

**CI-0705****TAB 7: TECHNICAL DISCIPLINES****Drawing Standards****GENERAL****OVERVIEW**

GO Transit has a detailed set of standards for preparing drawings. These standards are flexible enough to handle all types of drawing needs, but specific enough to provide uniformity between drawings.

**BASIS OF CRITERIA****CAD SUBMISSION REQUIREMENTS FOR CONTRACT AND RECORD DRAWINGS DOCUMENTS**

All drawings are to be produced on a CAD (Computer-Assisted Design) system with file portability and which is compatible with GO Transit's CAD system via the following format:

- > drawing file (.DWG); AutoCAD 2012

Consultant to provide GO Transit with 'As Built' contract drawings both on hard copy and respective computer (CAD) files and PDF format. The computer (CAD) files to be forwarded such that they are in a format compatible with and directly readable by GO Transit's CAD system namely:

- > Operating System: WINDOWS 7
- > Software Program: AutoCAD 2012
- > Storage Media: CD ROM or DVD

**REQUIREMENTS****GENERAL**

- > All design work shall be created in model space.
- > Use of external reference files (XRefs) should be minimized wherever possible.
- > XRefs, when possible, shall be attached, not overlaid. Insertion point is to be at 0, 0 unless otherwise impractical.
- > Include all files, both graphic and non-graphic, required for accessing (e.g., raster files, plot style, text styles, etc.)
- > Submitted CAD drawings shall be purged of all un-referenced line types, blocks, layers, shapes and text styles.



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#### Drawing Standards

- > Blocks shall be created on Layer 0, and shall not be mirrored, or inserted with unequal X, Y and Z scale factor. Insertion point to be at 0, 0 unless otherwise impractical.
- > The colour of all drawing elements should be set to BYLAYER, colour shall not be set by object.
- > Limit excessive use of hatch patterns to avoid unnecessarily large files. Solid hatches shall be with the SOLID command. Using dense hatch patterns to create solid fill shall not be permitted in the drawing set.
- > Continuous linear elements such as contour lines, or curb lines, shall be constructed with continuous polylines.

#### **STANDARD REQUIREMENTS**

Drawing presentation, size symbols and details must be standardized as much as possible to facilitate reading and handling. The criteria contained herein have been compiled for the purpose of establishing, defining, and clarifying procedures and standards to be used for project drawings.

#### **STANDARD GO TRANSIT DRAWING SHEET SIZES**

- > ANSI D (22" x 34")/ISO A1 SIZE

(Full size drawing submission must be plotted on exact media size of 22" x 34" and 11" x 17" for half-size.)

- > ANSI E/ISO AO SIZE (Subject to approval)

PEN ASSIGNMENT & STANDARD GO TRANSIT DRAWING SHEET – ANSI D/ISO A1 SIZE (Unit in Metric) \* all files shall be saved in AutoCAD version 2012 format

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Drawing Standards

**PEN ASSIGNMENTS****PEN ASSIGNMENT & STANDARD GO TRANSIT DRAWING SHEET – ANSI D/ISO A1 SIZE  
(UNIT IN METRIC) \* ALL FILES SHALL BE SAVED IN AUTOCAD VERSION 2012 FORMAT**

No.	Colour	Pen Size
1	Red	0.15
2	Yellow	0.25
3	Green	0.20
4	Cyan	0.45
5	Blue	0.35
6	Magenta	0.25
7	White	0.25
8	Grey	0.15
9	Light Grey	0.10
252	Grey (screen)	0.10
Others – 0.25mm or specified by the Consultant.		

Please use Pack 'n GO or e-Transmit includes all related attachments and submit 'ctb' file to GO Transit with each drawing submission.

**TITLE BLOCK**

GO Transit will supply the latest titleblock in electronic format both in block and layout template settings for consultant to use as default. Any modifications need to be submitted for GO Transit approval prior to drawing production. The layout of the title block, including the reference drawings and revision columns, shall be as indicated on Figure, Standard Title Block.

For example of the Drawing Identification Block, refer to figure XX on page 576



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Drawing Standards

#### DRAWING FILE NAMING SYSTEM

##### DRAWING FILE NAMING SYSTEM

FILE NAME:gobassht.dwg\* (or copy and paste block file ANSI\_Dtitleblock.dwg)

(dwt file can be saved in user's AutoCAD application template location for quick layout creation)

\*Use for all design drawings as title block.

Please insert and edit attribute w/attedit command. (Note: DO NOT explode or rename block or treat as external reference in order to maintain the attribute's integrity).

Insert block @0,0,0

Original scale: 1 to 1 mm

Drawing size 'ANSI D' 558.8 mm x 863.6 mm (22" x 34")



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#### Drawing Standards

FILE NAME:GO ANSI D signsheet.dwg

(dwt file can be saved in user's AutoCAD application template location for quick layout creation)

Copy drawing file and rename to suit.

DO NOT explode or rename block.

Edit attribute w/attedit command.

Drawing size 'ANSI D' 558.8 mm x 863.6 mm (22" x 34")

Plot to limits.

Layer: 'BORDER\_NOT\_PLOT' plotting function has been disabled and do not change the setting.

FILE NAME:GO ANSI D titlepage.dwg

(dwt file can be saved in user's AutoCAD application template location for quick layout creation)

Copy drawing file and rename to suit.

DO NOT explode or rename block.

Edit attribute w/attedit command.

Drawing size 'ANSI D' 558.8 mm x 863.6 mm (22" x 34")

Plot to limits.

Layer: 'BORDER\_NOT\_PLOT' plotting function has been disabled and do not change the setting.



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#### Drawing Standards

#### TEXT SIZE

- > Dimension Arrowhead shall be arrow, oblique or tick.
- > Typical note font shall be RomanS with 3.5 mm high and 1.0 width scale.
- > Medium font size: 4.5 mm; Large font size: 6 mm.

\* DO NOT create multiple drawings/tabs in ONE file and please remove all unrelated layouts (tabs).

#### STANDARD NAMING OF DIGITAL DRAWING FILES

All drawings' file names created for GO Transit must be named in the following manner:

i.e., CAD file name = 'GO Project No.' (6 digits) with (-) 'Drawing No.'.dwg

Digital File Name Example:

059243-A001.dwg Drawing number 1 of architectural job w/ GO project number 059243

059243-A002.dwg Drawing number 2 of architectural job w/ GO project number 059243

052053-M001.dwg Drawing number 1 of mechanical job w/ GO project number 052053

052053-M002.dwg Drawing number 2 of mechanical job w/ GO project number 052053

Drawing No. and Drawing Type in titleblock shall be C-001, L-001, A-001,

S-001, M-001, E-001, etc. accordingly.

All civil, landscape, structural, electrical, and other drawings shall be named in a similar manner.

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Drawing Standards

**TYPICAL DISCIPLINE LETTERS:**

G – General

C – Civil

L – Landscaping

A – Architectural

S – Structural

M – Mechanical

E – Electrical

R – Rail

WSP – Wayfinding and Signage Drawings

D – Process Drawings

**DESCRIPTION OF TITLEBLOCK ATTRIBUTES**

Attribute Tag	Prompt	Enter Value	Examples
Facility	Enter Station Name	XXXXXXXXX STATION  *do not insert word “GO” before STATION or BUS TERMINAL.	MAPLE STATION;
			MIDDLEFIELD;
			WILLOWBROOK;
			FINCH BUS TERMINAL*;
			STEEPROCK GARAGE*;
			WHITBY WAYSIDE*;
			VARIOUS STATIONS (pertain to contract that is for more than one station in the same corridor);



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Attribute Tag	Prompt	Enter Value	Examples
			VARIOUS FACILITIES (pertain to contract that is for more than one station in the various corridors).
Desc	Enter Description	TYPE OF WORK	PARKING LOT EXPANSION CCTV UPGRADE – STREETSVILLE P.A. UPGRADE – CREW CENTRE PLATFORM EXPANSION – WHITBY
Minordesc	Enter Minor Desc 1	DESC 1	EXISTING LAYOUT
Minordesc2	Enter Minor Desc 2		REMOVAL
Cap_Pro_Nu	Enter GO Project Number	XXXXXX	059625 (6 digits)
Contract_N	Enter GO Contract Number	XX-200x-EN-xxx	IT-2004-EN-025; PT-2005-EN-001
Dwg_No	Enter Drawing Number	C-001	C-002, A-001, M-001, E-001, L-001, etc.
Rev	Enter Revision Number	1	1,2,3.....
Sheet	Enter Sheet No. (of Total Sheet No.)	1	12/120 (cover page = p.1 & signing sheet = p.2)
DrawnBy	Enter Cad Operator	X.X.X.	
DwgDate	Drawn Date	YY/MM/DD	beginning of the project.
Designedby	Enter Designer's Name		
Designdate	Designed Date	YY/MM/DD	
CheckBy	Checked By		



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Drawing Standards

Attribute Tag	Prompt	Enter Value	Examples
CheckDate	Checked Date	YY/MM/DD	
ApprovedBy	Approved By		
Approvdate	Approved Date	YY/MM/DD	
Scale	Enter Drawing Scale		

**DRAWING NUMBERING SYSTEM**

A two (2) segment drawing numbering system will be used (e.g., C-001, A-001, M-001, E-001, SP-001, PP-001):

1. 1st segment - drawing type - see below; and
2. 2nd segment - sequence number - from 001 to 999.

**SEQUENCE NUMBER**

If more than one consultant prepares drawings for one contract, groups of numbers will be allocated to each Subconsultant by main Consultant, i.e., 001 to 099, 100 to 299, etc.

**SKETCHES**

When the drawing is a Sketch, the letters SK will precede the sequence number, e.g., PR SK 001.

**CONTRACT NUMBER**

Contract number will be assigned by GO Transit.

**SHEET NUMBERS**

Drawing order in the contract book shall be established by numbering (1, 2, 3 of total sheets, e.g. 1/28) each sheet, in the box at the bottom right-hand corner, adjacent to the drawing number, in the sequence desired. New drawings added after the contract book has been prepared, shall be placed in the order desired, by using the preceding sheet number followed by the letter A, B, C, etc.

**REVISIONS**

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Revisions shall be recorded in the appropriate location in the Drawing Identification Block. All amendments or revisions to preliminary, contract or standard drawings shall be recorded in the revision column as follows.

**PRELIMINARY DRAWINGS**

All revisions to preliminary drawings and sketches shall be recorded, initialled and dated in the revision column. Each revision shall be numbered sequentially starting with number one (1). It shall not be necessary to identify the change in the drawing or to retain a record file copy of the drawing. Should a preliminary drawing become a contract drawing, all noted revisions shall be removed from the revision column.

**CONTRACT DRAWINGS**

All amendments or revisions to contract drawings shall be recorded, initialled and dated in the revision column. Amendments made during the tender period (by addendum) or revisions made afterward during construction (by change order) shall be numbered sequentially starting with number one (1) and shall be clearly marked to identify the change. The revision number shall be placed directly below the revision cloud in the bottom border to highlight the change location. Description of the change, in the revisions column shall be brief, and should include the change order number. Amendments made during the tender period need not be described, but reference to the "Addenda No" should be indicated. When a drawing is redrawn or a new drawing added, the revision column should indicated "Redrawn" or "New Drawing" respectively. If there are previous revisions on a drawing to be redrawn, then the next sequential revision number shall be used on the redrawn drawing.



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### TAB 7: TECHNICAL DISCIPLINES

#### Drawing Standards

#### **STANDARD DRAWINGS**

All revisions to standard drawings should be made by CAD and only by the original consultant and shall be recorded, initialled and dated in the revision column, numbered sequentially, starting with number one (1). These revisions shall remain on the drawing when used in a contract.

#### **REFERENCE BLOCK**

The reference drawing block should list drawings containing related information. Specific reference drawings called up in the body of the drawings should be repeated in the "Reference Drawings" block.

#### **SCALES**

All scales shall be metric, unless circumstances dictate use of imperial and approved by GO Transit.

#### **GRAPHIC SCALES**

The basic scale used on each drawing shall be noted and shown graphically where indicated on the title block. A graphic scale shall be provided on all scale drawings as shown on Page 29. A sampling of recommended scales to be used are as follows:

- > 1:2000, 200, 20;
- > 1:1000, 100, 10; and
- > 1:5000, 500, 50, 5.

#### **LINE WORK**

Linetype and lineweight shall be BYLAYER

Line work shall be of sufficient size, weight, and clarity to be read easily from a print which has been reduced to one-half size. Lines denoting a structural outline or centreline, etc., shall have even thickness and uniformity within a set of Contract Drawings.

Where a reference line runs between a series of parallel lines (i.e. in the case of overlays on highway drawings), the reference line must stand out clearly.

#### **LETTERING, DRAWING IDENTIFICATION BLOCK AND CONTRACT TITLE SHEETS LETTERING**

For samples and sizes refer to Figures.

#### **DIMENSIONS**

All dimensions shall be fully associated. Manual input of dimension text or otherwise over riding the actual dimension is not acceptable.

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In general, keep dimension lines outside of views. Show horizontal dimensions on plans, vertical dimensions on sections and elevations. Show dimensions above dimension line and do not break the line. Dimension style shall be consistent and uniform. Refer to Page 579

**SECTION AND DETAIL MARKERS**

Identify sections, elevations and details by referencing them with symbols or callouts. Identify sections and elevations by LETTERS, and details by NUMBERS.

On the sheet where the section is taken or the detail indicated, the reference will indicate the drawing on which the section or detail is drawn. On the sheet on which the section or detail is drawn, the reference will indicate the sheet on which the section or detail is indicated.

No reference or cross references are required for sections and details indicated and shown on the same sheet.

**SCALES ON SUBTITLES**

Where a scale differs from the basic graphic scale indicated on the title block, it shall be noted under the appropriate subtitle.

**SIGNATURES**

The name, giving initials and surname of the drafter, checker and designer, shall be entered in the appropriate blocks and also the signature of the supervising engineer or architect. The date shall be shown numerically giving the year, month, and day, e.g., 04/12/20, immediately below each name or signature listed above.

**ENGINEER'S OR ARCHITECT'S SEAL**

An engineer's or an architect's seal shall be stamped on all contract and record drawings and signed in accordance with the provincial law governing the practice of professional engineering and architecture.

**DRAWING ORIENTATION AND NORTH ARROWS**

When possible, drawings shall be oriented so that the stationing increases from the left to the right across the sheet. In general, plan views shall be oriented so that north is toward the top of the sheet. If this is not convenient, all plan view drawings in a set shall be oriented in the same general direction with the second preference being north towards the right-hand side of the sheet. The standard north arrow as indicated on page 577 shall be displayed in the upper right-hand corner of all plan drawings, if possible. The small size arrow will be located in the key plan.

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Stationing shall be governed by Rail or Transportation Authority. Refer to GO Transit, CNR, StL&H, and MTO coordinates.

Stationing is along the reference line of the horizontal alignment. It shall follow the arcs of the spirals and curves.

**ABBREVIATIONS AND SYMBOLS**

The abbreviations of words on drawings shall be held to a minimum to ensure clarity and to reduce the chance of misinterpretation.

Only industry recognized abbreviations are to be used and shall be applied consistently on all drawings and specifications.

Each respective discipline (civil, architectural, structural, mechanical, electrical, etc.) shall include on their drawings, a legend which indicates the abbreviations and symbols used on the discipline's drawings.

Alternatively, a single drawing with a legend listing standard abbreviations and symbols used by all disciplines may be used.

**STRUCTURE IDENTIFICATION AND DETAILING**

In general, all structures of substantial length or size shall be broken down into parts, to be dealt with as units each detailed separately. The unit will be identified on the basis of transverse joints in the structure.

**UNIT NUMBERING SYSTEM**

Rail or highway structures are to be identified and referenced by a number.

The number shall be based on the station at the centre of the unit. The number shall be the station rounded up to the nearest multiple of 5 metres. For example, if the station at the centreline of a unit is 16+043, the station number would be rounded up to 16+045 and the reference number of the unit would be expressed as 16045. If the GO Transit unit coincides with another structure, the GO Transit unit numbering system shall be continued with adequate cross reference to the other structure reference number.

**REFERENCE GRIDS**

The structural drawings frequently involve column lines and column grids identified by letters and numbers. Column line designations for new jobs shall be:

- > Horizontally by letters starting with A to the left

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- > Vertically by members starting with 1 at the top

It is often convenient and desirable to superimpose this grid on other contract drawings to permit dimensioning to an established grid reference point. In general, all horizontal dimensions should be tied to either the reference line or the basic column grid. Secondary column lines should not be used to tie in significant dimensions.

**FLOOR PLANS**

Except in simple structures, layouts should present a plan of every floor or other significant elevation. The drawings should be arranged so that a plan of each level is presented first, followed by details and sections which clarify and supplement the plan views. Plans should indicate the level at which they are cut in the title; e.g., Plan at Platform Level, Street Level Plan, etc.

**ELEVATIONS**

Elevations shall be drawn to define and detail the exterior form or walls of a structure. The elevation should generally be to scale (not isometric) and should, where possible, be identified as “Looking North”, etc.

**CROSS SECTIONS**

Cross sections shall be portrayed looking in the direction of increasing stationing, where possible, with identifying section and reference markers as shown on Page 580.

**DETAILS**

Detailed blowups of parts of plans, elevations or sections will be required to clarify the contract drawings. Details shall be identified by encircling the area to be clarified and connecting this circle with the detail symbol.

The orientation of the detail shall be identical to that of the plan, elevation or section where it is identified. Wherever practical, a detail which is drawn on the same sheet on which it is identified, shall be drawn in the immediate vicinity of its identification symbol. Details shall be standardized wherever possible.

**GRAPHIC SYMBOLS**

Graphic symbols for construction are to follow established graphic symbols as set forth by respective discipline. (Typically, these symbols are addressed in software application, i.e., AutoCAD).

Symbols used in Ontario Provincial Standards for Roads and Public Works for civil projects are to be utilized. Each discipline is to provide a legend of graphic symbols used. The legend is to be located on the same drawing as the abbreviations. Symbols are to be consistently applied on all contract drawings.



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Drawing Standards

**DRAWING MEDIA AND CLOSE UP DRAWINGS**

As part of the close-out package, the Consultant shall provide:

- > Three (3) sets of 11" x 17" on BOND PAPER;
- > AutoCAD files (version 2012) on CD;
- > Drawings converted to PDF format on CD.



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**TAB 7: TECHNICAL DISCIPLINES**

Drawing Standards


FIGURE: STANDARD DRAWING TITLE BLOCK

**SECTION:**

Tab 7:  
Technical  
Disciplines

**FIGURE:**

Title Block  
Set

METROLINX PROJECT NO. 053130				
		 A Division of Metrolinx	AGINCOURT STATION	7mm
			PARKING LOT EXPANSION	5mm
			LANDSCAPING	5.5mm
			LAYOUT AND DETAILS	5.5mm
CONTRACT NO. PT-2000-EN-036		DWG. NO. L-001	REV. SHEET 1 12/36	5.5mm





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**TAB 7: TECHNICAL DISCIPLINES**  
Drawing Standards

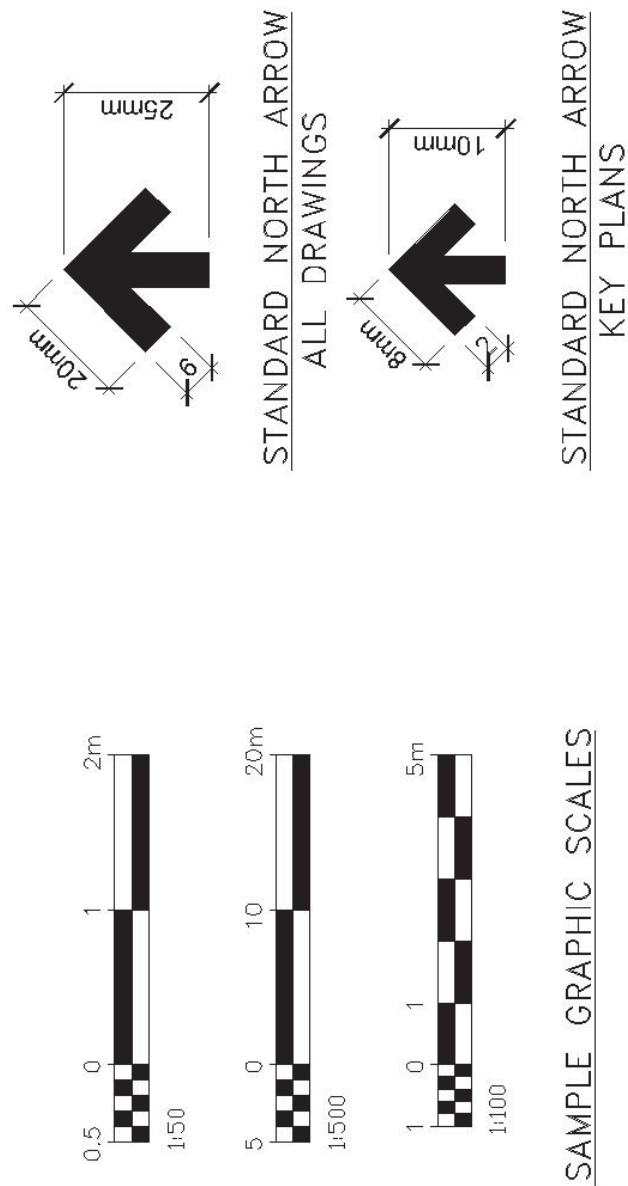
FIGURE: GRAPHIC SCALES, NORTH ARROWS

**SECTION:**

Tab 7:  
Technical  
Disciplines

**FIGURE:**

Graphic  
Scales North  
Arrows





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**TAB 7: TECHNICAL DISCIPLINES**

Drawing Standards

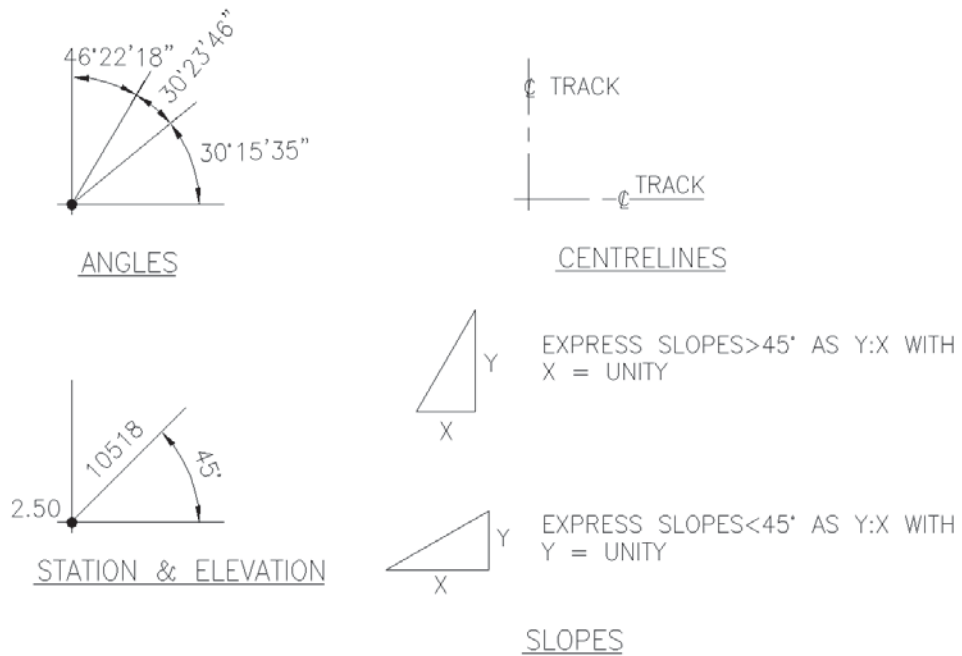
FIGURE: LINE WORK AND MISCELLANEOUS SYMBOLS

**SECTION:**

Tab 7:  
Technical  
Disciplines

**FIGURE:**

Line Work  
and  
Miscellaneous  
Symbols





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**TAB 7: TECHNICAL DISCIPLINES**

Drawing Standards

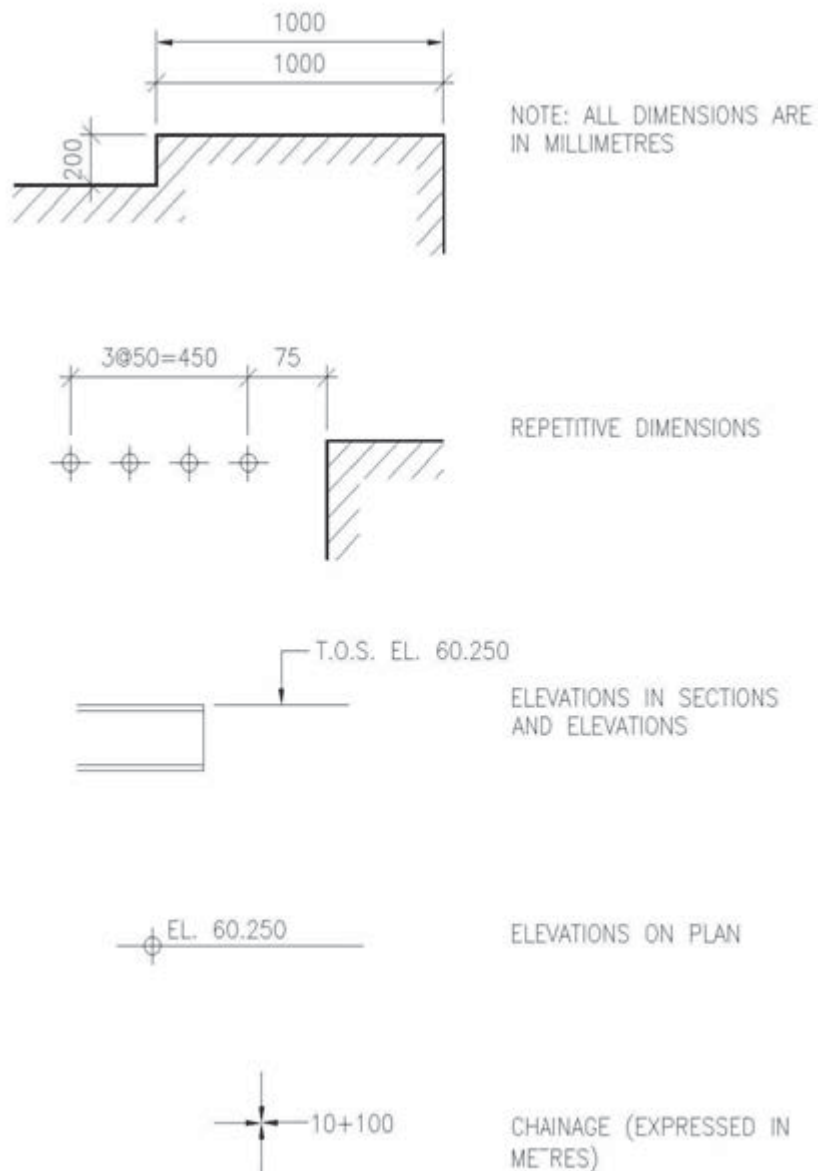
Figure: Dimensioning

**SECTION:**

Tab 7:  
Technical  
Disciplines

**FIGURE:**

Dimensioning





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**TAB 7: TECHNICAL DISCIPLINES**

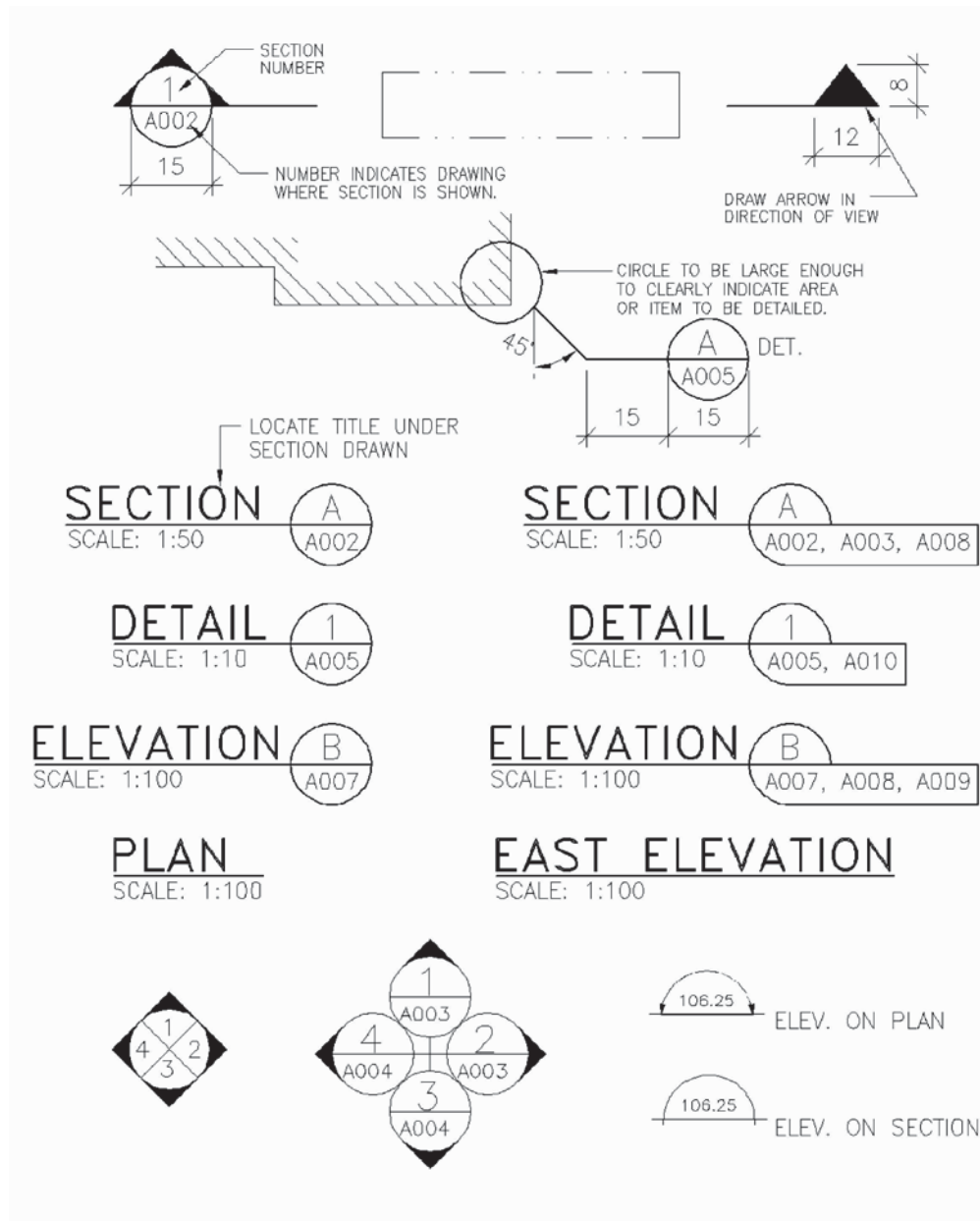
Drawing Standards

**FIGURE: SECTION AND DETAIL MARKERS**

**SECTION:**

Tab 7:  
Technical  
Disciplines

**FIGURE:**  
Section and  
Detail  
Markers





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**TAB 7: TECHNICAL DISCIPLINES**  
Drawing Standards

FIGURE: TITLE SHEET

**SECTION:**

Tab 7:  
Technical  
Disciplines

**FIGURE:**

Title Sheet



A Division of Metrolinx

XXXXXXX STATION

TYPE OF WORK  
LINE 2 DESC.

CONTRACT NO.

GARY W. McNEIL - PRESIDENT, GO TRANSIT



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TAB 7: TECHNICAL DISCIPLINES

Drawing Standards


FIGURE: SIGNATURE SHEET

SECTION:

Tab 7:  
Technical  
Disciplines

FIGURE:

Signature  
Sheet

 A Division of Metrolinx	
CONTRACT No.	XX-200X-EN-XXX
TYPE OF WORK	TYPE OF WORK MINOR DESC.
LOCATION	XXXXXXXXX STATION
MUNICIPALITY	XXXXXXXX
<div></div>	
N. SPONSOR DIRECTOR MULTIMODAL INFRASTRUCTURE CORPORATE INFRASTRUCTURE	DATE J. KNIGHT VICE-PRESIDENT CORPORATE INFRASTRUCTURE



## TAB 7: TECHNICAL DISCIPLINES

### Drawing Standards

## FIGURE: LEGEND/ LIST OF DRAWINGS

**FIGURE:**  
Legend List  
of Drawings

