the start of commissioning, the Contractor shall prepare a full comprehensive set of As-Built Drawings which will be labeled as the “Preliminary As-Built Drawings”. Label each drawing in the lower right hand corner in letters a minimum of 12 mm high as follows: - "PRELIMINARY AS-BUILT DRAWING: THIS DRAWING HAS BEEN REVISED TO SHOW SYSTEMS AS INSTALLED" (Signature of Contractor) (date).

### The “Preliminary As-Built Drawings” shall be submitted to the Consultant for review and approval. A minimum of 10 Working Days are required for the review of the drawing package. Make corrections as directed. Commissioning will not be permitted until the Preliminary As-Built Drawings have been reviewed and approved. The Consultant will scan the approved set in digital format for distribution to the Region, the original set will be returned to the Site to be used for commissioning.

### Within 10 Working Days after the completion of commissioning and prior to the issuance of Substantial Performance, record any changes to the Preliminary As-Built drawings as a result of the commissioning and submit a full comprehensive set of Final As-Built Drawings to the Consultant for review and approval. Make corrections as directed. Label each drawing in the lower right hand corner in letters a minimum of 12 mm high as follows: - "FINAL AS-BUILT DRAWING" (Signature of Contractor) (date). The Consultant will scan the approved set in digital format for distribution to the Region, the original set will be returned to the Site.

### Contracts with milestone completion dates or phased Work will require “Interim As-Built” documentation to be submitted to the Consultant for review in scanned digital format prior to commissioning of that Work. The interim As-Built set of drawings shall be submitted to the Consultant for review and approval a minimum of 10 Working Days prior to commissioning of that phase of the Work. The interim As-Built drawings shall be comprehensive to include all drawings required for operation and maintenance of that portion of the completed Work.

### Document and submit any changes to the Final As-Built drawing resulting from Work performed after Substantial Performance to the end of the Warranty Period. The updated Final As-Built drawings shall be submitted in digital scanned format within 14 Calendar Days after completion of the Work for review and approval by the Consultant. The Contractor will be required to make any changes as directed by the Consultant.

# PRODUCTS (NOT USED)

# EXECUTION

## General

### Contractor shall delegate the responsibility for maintenance of the As Built drawings to an Ontario Land Surveyor or qualified and experienced person as approved by the Consultant, whose duty and responsibility shall be to maintain the As-Built drawings and record GPS coordinates.

### The Contractor shall make the As-Built drawings available for reference purposes and inspection at all times. Store As-Built drawings and samples in the field office apart from any documents used for construction.

### Maintain As-Built drawings in a clean, dry and legible condition. Do not use these documents for construction purposes.

### Make legible and accurate entries on the As-Built drawings within 24 hours after receipt of information on a change that has occurred. Transfer all As-Built information to the Contract Drawings weekly to show all Work as it is actually installed.

### Record information concurrently with the progress of construction. Do not cover or conceal the Work until the required information is recorded.

### The Consultant is responsible for the Quality Assurance of the As-Built drawings. The Contractor shall coordinate, provide access and assist the Consultant with the recording, collection or field verification of any part of the Work at no additional cost to the Region.

### The Contractor will be responsible to provide details, site layout and mark newly installed infrastructure for any locate requests by third parties or sub-contractor until final As-Built Drawings in AutoCAD have been produced by the Consultant and approved by the Region.

## Supplement

### The supplement listed below, attached following “END OF SECTION”, forms a part of this Section

#### Section 01450A - Declaration of Complete and Accurate As-Built Information

**END OF SECTION**