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Article 17. Drawings

17.1 General

17.1.1 Scope

- (a) This Article 17 [Drawings] specifies the requirements and criteria for Design drawings that the Primary Contractor shall produce for all Province Infrastructure to the extent that such infrastructure is to be constructed, installed, altered, upgraded and/or augmented by the carrying out of the Work, subject to any requirements set out elsewhere in Schedule 4, including Article 3.7 [Surveys, Inspections, Plans, Drawings and Other Information], Part 1 of Schedule 4.

17.1.2 General

- (a) Without limiting any other provision of this Agreement, the Primary Contractor shall produce the drawings required under this Agreement in accordance with the requirements, standards and guidelines set out in this Article 17 [Drawings] and Good Industry Practice.

17.2 Drawing Planning

17.2.1 Drawing Software

- (a) The Primary Contractor shall use:
 - (i) AutoCAD, version 2008 or later, in the preparation of drawings; and
 - (ii) SketchUp, version 2008 or a later standard version, in the preparation of three dimensional Fixed Facility drawing files and imagery.

17.2.2 Drawing Lists

- (a) The Primary Contractor shall develop and provide to the Province's Representative by the date specified in the Design Management Plan, a drawing list, which list shall include:
 - (i) the title of the drawing;
 - (ii) the scale; and
 - (iii) the drawing number,

(collectively a “**Drawing List**”).

- (b) The Primary Contractor shall provide updated Drawing Lists to the Province’s Representative in accordance with Article 3.2.1 [Records Documentation], Part 3 of Schedule 4.

17.2.3 Drawing Numbers, File Names, and Directory Structures

- (a) The Primary Contractor shall follow the conventions listed below and ensure that each drawing has its own drawing number:

- (i) Type Identifier:

Contract	C
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Note: The contract number shall be assigned by the Province on or before the Effective Date.

- (ii) Community Identifier:

Burnaby	BU
Coquitlam	CQ
Port Moody	PM
System Wide	SW

- (iii) Fixed Facilities Mnemonics System Identifier:

Fixed Facility Name	Mnemonic
Lougheed Town Centre Station	LH
Lougheed Substation	LHZ
Burquitlam Station	BQ
Burquitlam Substation	BQZ
North Portal Substation	NPZ
Port Moody Central Station	PM
West Port Moody (future)	WP
Electronic Avenue Substation	ELZ (TBD)
loco Station	IO
Falcon Station (future)	FC
Falcon Substation	FCZ
Vehicle Storage Facility	VSF
Vehicle Storage Substation	VSZ (TBD)
Coquitlam Central Station	CC

Fixed Facility Name	Mnemonic
Coquiltam Central Substation	CCZ (TBD)
Lincoln Station	LI
Douglas College Station	DC
Douglas College Substation	DCZ

Note: In the event that a Fixed Facility name changes, the mnemonic will remain the same.

TBD: requirement for substation to be determined by the Primary Contractor in accordance with the requirements set out in Article 13.9.5 [Power System Analysis] of this Part 2.

(iv) Discipline Identifier:

Architectural	A
Art Work	AW
As-built	AB
Automatic Train Control	ATC
Bridge	B
Civil	C
Electrical	E
Environmental Drawings	ENV
Furniture	F
General	G
Graphics and Signs	GS
Landscape	L
LIM Rail	LIM
Mechanical	M
Piping	P
Plan and Profile	PP
Paving and Restoration	PR
Power Rail	PRL
Structural	S
Soils and Geotechnical	SO
Survey	SU
Trackwork	TR
Typical Station	TS

Utilities	U
Miscellaneous cross references	X

- (v) Sheet numbers consist of four digits, starting from 0001 and going up to 9999.
- (b) Examples of drawing numbers, file names, and directory structures:

- (i) Example drawing number (for Systems and Tunnel Ventilation System related drawings)

Type:	C
Contract Number:	XXXX
Community Identifier:	SW
Discipline Identifier:	ATC
Sheet Number:	0001
Revision Number:	1
Drawing Number:	C-XXXX-SW-ATC-0001
Revision Number:	1
Equivalent Path:	...\C-XXXX\
File Name:	C-XXXX-SW-ATC-0001_1.DWG
Equivalent path and file name:	...\C-XXXX/C-XXXX-SW-ATC-0001_1.DWG

- (ii) Example Drawing Number (for Fixed Facility related drawings only)

Type:	C
Contract Number:	XXXX
Community Identifier:	BU
Station Mnemonic (Lougheed Station):	LH
Discipline Identifier:	A
Sheet Number:	0100
Drawing Number:	C-XXXX-BU-LH-A-0100
Revision Number:	3
Equivalent Path:	...\C-XXXX\

File Name: C-XXXX-BU-LH-A-0100_3.DWG
Equivalent path and file name: ... \C-XXXX\C-XXXX-BU-LH-A-0100_3.DWG

17.3 Drawing Titles

- (a) The Primary Contractor shall ensure that drawing titles are clearly marked on each drawing and that all drawing titles are consistent with the drawing titles set out in the Drawing List. Any changes to drawing titles must be submitted to the Province's Representative for acceptance, acting reasonably, pursuant to the Consent Procedure.

17.4 Sheet Size

- (a) The standard for a full-size drawing shall be 558mm x 863mm (22" x 34"). The Primary Contractor shall ensure that each drawing incorporates a title block in the form set out in the sample drawing sheet attached as Attachment A [Sample Drawing Sheet] to this Article 17. An electronic copy of each standard full-size drawing sheet containing the title block will be provided as Disclosed Data.

17.5 Layering Convention

- (a) The Primary Contractor shall establish drawing layer names which shall be descriptive and consistent throughout disciplines. Numbers shall not be used as a layer name.

17.6 Drawing Organization

- (a) The Primary Contractor shall ensure that drawings are presented in the following sequence:
 - (i) the Drawing List, including a reference to the Evergreen Line Rapid Transit Project and the location as to where the drawings refer to;
 - (ii) general arrangements;
 - (iii) general notes;
 - (iv) site plans;
 - (v) site details and other miscellaneous site related drawings;
 - (vi) plans and layouts;

- (vii) elevations or profiles;
 - (viii) full or major sections;
 - (ix) partial enlarged plans;
 - (x) sections and details:
 - A. show typical sections first. Show all typical information on these sections and do not duplicate;
 - B. show sections and details with exceptions next; and
 - (xi) standard details and sections.
- (b) The Primary Contractor shall ensure the following in respect of drawing organization:
- (i) all plans have a north arrow situated in the upper right corner of the drawing;
 - (ii) chainage increasing in order from left to right on the sheet;
 - (iii) a sequence of plan drawings for a drawing set is uninterrupted;
 - (iv) match lines are used for plans that extend over more than one sheet;
 - (v) match lines are labeled with the chainage at the match line location;
 - (vi) key plans appear on all plan type drawings and consist of a series of miniature drawing sheets arranged in the same configuration as the plans when matched together;
 - (vii) a number is placed on the key plan next to the appropriate sheet indicating the current drawing number;
 - (viii) major streets and major watercourses are shown on key plans;
 - (ix) the key plan will be situated in the lower left corner of the sheet; and
 - (x) a ¼ size north arrow will appear in the upper right corner of the key plan.

17.7 Project Coordinates

- (a) The Primary Contractor shall ensure that all drawings are completed using the Project Coordinate System and shall ensure that all drawing elements will be oriented geographically to the Project Coordinate System.

17.8 Drawing Production

The Primary Contractor shall produce drawings in accordance with this Article 17.8 [Drawing Production].

17.8.1 Scales

- (a) The Primary Contractor shall use the scales set out below, as applicable, for drawing production, and shall ensure that drawing scales are clearly shown on each drawing and that a graphic scale bar is included to allow scale verification when drawings are reduced or enlarged when printed. The scale bar shall list scale values to show the scale values at full size and half size.

Drawing type	Scale
block plans	1:2000; 1:1000
context plans	1:1000
site plans	1:500
architectural site plans	1:200
environmental site plans	1:500
plans, elevations and general sections	1:200; 1:250; 1:100
environmental plans, elevations and general sections	1:200; 1:250; 1:100
architectural floor plans, longitudinal sections, cross sections and building elevations	1:200; 1:150
specific areas or sections	1:50
architectural enlarged plans	1:50
architectural enlarged sections	1:20
architectural construction detail drawings	1:25; 1:20; 1:10; 1:5
sections and details	1:20; 1:25; 1:10; 1:5

17.8.2 Drawing Data Stamp

- (a) The Primary Contractor shall ensure that a drawing data stamp is placed into the bottom left margin of the title block. The drawing data stamp shall include the file name and date of the drawing.

17.8.3 Technical Lettering

- (a) The Primary Contractor shall ensure the following fonts and heights are used for drawing production:
 - (i) general lettering: 1.8mm, 2.0mm, 2.5mm, 3.5mm, 5.0mm, 7.0mm, 10.0mm (Romans font, width factor 1.0, oblique angle 0); and
 - (ii) titles of single objects: 1.8mm, 2.0mm, 2.5mm, 3.5mm, 5.0mm, 7.0mm, 10.0mm (True Type Arial font, regular font style, width factor 1.0, oblique angle 0).

17.8.4 Linework

- (a) The Primary Contractor shall ensure that all linework is “by layer” and conforms to Good Industry Practice. The Primary Contractor shall ensure that it uses consistent pen settings throughout Design of the Project as set out in the Design Manual.

17.8.5 Dimensions and Leader Lines

- (a) The Primary Contractor shall ensure the following in respect of dimensions and leader lines:
 - (i) that the dimensions necessary to specify and define the work are provided and that there is no duplication;
 - (ii) that dimensions are drawn using closed filled arrowheads;
 - (iii) that leaders for drawing notes are drawn with a closed filled arrowhead placed at the graphic object which the drawing note refers to;
 - (iv) that all elevations are written in metres and expressed in decimal form to 3 decimal places (e.g. Elev. 2.500); and
 - (v) that site plan dimensions are written in metres and expressed in decimal form to 3 decimal places.

17.8.6 Baylines (Building Grid Lines)

- (a) The Primary Contractor shall ensure that baylines are designated alphabetically and numerically. The number designations shall be used in the long axis with letters being used in the short axis. Baylines shall be indicated using a centre line with a 12mm diameter balloon attached.

17.8.7 Sections

- (a) The Primary Contractor shall ensure the following in respect of sections:

- (i) that section symbols are indicated by a bubble bisected with a line and a connecting line terminated by an arrow;
- (ii) that when cutting large views, two section symbols are used;
- (iii) that sections are oriented looking 'up chainage'; and
- (iv) that section titles are left justified under the section drawn.

17.8.8 Details

- (a) The Primary Contractor shall ensure the following in respect of details:
 - (i) that detail symbols consist of a bubble bisected with a line and a connecting leader line terminated by a larger bubble outlining the desired view; and
 - (ii) that detail titles are left justified under the detail drawn.

17.8.9 Architectural Drawings

- (a) The Primary Contractor shall ensure the following with respect to all architectural sections, elevations, enlarged plans and detailed drawing:
 - (i) that all drawings contained within each sheet have an individual drawing title bubble bisected with a line extending through the bubble and generally the width of the individual drawing sufficient to clearly associate the title with its respective drawing. This requirement will apply to all individual drawings regardless of whether one or multiple individual drawings are arranged on a drawing sheet;
 - (ii) that the bubble is located on the left side of the sheet and the bubble contains the drawing number on the top half and the back reference sheet number is located on the bottom half;
 - (iii) that the drawing title is listed above the title line with the scale of the drawing listed below this line; and
 - (iv) that, where multiple back references are applicable, the most common generic reference of the group is referenced.

17.8.10 Drawing Revisions

- (a) The Primary Contractor shall ensure the following in respect of revisions:
 - (i) that the revision section of the title block is updated when a drawing is changed or upgraded;
 - (ii) that all drawings issued to the Province bear revision numbers starting with revision "0" and subsequent revisions are identified numerically;

- (iii) that revision triangles (60 degree, 10mm) are placed in close proximity to each change and the revision number corresponding to the change is indicated within the triangle;
- (iv) that a copy of the revision triangle is located at the bottom of the drawing sheet in line with the revision triangle placed near the change;
- (v) that revisions are highlighted by drawing a “cloud” to enclose the change and the revision triangle; and
- (vi) that, when making the next series of revisions, all “clouds” drawn for the previous revisions are removed and the next revision is highlighted in accordance with this Article 17.8.10 [Drawing Revisions].

17.8.11 Cross-Reference Files

- (a) The Primary Contractor shall ensure that all files, including cross-references for a given contract, reside in a single directory. The directory name shall be derived from the contract number as shown in the examples set out in Article 17.2.3 [Drawing Numbers, File Names and Directory Structures] of this Part 2.
- (b) The Primary Contractor shall ensure that it does not bind cross-reference files.

17.8.12 Digital Submissions

- (a) The Primary Contractor shall ensure the following in respect of digital submissions to the Province:
 - (i) that all drawings submissions as detailed in Article 2 [Design and Construction Certification Procedures], Part 3 of Schedule 4, shall be provided on clearly, typewritten labeled CD or DVD ROMs;
 - (ii) that compressed files are not used;
 - (iii) that one CD or DVD ROM containing only PDF files of drawing sheets is submitted;
 - (iv) that one CD or DVD ROM containing only design related files is submitted (i.e. xml files from Civil3D, etc.);
 - (v) that, from time to time, at the request of the Province’s Representative, the Primary Contractor shall provide all related AutoCAD drawing files within five working days on a self-sufficient CD or DVD ROM’s containing all the necessary support files and associated drawings. Drawings must be accessible directly from the CD or DVD ROM. Compressed files are not allowed. All files for a particular contract will reside in a single contract numbered directory as shown in Article 17.2.3 [Drawing Numbers, File Names and Directory Structures] of this Part 2;

- (vi) that the CD or DVD ROM case label and disc surface are labeled with the Primary Contractor's name, the Evergreen Line Rapid Transit Project , contract number, submission status (i.e. 100%, etc.), and the date the CD or DVD ROM was prepared; and
- (vii) the CD or DVD ROM volume label is non-blank.

ATTACHMENT A TO ARTICLE 17
 SAMPLE DRAWING SHEET

