



Section 700

Drafting Standards

Engineering Branch

December 2003

700 DRAFTING STANDARDS

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701 INTRODUCTION TO DRAFTING STANDARDS

701.1 ABOUT SECTION 700

Section 700 describes drafting standards that were established to create consistent presentation for all electrical and signing and pavement markings installation drawings.

Electrical and signing and pavement marking drawings are a separate set of drawings which contain some common details.

All Drawings are produced by computer, not manually. Drawings are generated by computer using the drafting program “AutoCAD,” by AutoDesk Inc. The Ministry of Transportation uses AutoCAD software exclusively for:

- .1 Maintenance and development of established drafting standards, ensuring consistent drawing quality and integrity.
- .2 Retrieval and revision of existing cad generated drawings due to ongoing signal and lighting upgrading undertaken by the Ministry.
- .3 Maintenance of the existing system of records to ensure accessibility and continuity.
- .4 Digitizing older, hand drafted drawings.

701.2 BEFORE YOU BEGIN

- .1 Drafters shall confirm the current version of AutoCAD software being used by the Ministry. Digital files are to be submitted in the Ministry approved version only.
- .2 The Ministry requires that all drawings use standard symbols and details. A hardcopy of the library symbols and details are located in Appendix 700. Digital copy can be obtained from the attached compact disc (CD) in Appendix 1000 or at http://www.th.gov.bc.ca/Publications/eng_publications/eng_pubs.htm. Please verify that you are using the current library before you begin. You can verify this one of two ways, by visiting the web site or contacting the Ministry Electrical Representative. Included are some generic details that may require minor modifications to suit the particular application.

702 DRAWING NUMBERING AND FILE NAMES

702.1 OLD DRAWING SERIES VS. NEW DRAWING SERIES

- .1 When you begin drafting from an old design, you need to determine if the new work is considered major or minor.
- .2 Minor work should be considered a revision to the old design. (i.e., new curb return, requires pole relocation, etc.). Proceed using the defened revision procedures.
- .3 If the project requires a complete re-design, (i.e., new geometrics, all new conduit poles, etc.) a new drawing series will be required. Contact the Ministry Electrical Representative for the new project number.

702.2 DRAWING SHEET NUMBERING

- .1 A drawing series number as noted in *Figure 1* is allocated to each project by the Ministry Representative. This drawing number is described as follows:
 - .1 The prefix “TE-” is added to the drawing series number to designate electrical installations, such as signal and/or lighting installations.
 - .2 The prefix “TS-” is added to the drawing series number to designate signing and pavement marking installations.
 - .3 The first two digits in the drawing series number represent the year of the installation (96 = 1996, 00 = 2000, 03 = 2003) and the last three digits represent the sequence of the installation in that year (112 = 112th installation of the calendar year).
- .2 The drawing sheet number is placed on the drawing below and to left of the title block.

DRAWING NUMBERING AND FILE NAMES

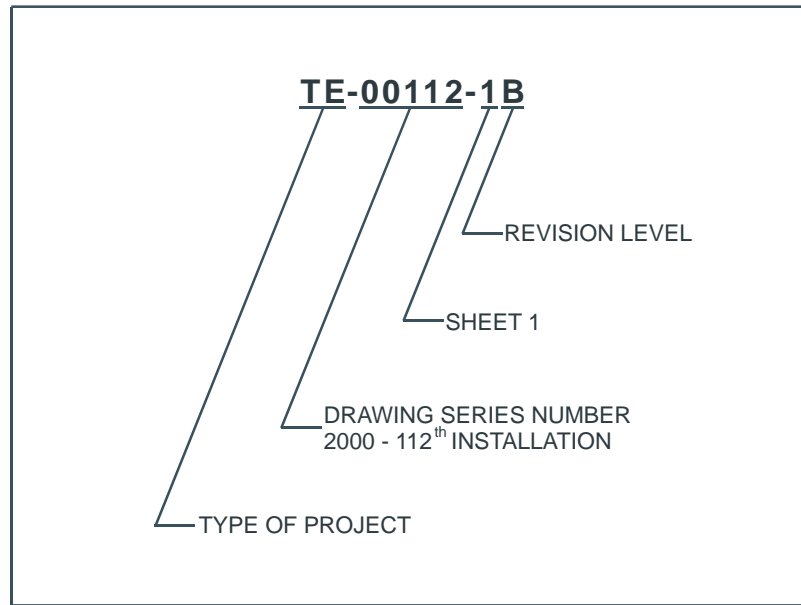


Figure 1. Drawing sheet numbering convention

702.3 DRAWING FILE NAMES

- .1 The typical drawing number convention is shown in *Table 1*.
- .2 Drawing file names are derived from the drawing series number as follows:
 - .1 A five-digit drawing series number, with no prefix, denotes an electrical (lighting and/or traffic signal) installation.
 - .2 The addition of the prefix “S” to the drawing series number denotes a sign and marking installation.
- .3 Revised drawings are identified by adding the revision letter to the end of the drawing file name. Thus, the file name for drawing sheet number TE-01112-1A is 011121A as shown in *Table 1*.

INSTALLATION TYPE	DRAWING SHEET NUMBER	COMPUTER FILE NAME
Signal and Lighting	TE-01112-14	0111214
Signal and Lighting (Revised)	TE-01112-14A	0111214A
Signing and Markings	TS-01112-14	S0111214

Table 1. Drawing sheet and computer file names

703 STANDARD DRAWING SHEETS

703.1 GENERAL

- .1 All electrical or signing and marking installation drawings are prepared using the standard template sheet (e.g., EEC_A.DWT).
- .2 A softcopy (digital file) of the standard drawing sheet is located in *Appendix 700*.
- .3 All drawing parameters such as layers, text style, linetypes, linetype scale factor, snap resolution and system variables are defined in the “EEC_A.DWT”. All drawings for the Ministry must use the settings defined in this drawing.

703.2 STANDARD DRAWING SHEET BORDERS

- .1 *Appendix 1000* contains a softcopy (digital file) of the drawing border – “EEC_A.DWT” and two plotting overlays: “EECL_A.DWG” and “EEC_A.DWG”.
- .2 The current EEC_A.DWT is used to create new drawings and update old drawings. It defines the usable drawing area and text positioning. It is used only for editing drawings, not for plotting. The surround or neatline layer “EEBASE” is turned off when the drawing is saved/submitted to the Ministry.
- .3 “EECL_A.DWG” and “EEC_A.DWG” are not to be modified and no other border drawings are to be substituted. EECL_A.DWG contains the legend and title block information and is x-referenced to the drawing for plotting of sheet one only. “EEC_A.DWG” is similar to “EECL_A.DWG” except it has no legend. “EEC_A.DWG” is to be used for plotting all sheets other than sheet one. **All standard drawing sheet border x-refs are to be removed before submission to the Ministry.**

703.3 STANDARD DRAWING SHEET SCALE

- .1 Drawings submitted are not to be scaled in any manner.
- .2 All components introduced into the drawing (e.g., site plan, elevations, details) are inserted onto the project drawings at presentation scale.
- .3 Refer to *Clause 707.2 (Table 3)* for electrical and signing site plan presentation scale by type of installation.
- .4 Refer to *Chapter 707.4* for information of electrical symbols and labels.
- .5 Refer to *Chapter 707.5* for information of signing and marking symbols and labels.

703.4 STANDARD DRAWING SHEET EDITING - GENERAL

- .1 The EEC_A.DWT file contains the title block and revision block text entries that are edited on each drawing. These text entities are on their proper layers (e.g., EECTEXT) and remain on when the “EEBASE” layer is off.
- .2 All text on electrical drawings is in upper case using the AutoCAD “Romans” font. No other fonts are to be used. Descriptive text, such as callouts, dimensioning (including leaders), etc. is entered on the “EEYTEXT” layer, 2.0mm in height, regardless of the rotation of the site plan. Text pertaining to the site plan (eg. roads, rivers, stationing, etc.) are rotated to match the site plan.
- .3 Single line callouts are shown using a dimension-leader with the Dimensioning System Variables set as in EEC_A.DWT supplied in *Appendix 1000*. Multiple line callouts require the use of a facing bracket (a vertical line extending the depth of the lines of text) in conjunction with arrowhead leaders. Conduit callout brackets are to be as shown on sample drawings in *Appendix 700*.

703.5 STANDARD DRAWING SHEET EDITING - TITLE BLOCK

- .1 The title block section of “EEC_A.DWT” is edited to identify the following (refer to *Figure 2*):
 - .1 Line 1: Installation Type (e.g., SIGNAL AND LIGHTING INSTALLATION) as specified by the Ministry representative.
 - .2 Line 2 and/or 3: Location of Installation (Route number (“local name”) and cross street names).
 - .3 Line 4: City, Town or Area of Installation.
 - .4 Line 5: Drawing Contents, e.g., Site Plan - Notes - Wiring Diagram - Elevations - Details. For multiple intersection projects, the site plan enlargement and details sheets of the individual intersections are identified by adding the cross street name after the drawing contents title, on “EECTEXT”, 3.5mm height, eg. SITE PLAN (FIFTH STREET). The two text entries are centered in the drawing contents title space (see examples, *Appendix 700*).
- .2 Sheet # of # - enter the sheet number and total number of sheets in the drawing series. Note that leading zeros are not used. (e.g., sheet 7 of 9, not sheet 07 of 09.)
- .3 Site Code - South Coast region only at this time (contact Ministry Electrical Representative).
- .4 District - enter the highway district number.
- .5 Region - enter the highway region number.


703.6 STANDARD DRAWING SHEET EDITING - REVISION BLOCKS

- .1 The revision block is edited for all drawings to include the following:
 - .1 Designed by – Enter designer’s initials (3 characters) and the month and year of the current design using 5 characters – e.g., APR/03.
 - .2 Checked by - To be hand initialed by a checking designer. Refer to *Section 204.1*.
 - .3 MoT Electrical Design Review - To be hand initialed by MoT reviewer.
 - .4 Rev - enter the revision letter (unless it is the first issue of the drawing series, in which case it is left blank).

STANDARD DRAWING SHEETS

- .5 Date - Enter the current month and year of installation or revision using 5 characters - e.g., APR/00.
- .6 Description of why drawing was issued:
 - .1 ISSUED FOR CONSTRUCTION (new electrical installation).
 - .2 DRAWING ISSUED – NO CHANGE – RECORD DRAWING (new drawing number – no change to drawing – latest drawing of the site).
 - .3 LOOP CONFIGURATION CHANGED – RECORD DRAWING (as-built information has been added to the drawings - latest drawing of the site).
- .7 Drawn - Enter consultant or MoT employee initials.

STANDARD DRAWING SHEETS

	REVISION LETTER (WHERE APPLICABLE)																				
	5 CHARACTER ENTRY ONLY (E.G. JUL/01)																				
	INFO PROVIDED																				
	CONSULTANT EMPLOYEE OR MINISTRY INFO PROVIDED																				
	5 CHARACTER ENTRY ONLY (E.G. JUL/01)																				
	DRAFTING SERVICE COMPANY NAME OR CONSULTANT EMPLOYEE INITIALS (MAXIMUM 10 CHARACTERS)																				
	PROJECT TITLE, LOCATION, AND DRAWING CONTENTS INFO PROVIDED																				
ENGINEERING CONSULTANT COMPANY LOGO	 MINISTRY OF TRANSPORTATION ELECTRICAL ENGINEERING CENTRE																				
DESIGNED BY <u>XX</u> DATE <u>XXX/XX</u> CHECKED BY _____ DATE _____	XXX XXXXXXXXXXXXXXXXXXXXXXXXXXXX																				
M.O.T. ELECTRICAL DESIGN REVIEW _____ DATE _____	XXXXXXXXXXXXXXXXXXXXXXXXXXXX																				
REVISIONS	XXXXXXXX - XXXXX - XXXXX																				
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;">REV</th> <th style="width: 10%;">DATE</th> <th style="width: 80%;">DESCRIPTION</th> <th style="width: 5%;">DRAWN</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">XXX/XX</td> <td style="text-align: center;">XXXXXXXX</td> <td style="text-align: center;">X</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	REV	DATE	DESCRIPTION	DRAWN	X	XXX/XX	XXXXXXXX	X													ELECTRICAL ENGINEER OF RECORD (FOR CURRENT REVISION)
REV	DATE	DESCRIPTION	DRAWN																		
X	XXX/XX	XXXXXXXX	X																		
	DATE _____																				
SHEET NUMBER SHEET XX OF XX	SITE CODE _____ HWY DIST XX REGION X DRAWING NUMBER TE-00XXX-XX																				

SHEET No. _____	
TOTAL No. OF SHEETS _____	
SENIOR ELECTRICAL ENGINEER ENGINEERING HEADQUARTERS OR CONSULTING ENGINEER _____	
INFO PROVIDED _____	
HIGHWAY DISTRICT No. _____	
REGION No. _____	
PROJECT No. _____	
SHEET No. _____	
REVISION LETTER (WHERE APPLICABLE) _____	

Figure 2. Sample title block

704 DRAWING LAYERS AND LINETYPES

704.1 GENERAL

- .1 Required drawing layering and linetypes for Ministry electrical and signing and pavement marking drawings are described in the following clauses.

704.2 DRAWING LAYERS

- .1 The layer colours and linetypes for the electrical drawings are defined through the AutoCAD “BYLAYER” option, which is the only method to be used. This will ensure all entities are on their proper layers. Only Survey plan layers are permitted to have more than one linetype and colour per layer.

- .1 Pen to line weight parameters are as follows:

<u>Pen No./Colour</u>	<u>Pen Width</u>
1 (Red)	0.25 mm
2 (Yellow)	0.35 mm
3 (Green)	0.50 mm
4 (Cyan)	0.70 mm
5 (Blue)	0.25 mm
6 (Magenta)	0.25 mm
9 (Grey)	0.25 mm
11 (Salmon)	0.01 mm

- .2 Refer to *Table 2* for a listing of commonly used layers.
- .3 If it is necessary to create a new layer, use the naming convention outlined in *Table 2*, Electrical Drawing Layers and notify the Ministry Electrical Representative of the new layer created.
- .4 All shading is set at 25 percent.

DRAWING LAYERS AND LINETYPES

Standard Drawing Layers for Electrical and Signing Drawings

<u>Layer</u>	<u>Colour</u>	<u>Line Type</u>	<u>Examples for use</u>
0	7	Continuous	Construction lines
EECTEXT	4	Continuous	>2.5 mm high text
EEGTEXT	3	Continuous	2.5 mm high text
EEYTEXT	2	Continuous	2.0 mm high text
EEC120	4	120-240V	120/240V Electrical conduit
EEC347	4	347-600V	347/600V Electrical conduit
EECCOM	4	Communication	Communication conduit
EE11CO	11	Continuous	Future poles
EE11DA	11	Dashed	Future geometrics
EE11HI	11	Hidden	Future loops
EECCO	4	Continuous	Overhead conductors (EEC only) and base symbols
EECHI	4	Hidden	Hidden electrical conduit (elevations)
EEGCO	3	Continuous	Elevations and symbols
EEMCO	6	Continuous	Miscellaneous thick lines
EERCE	1	Centre	Dimension line at centre of object
EERCO	1	Continuous	Elevations, details and symbols
EEYCO	2	Continuous	Elevations, details and symbols
EEYDA	2	Dashed	Elevations, details and symbols
EEYSM	2	Smdots	All equipment to be removed or relocated

Survey Drawing (Xref) Colours and Layers for Electrical and Signing Drawings

<u>Layer</u>	<u>Colour</u>	<u>Line Type</u>	<u>Examples for use</u>
EEP254	254	Continuous	Stop bars, crosswalks & chevrons (bordered by a 0.25mm line)
N/A	2	Continuous	Edge of pavement, misc. geometrics
N/A	2	Dashed	Edge of gravel shoulder
N/A	2	Smdots	Edge of pavement to be removed
N/A	3	Continuous	Control lines and station markings only
N/A	11	Retain Civil line types	All underground utilities
N/A	2	Phantom	Property Lines
N/A	9	Retain Civil line types	All Lane Lines and edge of lane lines

Drawing layer naming convention

EEGCO

EE = Electrical Engineering

G = Colour (3 = Green)

CO = Line Type (Continuous)

Table 2. Electrical, Signing and Survey drawing layers

DRAWING LAYERS AND LINETYPES

704.3 LINETYPES

- .1 For linetypes, use those supplied in the file "EEC.LIN". Refer to the softcopy (digital file) of the symbols library in *Appendix 1000*.
- .2 The global linetype scale factor of 1.0 is used in electrical drawings.

<u>LINETYPE NAME</u>	<u>EXAMPLE:</u>
CENTER (CE)	-----
COMMCOND (COM)	-----
CONTINUOUS (CO)	—————
DASHED (DA)	-----
FUTURE (FU)
HIDDEN (HI)	-----
PHANTOM (PH)	-----
SMDOTS (SM)
TECK (TEC)	-----
TELEPHONE (TEL)	-----
120/240V (120)	-----
347/600V (347)	-----
PAINT LINE (P250) (1:250 SITE PLAN)	— — — — —
PAINT LINE (P500) (1:500 SITE PLAN)	— — — — —
CONTINUITY (C250) (1:250 SITE PLAN)	— — — — —
CONTINUITY (C500) (1:500 SITE PLAN)	— — — — —

NOTE: LETTERS ENCLOSED IN PARENTHESIS () DENOTE ABBREVIATIONS FOR LINETYPES USED IN LAYER NAMES.

Figure 3. Electrical drawing linetypes

705 DRAWING SHEET LAYOUT

705.1 GENERAL

- .1 Guidelines for the layout of drawings are as follows:
 - .1 The electrical legend is only presented on Sheet 1 of each drawing series.
 - .2 Location Plan and (if necessary) Sheet Key Plan shall be placed on Sheet 1.
 - .3 Installation notes are placed on the first site plan sheet with enough space to accommodate them. The location of the notes is referenced on all other sheets.
 - .4 The colour code is typically placed on the site plan sheet identifying the service panel.
 - .5 Refer to the following sections and the examples shown in *Appendix 700* for details.

705.2 DRAWING SHEET LAYOUT FOR SMALL ELECTRICAL PROJECTS

- .1 The following are examples of drawing sheet layouts for small projects. The scale information enclosed in square brackets [] is for reference only and is not included in the drawing sheet title.
 - .1 Conduit and Junction Box Installation.
Sheet 1: Site Plan [1:500] - Notes - Details
 - .2 Lighting Installation.
Sheet 1: Site Plan [1:500] - Key Plan - Notes
Sheet 2: Wiring Diagram - Elevations - Details
 - .3 Traffic Signal and Lighting Installation
Sheet 1: Site Plan [1:500] - Key Plan - Notes
Sheet 2: Site Plan [1:250] - Colour Code
Sheet 3: Elevations - Wiring Diagram - Details
 - .4 Signing and Marking Installation
Sheet 1: Site Plan [1:500] - Key Plan - Notes - Sign Listing
Sheet 2: Elevations- Details

DRAWING SHEET LAYOUT

- .2 The inclusion of the wiring diagram and colour code on the site plan sheet, though preferable, is dependent upon the length of the roadway approaches to the signalized intersection. A traffic signal installation complete with advance warning signs generally requires two site plan sheets. Therefore, the wiring diagram, together with the elevations and installation details are placed on succeeding sheets. The colour code is placed on the 1:250 site plan sheet detailing the electrical wiring at the traffic controller.

705.3 DRAWING SHEET LAYOUT FOR LARGE ELECTRICAL PROJECTS

- .1 Large Lighting Projects.
 - .1 Large lighting projects are presented at 1:500 scale using the basic layout technique of including the wiring diagram, colour code and service pole elevation on the site plan sheet identifying the location of the electrical service. The colour code and service pole elevation are included in the term “Details” in the drawing sheet title.
 - .2 The following is an example drawing sheet layout for a large lighting project. Information enclosed in square brackets [] is for reference only and not included in the drawing sheet title.
 - Sheet 1: Location Plan - Key Plan - Notes
 - Sheet 2: Site Plan
 - Sheet 3: Site Plan - Wiring Diagram - Details [Service 1]
 - Sheet 4: Site Plan
 - Sheet 5: Site Plan - Wiring Diagram - Details [Service 2]
 - Sheet 6: Site Plan - Wiring Diagram - Details [Service 3]
- .2 Large Lighting Projects with Signalized Intersections:
 - .1 Large lighting projects with signalized intersections are also laid out in consecutive order at 1:500 scale.
 - .2 A site plan enlargement reference box is drawn around the 1:500 scale signalized intersection site plan (on layer “EECCO”). The reference box area contains only the basic signal layout details, including the following:
 - .1 Traffic signal and luminaire pole station numbers.
 - .2 Service panel location.
 - .3 Traffic controller location.
 - .4 Luminaire circuit numbers/wattage.
 - .5 PEC location.

DRAWING SHEET LAYOUT

- .6 Junction box type (e.g., 10, 11, 12, etc.).
- .7 Conduits.
- .3 Signal wiring, phase identification, detector loops and installation detail labeling are not shown in this area.
- .4 Cross-reference notes shall be added to the 1:500 scale site plan indicating “REFER TO SHEET X FOR SITE PLAN ENLARGEMENT” and “REFER TO SHEET X FOR WIRING DIAGRAM AND DETAILS”.
- .5 An “enlargement reference box” is drawn around the necessary portion of the signalized intersection on the 1:500 scale site plan (on layer “EECCO”). This area is duplicated, enlarged to 1:250 scale and inserted onto a separate drawing sheet along with the colour code. This is to be followed by its respective elevation and detail sheet at the end of the project. The 1:250 scale site plan enlargement is shown enclosed within the same reference box lines shown on the 1:500 scale site plan. The 1:250 box is cross-referenced to the 1:500 box with the text “FOR CONTINUATION SEE SHEET X” on layer “EEGTEXT” at height of 2.5 on each side where the electrical continues on the 1:500 drawing.
- .6 The following are examples of drawing sheet layouts for a large lighting project with signalized intersections. Information enclosed in square brackets [] is for reference only and not included in the drawing sheet title.

- Sheet 1: Location Plan – Sheet Key Plan - Notes
- Sheet 2: Site Plan [1:500] – Elevations [Typical Luminaire]
- Sheet 3: Site Plan [1:500] - Wiring Diagram - Details (First Street) [Lighting]
- Sheet 4: Site Plan [1:500] (Second Street) [Signal]
- Sheet 5: Site Plan [1:500] - Wiring Diagram - Details (Third Street) [Lighting]
- Sheet 6: Site Plan Enlargement [1:250] Wiring Diagram (Second Street) [Signal]
- Sheet 7: Elevations - Details (Second Street) [signal elevations, detector loop details, signal display, etc.]

705.4 DRAWING SHEET LAYOUT FOR SIGNING AND MARKINGS PROJECTS

- .1 The following is an example of a drawing sheet layout for signing and marking projects. The scale information enclosed in square brackets [] is for reference only and is not included in the drawing sheet title.

- Sheet 1: Site Plan [1:500] - Notes

DRAWING SHEET LAYOUT

Sheet 2: Elevations – Details

705.5 KEY PLAN SHEETS

- .1 Key plan sheets are required for large projects extending over multiple site plan drawing sheets. Key plan sheets are required to serve as a quick reference for locating specific areas of the project by sheet number and for providing an overall view of the drawing sheet layout of the project. This is particularly true of interchange lighting projects where site plans tend to become fractured due to the limitations of the drawing sheet size. The key plan sheet shall contain the following:
 - .1 Notes - typical notes for entire project.
 - .2 Sheet Index - list of drawings by number with the exact title of each sheet.
 - .3 Project Location Map - a small map of the area to identify where the project is located.
 - .4 Sheet Key Plan - details the location of each site plan relative to the entire project.
- .2 The sheet layout is prepared using the project control line extracted from the roadworks plans. Boxes delineating the extents of each drawing sheet are then placed in consecutive order along the control line and labeled with the corresponding sheet number. The sheet layout plan is completed to include the following:
 - .1 Station numbers. (100 m intervals only).
 - .2 Route number and/or name.
 - .3 Cross street names.
 - .4 Destination indicators.
 - .5 Limits of Construction.
 - .6 Service panel location(s).
 - .7 Division between services.
- .3 The presentation scale of the sheet key plan is optional, depending on the overall length of the project and availability of space on the drawing sheet.
- .4 Separate key plan sheets are required for electrical and signing and markings drawing series.

706 SURVEY BASE PLAN DRAWINGS

706.1 GENERAL

- .1 Electrical and signing and markings site plans are generated from survey base plans that are either supplied on disk or digitized from hard copy survey plans.
- .2 The use of a computer scanned T.I.F. file of an original hard copy site plan survey is recommended over hand digitizing.
- .3 The EEC_A.DWT file contained in the drafting standards library is used as the prototype drawing when digitizing plans. This file is configured to include layers and drawing parameters set to Ministry standards.
- .4 Refer to *Appendix 700* for Survey Base Plan sample drawing. This drawing will help to assist the drafter with the survey base plan preparation by defining the proper layers and linetypes.

706.2 SURVEY BASE PLAN SCALE

- .1 Survey base plans are digitized in metric units (millimetres) to 1:1000 scale.

706.3 SURVEY BASE PLAN

- .1 Survey base plans are laid out so that the primary highway is run horizontally across the page with the cross streets run on the vertical, unless directed otherwise.

706.4 SURVEY BASE PLAN CONTENTS

- .1 Survey base plans contain only the roadway geometrics, roadway paint markings and site layout details as described by layer in *Chapter 704*. Refer to the *Pavement Markings Standards Manual* (see *Clause 104.1*) for complete guidelines of roadway paint markings and delineation.
- .2 There are no electrical, signing and markings symbols or miscellaneous site plan symbols on survey base plans. The AutoCAD “Point” or some other temporary locative mark is used to identify the position of existing or proposed electrical equipment, such as luminaires, traffic signal and sign

SURVEY BASE PLAN DRAWINGS

structures, power and/or telephone poles, etc. These locative marks are erased once the appropriately sized symbols are inserted into the drawing.

706.5 MODELSPACE AND PAPERSPACE

- .1 The use of modelspace and paperspace in MoT drawings is allowed. Everything in modelspace should be drawn at 1:1000 and everything in paperspace should be drawn at presentation scale (1:500, 1:250).
- .2 The drawing's modelspace will contain the survey base plan only (1:1000). For Projects that require multiple site plans, the use of an External Reference "Xref" drawing is recommended. The civil base should be prepared with the standard MoT drafting layers.
- .3 The drawing's paperspace will contain any viewports and all electrical design elements (e.g.; drawing sheet, site plan design, symbols, details etc.).

706.6 EXTERNAL REFERENCE (XREF) DRAWINGS

- .1 Only one Xref should be used per project. All survey and Civil design should be included in the one file.
- .2 When attaching the Xref drawing to the design drawing, they should be located in the same folder. Ensure that the "retain path" is not checked in the Xref Manager dialogue box.
- .3 Xref drawing file names shall follow the same method as noted in *Section 702.2* with exception of adding "xref" at the end instead of the sheet number. (e.g., 01121xref.dwg).
- .4 Set the User Coordinate System (UCS) in the Xref drawing to "world".
- .5 Xref drawings should be inserted at 0,0 in modelspace of the design drawing.
- .6 Xref drawings must be included with any digital drawing submissions to MoT.

706.7 VIEWPORTS

- .1 Viewports can be created with the "mview" command.
- .2 Viewports should use one of the typical MoT scales for site plans as noted in *Section 707.2* (i.e., 1:500, 1:250) depending on the type of Project. *TIP:*

SURVEY BASE PLAN DRAWINGS

Scale the viewport with the ZOOM XP command. (e.g.; 2XP for 1:500 plans, 4XP for 1:250 Plans)

- .3 Turn on “Viewport View Locking” after creation of all viewports.
- .4 Set the "psltscale" to 1. This will ensure all linetype scales match between the site plan in modelspace and the viewport in paperspace.
- .5 Viewports should be set to the “viewport” layer and frozen or configured not to print.

707 SITE PLAN DRAWINGS

707.1 GENERAL

- .1 When preparing any site plan drawings, the drafter shall use the standard library symbols located in *Appendix 1000*.
- .2 Separate site plan drawings are required for electrical and signing and markings installations. These drawings are defined as follows:
 - .1 **Electrical** - Represent any installation with electrical equipment. This shall include any sign poles or structures with electrical equipment.
 - .2 **Signing and Markings** - These drawings show all signs and markings. Sign poles or structures with electrical equipment are shown on the electrical drawings and duplicated on the signing and markings drawings.
- .3 Refer to *Appendix 700* for Electrical and Signing and Markings base plan sample drawing. This drawing will help to assist the drafter with the design preparation by defining the proper layers and linetypes.

707.2 TYPICAL SCALES

- .1 Project drawings are constructed at presentation scale on the EEC_A.DWT Standard Template Sheet.
- .2 Plot scale is always set at 1:1.
- .3 Presentation scales for Site Plans (Viewports) are listed in *Table 3*.

TYPE OF INSTALLATION	REQUIRED SCALE
Traffic Signal (Electrical)*	1:500 + 1:250
Lighting (Electrical)	1:500
Flashing Beacon (Electrical)	1:500
Pre-Duct (Electrical)	1:500
Signing and Markings	1:500
* Traffic signals include pedestrian and fire signals	

Table 3. Site plan scales

SITE PLAN DRAWINGS

707.3 BASE PLAN SYMBOLS AND LABELS

- .1 Once the survey base plan drawing (or T.I.F. file) is positioned on the base drawing sheet (EEC_A.DWT), the following items will be added, as required.
 - .1 **North Arrow:** - A north arrow shall be located in the top left hand corner of the site plan and shall be inserted at 1:1 scale for both 1:250 and 1:500 site plans. For the north arrow symbol, refer to *Appendix 700*.
 - .2 **Installation Notes:** - The appropriate installation “Notes” block, shall be inserted on a site plan drawing and modified, as required, with the AutoCAD snap mode set at 2.0 mm value to maintain consistent spacing. For blocks of typical notes refer to *Appendix 700*.
 - .3 **Posted Speed Note:** - All electrical drawing sheets with site plans are to include posted speed information (use “POST.DWG”).
 - .4 **Miscellaneous Notes:** - The appropriate notes shall be inserted on the site plan drawing and modified as required. For typical notes, refer to *Appendix 700*.
 - .5 **Roadway Geometrics Identification:** - The following roadway geometric information shall be identified only once on each site plan drawing. If possible, the callouts should be grouped together on the left side of the site plan:
 - .1 Lane edge (Typ.).
 - .2 Edge of pavement (Typ.).
 - .3 Gravel shoulder (Typ.) or curb and gutter (Typ.).
 - .4 Existing roadway (Typ.).
 - .5 Future roadway (Typ.).
 - .6 Sidewalk ramps and drop curbs.
 - .7 Concrete roadside or median barriers.
 - .8 Property lines.
 - .6 **Other Site Plan Labeling** - Items such as rivers, bridges, buildings or businesses located in the construction area are identified on the site plan on layer “EEYTEXT”, 2.5 mm height and underscored. Note: the AutoCAD control code “%%u” is used for all text underscoring.

SITE PLAN DRAWINGS

- .7 **Control Line and Station Numbers:** - Control line station chainage markings are located at 20m intervals and labeled every 100m on layer "EYTEXT", 2.0mm high. Station numbers shall be applied as follows:
- .1 Station numbers identify the location of luminaire and traffic signal poles, poles located in traffic islands and sign structures, with respect to the construction control line. Station numbers are positioned behind the concrete base symbol and rotated at the same angle as the pole, generally perpendicular to the control line.
 - .2 Station numbers are rounded to the nearest metre, e.g., 105+02.
 - .3 Rotation of station number text entries are entered as illustrated in *Figure 4*.
 - .4 The letters "Sta" are not required.
 - .5 Station numbers are only to appear when objects are being installed, relocated or removed. Station numbers are not required next to objects not being affected by a design.

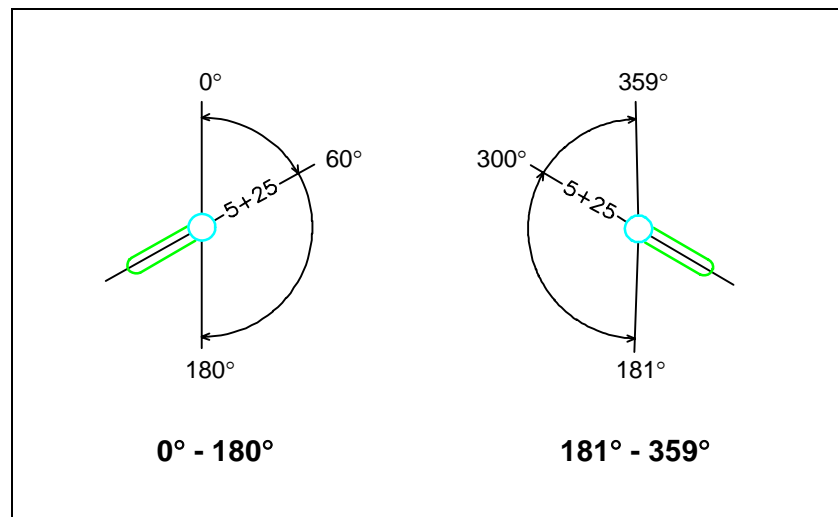


Figure 4. Rotated text alignment

SITE PLAN DRAWINGS

- .8 **Roadway Pavement Markings** - Shall be added in accordance with the Ministry *Pavement Marking Manual*. Typical pavement symbols have been developed and are shown in *Appendix 700*. When presenting pavement markings, make note of the following:
- .1 Directional arrows are inserted centered in the traffic lane and rotated at an angle parallel to the lane line. Generally, there are two arrows per turn slot, positioned three to five metres from each end.
 - .2 Not all pavement markings are included on electrical installation drawings, therefore a paint marking exclusion note (PAINT.DWG) is added to all site plans. Dedicated left and right turn directional arrows are included, while “straight through” direction arrows are omitted.
 - .3 On 1:250 scale drawings left turn arrows for signal site plan drawings are moved back from their actual locations so that detector loops are not obscured.
 - .4 Linetypes shall be as noted in *Figure 3* or as noted in the Ministry *Highway Design Manual Section 1200*.
- .9 **Road Names:** - Route number and name, if applicable and cross street names are entered on the site plan on layer “EEGTEXT”, 2.5 mm height as follows:
- .1 The Ministry standard for highway identification is “Route”, not highway (e.g., Route 3A, not Highway 3A). Exceptions include unnumbered highways such as the Inland Island Highway and numbered highways identified locally with proper names such as Route 7 (Lougheed Highway).
 - .2 The primary roadway name (e.g., Route 22) is preferably located at the far left of the site plan. The text entries for both primary and cross street names are rotated to the same angle as the roadway lane lines.
- .10 **Roadway Destination Indicators:** - Roadway destinations such as “← To Whistler” or “To Vancouver →”, are identified on the primary route at the extreme left and right hand sides of the roadway. For multiple site plan projects, the destination indicators are identified on all site plan sheets. For roadway destination labels, refer to *Appendix 700*.

SITE PLAN DRAWINGS

- .11 **Title and Scale Identification:** - Each site plan is labeled with the site plan reference and the scale. For site plan label, refer to *Appendix 700*.

707.4 ELECTRICAL SITE PLAN SYMBOLS AND LABELS

- .1 Wiring Notes:

- .1 All wiring and conduit shall be identified on the site plan drawings.
- .2 Arrowhead leaders using AutoCAD “Dim: Lead” are used for single conduit runs. For leaders identifying multiple conduit runs use the “ELLIPSE” symbol.
- .3 Site plan conduit and wiring callouts and leaders are drawn on layer “EYTEXT”.
- .4 The following list illustrates the order in which conductors are to appear within the wiring and conduit brackets:
 - .1 Cont Pwr (Controller Power)
 - .2 Emerg Pre-empt Pwr (Emergency Pre-empt Power)
 - .3 O/C Sign Pwr (Open/Close Sign Power)
 - .4 Irr Pwr (Irrigation Power)
 - .5 Lum (Luminaire)
 - .6 PEC (Photo Electric Cell)
 - .7 Sig (Signals)
 - .8 Sig Neut (Signal Neutral)
 - .9 Adv Warn Flash No XX (Advance Warning Flasher No. XX)
 - .10 Is Flash (Island Flasher)
 - .11 Comm (Communication Intertie)
 - .12 Tel (Telephone)
 - .13 Emerg Ind Lt (Emergency Indication Lights)
 - .14 Emerg Pre-empt Intercon (Emergency Pre-empt Interconnect)
 - .15 Emerg Pre-empt Sensors (Emergency Pre-empt Sensors)
 - .16 Rail Pre-empt Inter (Rail Pre-empt Interconnect)
 - .17 Rail Signing (Blankout sign)
 - .18 Loops (Detector Loops)

SITE PLAN DRAWINGS

.19 Bond (Bonding Conductor)

- .2 **Service and Distribution Panels** - The two main types of service used by the Ministry for roadway signals and lighting are the overhead drop service and the underground dip service. Standard symbols are as follows:
 - .1 The symbols “PANEL” and “SERDISC” are used to locate the electrical service equipment on the Ministry pole and Hydro utility, respectively. Refer to *Appendix 700*.
 - .2 The service panel or distribution panel and corresponding service disconnect panel are numbered and labeled on the site plan.
- .3 **Division of Services** - The division of services on projects with multiple services are indicated using the symbol “SERDIV” which clearly delineates the end of one service and the beginning of the next. Refer to *Appendix 700*.
- .4 **Telephone Demarcation Panel** - The symbol “DEMPAN” is used to indicate the panel used for telephone intertie connections. The panel is typically mounted on a Ministry pole and labeled “Telephone Demarcation Panel.” Refer to *Appendix 700*.
- .5 **Junction Boxes** - Are represented by the generic “JB” symbol as shown in *Appendix 700*. The junction box type is identified by adding the appropriate JB number (e.g., 10, 11, 12, etc.) next to the JB symbol.
- .6 **Concrete Junction Boxes and Vaults** - Are represented by the generic “CJB” symbol as shown in *Appendix 700*. The concrete junction box or vault is identified by adding a note stating “concrete junction box” or “small concrete vault” with an arrow to the box. The concrete junction box is further clarified by placing the letter “C” beside it.
- .7 **Conduit** - Conduit is run from junction box to junction box, using AutoCAD “Osnap: Midpoint” to produce clean break lines at the junction boxes. Conduit is not run through concrete bases. Conduit is drawn as follows:
 - .1 By layer, according to purpose, such as 120/240V or Communication. Refer to *Table 2* for a complete listing of conduit layers by application.

SITE PLAN DRAWINGS

- .2 Dual conduit runs are drawn at an offset of 1.0 mm for both 1:250 plans and 1:500 plans and are centered on centre of junction box symbol. Triple and quadruple conduit runs are drawn in the same manner. Refer to Sample Projects in *Section 700* for depicting 3 or more conduits connecting to the junction box symbol.
- .8 **Concrete Bases** - Concrete bases are represented by the generic “circle” symbol integrated with the appropriate signal, luminaire or sign pole symbol. Refer to *Appendix 700*.
- .9 **Luminaire Poles** - All luminaire poles are represented by the generic “LT” symbol. Refer to *Appendix 700*. When presenting luminaire poles make note of the following:
 - .1 The symbols are inserted on the site plan using AutoCAD “Osnap: Perpendicular” to the control line. If no control, then perpendicular to road shoulder marking.
 - .2 Each luminaire is identified with a service number, circuit number, luminaire number, and wattage as shown in *Figure 5*.
 - .3 Luminaires installed with flat glass refractors are identified on the site plan as shown in *Figure 5*.

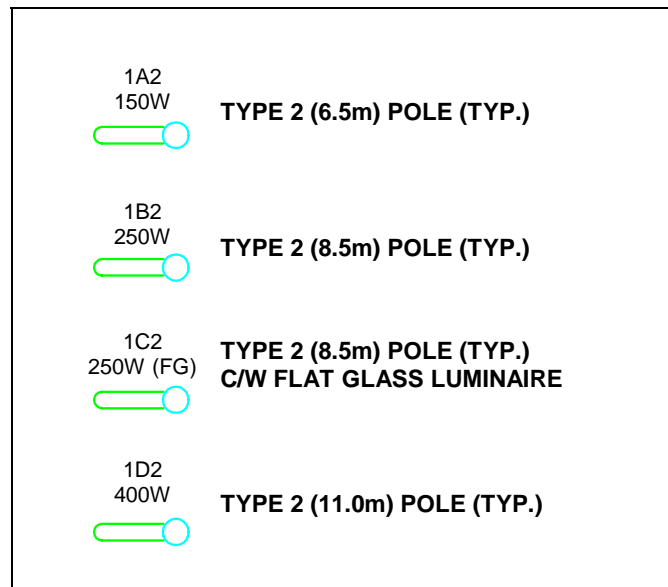


Figure 5. Luminaire pole symbols

- .10 **Highmast Lighting** - Highmast poles are represented by the symbol “HIMAST”, as shown in *Appendix 700*. When presenting highmast lighting poles, note the following:

SITE PLAN DRAWINGS

- .1 The symbol is inserted on the site plan using the AutoCAD “Osnap: Perpendicular” to the control line.
 - .2 The symbol requires the outline of the concrete base and the orientation of the luminaire optical system to be specified.
 - .3 Each luminaire shall be identified with the circuit number and wattage.
- .11 **Photo Electric Cell (PEC)** - Is mounted on the service pole of the installation or on the closest luminaire pole to the service. The letters “PEC” are placed next to the appropriate pole to show its location. Generally there is one PEC per lighting service.
- .12 **Frangible and Breakaway Bases** - Luminaires equipped with frangible bases are designated by the letter “F”, which is placed next to the concrete base symbol. 13.5 m luminaire poles and Type 3 sign poles equipped with breakaway bases are designated by the letter “B”, which is placed next to the concrete base symbol.
- .13 **Traffic Signal Poles** - Traffic signal poles are represented using the appropriate symbols shown in *Appendix 700*. When presenting signal poles make note of the following:
- .1 Blocks are inserted onto the 1:250 scaled drawings and the line representing the arm is stretched to suit the desired reach. Arm length for Type 1, 3, 6 and 7 poles is measured from the centre of the circle representing the base of the pole, for this purpose. Arm length for Type S, L, M and H poles is measured from the arm flange.
 - .2 The total arm length is labeled alongside the pole symbol on the 1:250 site plan. It is centered over the pole arm reach and entered on layer “EYTEXT”, 2.0 mm height. Refer to *Figure 6*.

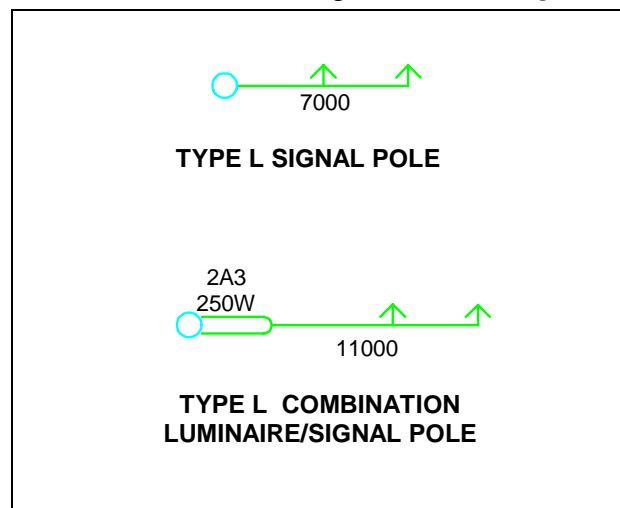


Figure 6. Signal pole symbols

SITE PLAN DRAWINGS

- .3 Types 4, 4A and 5 signal posts are represented using the symbol “SIGPT” as shown in *Appendix 700*. The symbol is edited, as required, to correspond with the number of signal heads side-mounted on the post. *Figure 6* illustrates the symbol used for signal posts.
 - .4 Each traffic signal pole is individually numbered on the site plan using the symbol “POLENO” in a clockwise manner, starting with the signal pole in the traffic controller quadrant. Refer to *Appendix 700*.
- .14 **Signal and Pedestrian Heads** - Are represented using the symbol “AHEAD”, which indicate primary and secondary heads respectively. Refer to *Appendix 700*. The symbols are inserted using AutoCAD “Osnap: End of” or “Nearest” onto the signal pole symbol and rotated to the appropriate angle in the direction of the movement that the signal head is controlling. As shown on *Figure 7*, a letter designation such as A1, B2, PA2, is then placed next to the “SIGNAL HEAD” symbol to identify the phase the signal head represents.
- .1 Signal head tunnel visors shall be shown on both the site plan and elevation drawings with a “(T)”.
 - .2 Audible pedestrian signal indications are shown on the drawings to include “(a)” appended to the signal head designation on both the site plan and elevation.

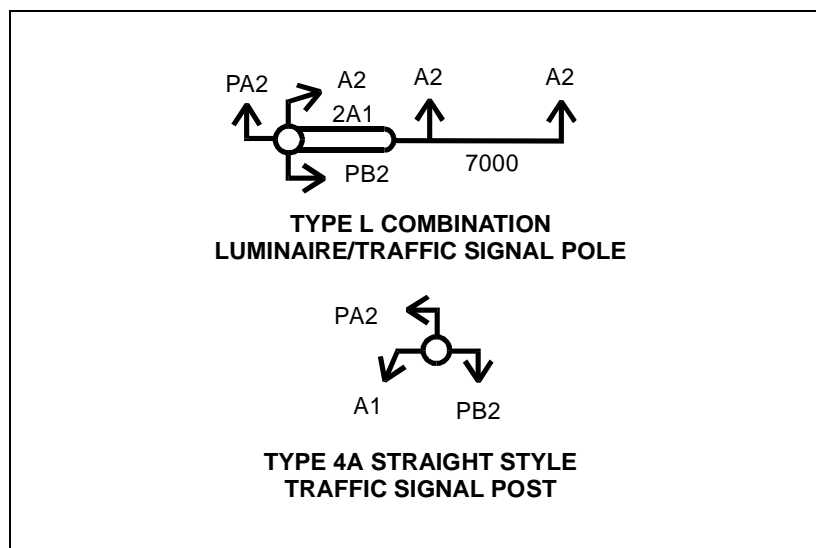


Figure 7. Signal head labeling

SITE PLAN DRAWINGS

- .15 **Advance Warning Signs** - Are installed on sign poles and are represented by the symbols AWFLT and AWFSP. Refer to *Appendix 700*. When presenting advance warning signs, make note of the following:
- .1 The advance warning sign number, such as No. A1, No. A2 beside each pole.
 - .2 The advance warning sign distance. In the case where an intersection is enlarged to a 1:250 scale site plan from a 1:500 scale layout, the advance warning sign distance is shown on both site plans.
 - .3 Approach grade is noted on both 1:250 and 1:500 traffic signal site plans.
- .16 **Post Mounted Flashers** - are represented by the symbol “FLASHER”. Refer to *Appendix 700*.
- .1 **Traffic Controllers** - are base mount or pole mount type. Base mount controllers are represented by the symbols “MTC” - 4 phase and “STC” - 8 phase. Pole mount controllers are represented by the symbol “PMTC”. Refer to *Appendix 700*.
 - .2 The traffic controllers are to be labeled only on the 1:250 site plans.
- .17 **Vehicle Detector Loops** – four types of loops are presently utilized by the ministry Diamond, Round, Pre-formed and Rectangular. When presenting detector loops, make note of the following:
- .1 **Quadrupole Loop** - symbol “LOOP” represents the previous standard detector loop and is used only when drafting existing installations.
 - .2 **Loop Number Assignment** - All loops shall be labeled starting at the traffic controller and numbered sequentially clockwise. Detector loops are labeled only on the 1:250 site plan. If the loops only appear on the 1:500 site plan, they are to be numbered there.
- .18 **Emergency Vehicle Pre-emption** - Siren, strobe, radio and digital cellular activated pre-emption systems are represented with the appropriate block as shown in the Drafting Standards Drawings, in *Appendix 700*. Sample project drawings illustrating the current electrical design and drafting presentation standards, for each type of emergency pre-emption system, are included in *Appendix 700*. Pre-emption system components and mounting are to be confirmed by the Ministry Electrical Representative.
- .19 **Railroad Pre-emption** - Sample projects illustrating the current electrical design and drafting presentation standards for railroad pre-emption systems, including designs with and without fibre-optic turn restriction signs, are

SITE PLAN DRAWINGS

included in *Appendix 700*. LED sign mounting is to be confirmed by the Ministry Electrical Representative.

- .20 **Short Count Stations** - Refer to *Appendix 700* for drawing detail.
- .21 **Permanent Count Stations** - Refer to *Appendix 700* for example drawings.
- .22 **Proposed Electrical Equipment** - such as poles and junction boxes are shown as inserted.
- .23 Existing Electrical Equipment
 - .1 Poles, junction boxes and conduits are shown as inserted or drawn. The note block “ALL EQUIPMENT IS EXISTING EXCEPT WHERE NOTED” is placed on the drawing. Only objects being modified are tagged with “INSTALL”, “RELOCATE”, etc.
- .24 **Existing Electrical Equipment to be Removed or Relocated** - including conduit runs, are drawn on layer “EEYSM”, and labeled accordingly.

707.5 SIGNING AND MARKING SITE PLAN SYMBOLS AND LABELS

- .1 **Luminaire Signal and Sign Poles, Sign Bridge and Cantilever Structures** - are shown on the signing and markings drawings using the appropriate symbols from drawing located in *Appendix 700*. When preparing drawings, make note of the following:
 - .1 Sign poles and structures with electrical equipment are shown on both the electrical and signing and markings drawings.
 - .2 Each sign pole and structure shall be individually numbered and labeled from the beginning to the end of the project to match electrical drawings.
 - .3 Each sign pole shall display the sign message. The sign faces should be shown on the 1:500 site plan. The sign face shall be oriented to face the flow of traffic. Refer to examples in *Appendix 700*
 - .4 Electrical information such as luminaire wattages, and circuit numbers are not shown on the signing and markings drawings.
 - .5 Electrical information is generally shown on the electrical drawings only.
- .2 **Pole Mounted Signs** - Smaller signs mounted on the shaft of a pole are represented by the “SNPT” symbol. Refer to *Appendix 700*.

SITE PLAN DRAWINGS

- .3 **Breakaway Sign Structures** - are represented by the symbols “BRSN2” and “BRSN3” located in *Appendix 700*. Each breakaway sign structure shall be individually numbered and labeled “SNOTE4” and shall display the sign message as shown in *Appendix 700*.
- .4 **Wood Post Sign Structures** - are represented by the symbols “WP1” and “WP3” located in *Appendix 700*. Each multi leg wood post shall be individually numbered and labeled from the beginning to the end of the project with label “SNOTE5” and shall display the sign message shown in *Appendix 700*.
- .5 **Perforated Square Steel Sign Structures** - are represented by the symbols “SS1” and “SS2” shown in *Appendix 700*.
- .6 **Round Steel Sign Structures** - are represented by the symbols “RS1” shown in *Appendix 700*.
- .7 **Barrier Mounted Sign Structures** - are represented by the symbols “BSMCMB” and “BMCRB” shown in *Appendix 700*.
- .8 **Signs With Flashing Luminaires** - sign posts with flashing amber luminaires shall be shown on both the signing and marking and electrical drawings and shall be labeled “For Information Only”. Refer to Electrical drawings on the signing and markings drawings.
- .9 **Delineators** - are represented by the symbols “STLTD”, “WPD” and “SSD” shown in *Appendix 700*. Each delineator shall show the number and colour of the reflectors, for example 1W for one white reflector, 3Y for three yellow reflectors.
- .10 **Raised Pavement Markings** - are reflectors mounted on pavement and/or concrete barriers and are represented by the symbols located in *Appendix 700*.
- .11 **Sign Listing Table** - each drawing series shall have a sign listing table indicating all required permanent signs. This listing table shall include Ministry sign numbers, description of message, quantity and any mounting hardware normally supplied by the sign shop. Mounting hardware shall include J clips, aluminum T section and angle iron supports. The sign listing table block is located in *Appendix 700*.

708 POLE AND STRUCTURE ELEVATIONS

708.1 GENERAL

- .1 All signal, lighting, sign poles and structures with electrical equipment are shown on the electrical elevation drawings. Sign poles and structures with no electrical equipment are generally shown on the signing and markings drawings. Under no circumstances shall elevations be duplicated on the electrical and signing and marking drawings.
- .2 Elevations are generally on the electrical drawings for the following:
 - .1 Each service pole.
 - .2 Each signal pole.
 - .3 Each advance warning sign pole.
 - .4 Each sign pole (with electrical equipment).
 - .5 Each luminaire pole type and mounting arrangement.
 - .6 Each pole with telephone demarcation panel.
 - .7 Each pole with emergency panel/indication lights.
 - .8 Each cantilever sign structure (with electrical equipment).
 - .9 Each sign bridge structure (with electrical equipment).
 - .10 Each sign mounted on an over/underpass structure (with electrical equipment).
 - .11 Any special poles or structures.
- .3 Elevations are generally required on signing and markings elevation drawings as follows:
 - .1 Each sign pole and structure with no electrical equipment.
 - .2 Each multiple leg wood post sign structure.
 - .3 Each breakaway sign structure.
- .4 Elevations are assembled from the ground upwards, starting with the concrete base. Each additional component of the pole or structure is inserted using AutoCAD “Osnap” exploded and trimmed as necessary. Elevations are oriented in such a way that the overhead primary signal heads or signs face forward (approach view).

POLE AND STRUCTURE ELEVATIONS

708.2 ELEVATION SHEET LAYOUT

- .1 Pole and structure elevations are laid out across the drawing sheet from left to right in the order in which they are labeled on the site plan.
- .2 Sign structures with electrical shall generally be shown on the electrical drawing series, whereas signs with no illumination are generally shown on the signing and marking drawing series.

708.3 ELEVATION LABELING

- .1 Each individual elevation shall be labeled as per the following examples:
 - .1 Service Poles - Service Pole No. 1 etc.
 - .2 Signal Poles - ①, ②, ③, etc.
 - .3 Advance Warning Sign Poles - Adv Warn Flash No. A1, etc.
 - .4 Sign Poles - S1, S2, S3, etc.
 - .5 Luminaire Poles - TYPICAL NEW LUMINAIRE POLE, TYPICAL EXISTING LUMINAIRE POLE.
 - .6 Any special poles or structures - describe pole or structure and station.
 - .7 Multiple Wood Post Structures - Wood Post Structure No. 1, etc.
 - .8 Breakaway Sign Structures - Breakaway Sign Structure No. 1, etc.
 - .9 Cantilever Sign Structures - Cantilever Sign Structure No. 1, etc.
 - .10 Sign Bridge Structures - Sign Bridge Structure No. 1, etc.
- .2 Elevation labels, are entered on layer “EEGTEXT”, 2.5 mm height, underscored and spaced vertically at 5.0 mm. Station number identification is centered below the elevation label on layer “EEYTEXT”, 2.0 mm height and underscored.
- .3 Title and scale identification (e.g., ELEVATIONS 1:75) shall be added under each set of elevations. Refer to *Appendix 700* for standard drawing block.

708.4 CONCRETE BASES

- .1 Standard concrete bases are represented with the appropriate symbols shown in *Appendix 700*. Non-standard bases must be drawn to scale from scratch.
- .2 The Ministry utilizes a number of standard concrete bases for various pole and structure types.
- .3 Standard concrete bases for poles or structures shall be labeled with their base type. Non-standard concrete bases shall be labeled with a reference to the base design drawing.

708.5 LUMINAIRE POLE ELEVATIONS

- .1 The wattage of luminaire required generally determines the height of the Type 2 pole used by the Ministry for lighting roadways and other areas. Luminaire shafts and arms are represented with the applicable symbols shown in *Appendix 700*.

708.6 SIGNAL POLE ELEVATIONS

- .1 The configuration of traffic signal pole elevations is determined from data provided on the site plan. Typical signal pole elevations are shown on the sample drawings located in *Appendix 700*.
- .2 Each elevation identifies the total reach of the pole arm. The extensions and arms are added to the elevation using AutoCAD “Osnap”.
- .3 **Signal and pedestrian heads** are added to the elevation and oriented in the direction shown on the site plan. Overhead primary signal heads are mounted to the signal arms using the appropriate mounting hardware. The secondary heads and the pedestrian heads are mounted to the pole shaft using single arm brackets. Standard signal heads and mounting hardware are represented with the applicable symbols shown in *Appendix 700*.
- .4 **Pedestrian pushbuttons and signs**, though not shown on the site plan, are added to the pole elevation and oriented in the direction of the movement of pedestrian traffic. Pushbuttons and signs are represented with the applicable symbols shown in *Appendix 700*.

POLE AND STRUCTURE ELEVATIONS

- .5 **Street name signs** may be mounted on a signal arm. Street name signs are represented by the symbol “G7SN.DWG” (less than 70km/h), “G7OSN.DWG”(70km/h and higher) and “G8SN.DWG”(double street name signs) shown in *Appendix 700*.
- .6 **Audible signals** where required, shall be mounted on pedestrian heads. For audible signals use the symbol “AUDL” and “AUDF”.
- .7 **Emergency pre-emption equipment** where required, , as shown on the sample project drawings in *Appendix 700*.
- .8 The signal pole elevation is completed by the addition of the following:
 - .1 If required, the luminaire davit arm and extensions, and the luminaire symbol. Labeling the wattage and lamp type (e.g., “250W HPS”), is centered below the luminaire, with the roadway luminaire number centered above (e.g., “2A6”), and if applicable labeling the luminaire as flat glass is centered below the lamp type in brackets, i.e., “(FG)”.
 - .2 Signal displays such as A1, A2, B1, B2, PA1, etc., shall be shown next to the signal or pedestrian head.
 - .3 Pedestrian pushbutton and sign type such as SP10-L, ppb-PA1, etc., shall be shown next to the pushbutton and sign.

708.7 SERVICE POLE ELEVATIONS

- .1 Service and distribution panels are represented by the symbols “SERVEOH”, “SERVEUG” and “SERVEOHF”, shown in *Appendix 700*. The symbols are inserted on the pole elevation using AutoCAD “Osnap”. The panel number is modified using the “Change” command. Typical service pole elevations are shown on the sample drawings in *Appendix 700*.

708.8 SIGN POLE ELEVATIONS

- .1 Standard sign poles are represented with the applicable symbols as shown on the sample drawings located in *Appendix 700*. Signs are generally not illuminated with the following exceptions:
 - .1 All warning signs are normally illuminated with one 175W MV sign luminaire.
 - .2 Other signs where directed by the Traffic Engineer, are illuminated using 175W and 250W MV luminaires as required.

POLE AND STRUCTURE ELEVATIONS

- .2 The sign message shall be imported off the sign record drawing. The sign face may also be shown on the 1:500 site plan, oriented to the direction of travel.
- .3 The total arm lengths and the span from the centre of the sign to the centre of the pole is identified on each pole.
- .4 The elevations shall be labeled as follows:
 - .1 If the sign pole supports a roadway luminaire show the wattage and lamp type (e.g., “250W HPS”), centered below the luminaire, with the roadway luminaire number centered above (e.g., “2A6”), and if applicable labeling the luminaire as flat glass is centered below the lamp type in brackets, i.e., “(FG)”.
 - .2 The sign should be labeled with its dimensions and identification number.
 - .3 The sign luminaire must have a label identifying the luminaire circuit, e.g., “SIGN LUM. ON CCT. A”. The wattage and type of luminaire must also be identified (e.g., “175W MV”).

708.9 SIGN BRIDGE AND CANTILEVER ELEVATIONS

- .1 A typical single truss sign bridge structure elevation is represented with the symbol shown in *Appendix 700*. This drawing is intended to serve as a guide when preparing signbridges and cantilever elevations and shall be modified as required. Elevations for typical generic structures may be found in the Chapter 306 of the Ministry *Electrical and Signing Material Standards*.
- .2 The sign message shall be imported off the sign record drawing.

708.10 BREAKAWAY SIGN STRUCTURES

- .1 Each breakaway sign structure is represented with the symbol shown in *Appendix 700*. This drawing is intended to serve as a guide for the presentation of breakaway sign elevations and shall be modified as required.
- .2 The sign message shall be imported off the sign record drawing.

708.11 WOOD POST SIGN STRUCTURES

- .1 Multi-leg wood post sign structures are represented by the symbols shown in *Appendix 700*. This drawing is intended to serve as a guide for the presentation of a wood post sign elevation and shall be modified as required.

POLE AND STRUCTURE ELEVATIONS

- .2 The sign message shall be imported off the sign record drawing.

709 ELECTRICAL DETAILS

709.1 CONDUCTOR COLOUR CODE

- .1 A conductor colour code table is required for each electrical system.
- .2 Where audible signals are required, they shall be noted on the applicable pedestrian movements shown on the conductor colour code table. Refer to example drawing located in *Appendix 700*.
- .3 Typical conductor colour code tables are shown in *Appendix 700*. The drafter shall select the appropriate table and edit it to suit the electrical design.

709.2 SIGNAL OPERATION DIAGRAM

- .1 A signal display is required for each signalized intersection to show the sequence in the signal operation.
- .2 Typical signal displays are shown in *Appendix 700*. The drafter shall select the appropriate table and edit it as required.
- .3 Where audible signals are required, they shall be noted on the signal display as shown in *Appendix 700*.
- .4 The signal display is completed by identifying the intersection's street names and the north arrow orientation in the first frame of the display only.
- .5 If emergency vehicle preemption is required, each preemption movement shall have its own signal display box. Refer to *Appendix 700* for an example.

709.3 DETECTOR LOOP DETAILS TABLE

- .1 A detector loop table is required for each signalized intersection. The table lists the vehicle detector loops required for the traffic signal installation, the individual inductances and phase identification for connection in the traffic controller.
- .2 A detector loop table with typical 4 turn diamond loops is shown in *Appendix 700*. This table shall be edited and finalized to suit the signal design.

709.4 SERVICE WIRING DIAGRAM

- .1 A service wiring diagram is required for each service panel.
- .2 Typical wiring diagrams are shown in *Appendix 700*. The drafter shall select the appropriate diagram and edit it as required. The following editing is required:
 - .1 The luminaire number if there is a luminaire located at the top of the service pole.
 - .2 Where required, the number of conductors that run up the pole to the traffic signal heads (e.g., X No. 14).
 - .3 Use the note block “**WNOTE**” and edit it to suit when adding or removing equipment to the existing service panel.
 - .4 The service or distribution panel number in the wiring diagram title, as applicable.
 - .5 Service voltage.
 - .6 Telephone demarcation and/or signal pre-emption equipment, as required.

710 DRAWING REVISIONS AND RECORD DRAWINGS

710.1 DRAWING REVISIONS

- .1 When a revised edition of the drawing sheet is issued a revision letter such as A, B, or C is added to the end of the drawing file name (e.g., “941131.dwg” becomes “941131A.dwg”). Any revisions to the Xref should be noted in a similar fashion as the design drawings. (e.g., 01121xrefA.dwg).
- .2 A revision is required on the drawing when any changes are made to a previously signed and sealed drawing.
- .3 A new digital drawing file is created for each revision issued, and is submitted to the Ministry upon completion.
- .4 Revisions to existing electrical installations are presented as follows:
 - .1 **Identify New Electrical** - all new work on site plans, elevations and details are labeled with instruction notes: ADD:, INSTALL:, REMOVE:, etc. The addition of the note block “ALL EQUIPMENT IS EXISTING, EXCEPT WHERE NOTED” on the drawings. “ADD”, “REMOVE” and “INSTALL” notations are entered as necessary on layer “EEGTEXT”, 2.5mm high and underscored. Refer to the sample drawings located in *Appendix 700*.

710.2 TITLE AND REVISION BLOCK UPDATING

- .1 Title and revision block updating include the following:
 - .1 Revision letter identification in the title block.
 - .2 Designer initials and date, revision letter and date, revision description and drafter initials in the revision block.

710.3 REVISION LABELING

- .1 All changes to the current drawing are clearly labeled as the current revision, on layer “EEGTEXT”, 2.5 mm height and underscored (e.g., REV. A).
- .2 All previous revision labels are removed from the current drawing and those changes described in the previous revision completed to reflect current status. For example, on a “REV. B” drawing, all “REV. A” changes are

DRAWING REVISIONS AND RECORD DRAWINGS

completed on the drawing (e.g., phase additions, wiring changes, pole relocations, etc.). The “ADD” and/or “REMOVE” notations are erased and the “REV. A” labels are then removed.

710.4 RECORD DRAWINGS

- .1 Drawings are revised and the drawing number brought to the next revision letter (as applicable) when “as-built” information is added to the drawing.
- .2 The notation “RECORD DRAWING” is entered in the revision block under the new revision letter.
- .3 Record drawings have the following characteristics:
 - .1 No electrical equipment tagged as existing.
 - .2 No references to the removal and/or addition of electrical components.
 - .3 No revision labels. (e.g., REV. B).
 - .4 No underground utilities (i.e., turn off or freeze the underground layer(s)).

711 DRAWING DIGITAL FILE STORAGE

711.1 DRAWING STORAGE

- .1 Once the drawings are finished, the items on the following checklist are completed:
 - .1 Limits for all electrical installation drawings are to be set at -28.0, -5.0 to 828.6, 538.8.
 - .2 All residual “QTEXT” points must be deleted. Set “QTEXT” “ON”, “ZOOM” “ALL” and delete points outside the specified limits.
 - .3 “EEBASE” layer is turned off.
 - .4 Drawing is at AutoCAD: “Zoom - all” status.
 - .5 All blocks contained in the drawing file are exploded using the AutoCAD “Explode” command.
- .2 AutoCAD: “Wblock” or “PURGE” is used to clear out all unused blocks, layers, linetypes, etc. to reduce drawing size.
- .3 All final drawing submissions are to be in AutoCAD “MODEL SPACE” format.
- .4 Final drawing submissions are to include “all” Xref drawings.
- .5 The Consultant is required to maintain a digital backup of the current revision of all drawings submitted to the Ministry.

711.2 DRAWING FILE

- .1 Form of submission shall be confirmed with the Electrical Representative in charge of each project and all must be labeled as follows:
 - .1 Drawing No. – e.g., TE-99016
 - .2 Type of installation – e.g., Signal and Lighting
 - .3 Address (using drawing title) e.g., Route 3 at 6 St, Nelson

DRAWING DIGITAL FILE STORAGE

- .2 The Ministry Electrical Representative will ask for drawing files to be submitted in one of the following formats:
 - .1 Email using MIME encoding method. Individual “.DWG” files may be transmitted for small projects. However, if files total over 1.0MB, drawings must be archived into a self-extracting file.
 - .2 Compact disks may be used for record drawing files. Disks shall be formatted to be read by a standard CD-ROM device.
 - .3 Zip disks may also be used. Disks shall be formatted to be read by a standard 100MB Zip drive.
 - .4 3.5 inch floppy disks may be used for small projects.