

CADD/ BIM Standards Manual

CPG-DGN-PLN-084

Revision 2

04/09/2021

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References

TABLE 0-1 REFERENCES

Reference	Title
CPG-DGN-PLN-083	BIM Implementation Plan
CPG-DGN-PLN-085	BIM Execution Plan Template
MTO, October 2006	Engineering Survey Manual

Acronyms and Abbreviations

Definition Acronym or Abbreviation *.dgn Bentley MicroStation drawing file *.dgnlib Bentley MicroStation drawing library file *.dtm Bentley InRoads digital terrain model *.dwg AutoCAD drawing file *.rvt Revit model file *.rfa Revit family file o degree 2D Two-dimensional 3D Three-dimensional AFP Alternative Financing and Procurement BIM **Building Information Modelling** CADD Computer-aided Drafting and Design CCTV **Closed Circuit Television** CD-ROM Compact Disk - Read Only Memory CGVD **Canadian Geodetic Vertical Datum** CPG **Capital Projects Group** CSD **Combined Service Drawings** DVD-ROM Digital Versatile Disk - Read Only Memory GCS Geodetic Coordinate System

TABLE 0-2 ACRONYMS AND ABBREVIATIONS

HVAC	Heating, Ventilation, and Air Conditioning
IFT	Issued for Tender
IFC	Industry Foundation Classes (File type) – See Definitions
LCS	Local Coordinate System
m	metre
Manual	Computer-aided Drafting and Design/ Building Information Modelling Standards Manual
MCC	Motor Control Centre
mm	millimetre
MS	Microsoft
MTM z10	3 Degree Modified Transverse Mercator Zone 10
МТО	Ministry of Transportation Ontario
NAD83 CSRS	North American Datum 1983, Canadian Spatial Reference System
NBS	National Building Standard (UK)
NCR	Noncompliance Report
PA	Public Address
PAI	Passenger Assistance Intercom
PCo	ProjectCo
PDF	Portable Document Format
PEO	Professional Engineers Ontario
PLC	Programmable Logic Controller
PSF	Project Scale Factor
RCD	Reference Concept Design
RQQ	Request to Qualify and Quote
SCADA	Supervisory Control and Data Acquisition
SEM	Structural Electrical and Mechanical
TPSS	Traction Power Substation
UTM z17	Universal Transverse Mercator Zone 17

1. Purpose

Definitions

TABLE 0-3 DEFINITIONS		
Term	Definition	
As-built Drawings	PEO defines as follows: As-Built Drawings are prepared by the contractor, or by the engineer using information supplied by the contractor.	
Design Review Package	Full contents of the design package to be submitted to, and reviewed by, CPG Management.	
Revit Family	A type of digital file used by the BIM software: Autodesk Revit	
GO Transit	A division of Metrolinx; the regional public transit service for the Greater Toronto and Hamilton Areas.	
COBie	Construction Operations Building Information Exchange (COBie). An international standard relating to managed asset information including space and equipment. It is closely associated with Building Information Modeling (BIM) approaches to design, construction and management of built assets.	
IFC (File type)	Industry Foundation Classes: Open vendor-independent neutral file format that defines an extendable set of consistent data representing building information for exchange and interoperability between AEC software applications. The IFC specification is developed and maintained by BuildingSMART International as its "Data standard". It is registered with ISO as ISO16739. (Reference: National BIM Library – UK).	
PCo	Abbreviation for ProjectCo. A corporation incorporated under the laws of Ontario under contract with Metrolinx to design, construct, and maintain AFP Projects.	
Record Drawings	PEO defines as follows: Record Drawings are prepared by the reviewing engineer after verifying actual conditions of the completed project.	

Notes:

AFP = Alternative Financing and Procurement

CPG = Capital Projects Group

PEO = Professional Engineers of Ontario

OAA = Ontario Association of Architects

- 1.1.1 The purpose of this Capital Projects Group (CPG) *Computer-aided Drafting and Design/ Building Information Modelling Standards Manual (Manual)* is to provide guidance for consistently developing, maintaining, managing, monitoring, and controlling CPG design and construction drawings and BIM deliverables.
- 1.1.2 This *Manual* also defines the processes and procedures involved in managing Program and Project design drawings throughout the Program and Project life cycle, and the responsibilities of the stakeholders involved in the process.

2. Scope

- 2.1.1 This *Manual* applies to all Consultants and Contractors supplying drawings to the CPG, Metrolinx.
- 2.1.2 This *Manual* will be followed for all design, construction, and commissioning drawings prepared for Projects being implemented by Metrolinx CPG.

3. Submission Deliverables

3.1 Software Interoperability

3.1.1 It is incumbent upon ProjectCo and/or the Consultant to ensure that their selected software platform is compatible with Design and Review software to be used by CPG during design, construction, and commissioning of the project. This shall be confirmed by ProjectCo prior to commencing work. This shall include the ability to export drawings to .dwg format.

3.2 CADD Information Package

- 3.2.1 At the initial Project start up meeting, CPG will provide standardized template and reference files for the creation and transfer of CADD digital design and drawing files. The following items will be provided:
 - 1) CPG Title Block file (CPG_EngBord1.dwg / CPG_EngBord1.dgn) to be used to create all drawing file title blocks. Note: If applicable, CPG_Engbord1.rfa (Revit) shall be produced by ProjectCo/Consultant from CPG_engbord1.dwg.
 - 2) Microsoft (MS) Excel file Filelist.xls
 - 3) Metrolinx-CPG CADD/ BIM Standards Manual
 - 4) Metrolinx-CPG BIM Implementation Plan
 - 5) CPG BIM Execution Plan Template
 - 6) CPG Standard Cover Page and Signature Sheet (when required)
 - 7) Microsoft (MS) Excel file CPG_Topographic_Feature_Table.xls
- 3.2.2 On request of the CPG Project Manager, CADD staff may also provide other Project-relevant CADD data.

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3.2.3 If there are external source data only available in drawing formats other than Bentley MicroStation/Autodesk AutoCAD/ Autodesk Revit, CPG will provide such data in their original format. Any conversion of the digital data is the sole responsibility of the Consultant.

3.2.4 Autodesk AutoCAD

- a. CPG Template (seed) files to be used to create all AutoCAD drawing files
- b. CPG Title block files including annotation graphics (if applicable)

3.2.5 Autodesk Revit

- a. CPG Template files (if available) that include specified worksets, pre-loaded object styles, symbols, titleblock and component families to be used in the creation and development of revit design and construction models (CPG_Template.rvt). To be developed if required by PCo/Consultant or CPG per project agreement.
- b. Existing building models (if available)

3.2.6 Bentley Microstation 2D/3D

- a. CPG Seed files (CPG_Seed2d.dgn / CPG_Seed3d.dgn) to be used to create all MicroStation drawing files
- b. CPG standard level libraries (*.dgnlib)
- c. CPG standard cell or block files graphic elements

3.3 Submission Format

- 3.3.1 CADD files developed for CPG are subject to the standards and procedures detailed herein.
- 3.3.2 All CADD/BIM digital drawing files will be submitted in either AutoCAD .dwg, Revit .rvt or Bentley MicroStation .dgn file format unless noted otherwise or alternative software has been proposed and accepted. In addition, the following are requirements:
 - a. The file type and software version is to be confirmed with CPG project team prior to start of all work.
 - b. File types submitted must be compatible with CPG digital requirements for viewing/editing.
 - c. CPG reserves the right to request .dwg exports for internal review irrespective of the software selected.
- 3.3.3 Drawings shall be uploaded to the CADD/BIM drawing viewing platform in the respective Design Submissions location.
- 3.3.4 Submission milestones are defined in the specific Project contract and approved by CPG management.
- 3.3.5 CADD files developed for other Project stakeholders are subject to their standards and procedures.
- 3.3.6 In addition, each contract drawing will also be submitted in Adobe .pdf file format, via the Document Control System, meeting the following requirements:
 - 1) The name of each digital .pdf file set must match the contract drawing number.
 - 2) Portable document format (PDF) files may contain vector or raster data.



- 3) Each PDF file must be identical to the hard copy and the electronic file of the submitted drawing.
- 3.3.7 It is preferred that submissions not be made via CD-ROM/DVD-ROM; however, for submissions on CD-ROM or DVD-ROM, the disk label must contain the following:
 - 1) CPG Contract Number and Project Title
 - 2) "Issued for" Milestone/Submission
 - 3) Date of Issue
 - 4) Consultant's Company Logo
 - 5) If the submission spans multiple disks, number the disks including disk number and total number of disks (for example, Disk 1 of 3).

3.4 CADD Data Submission

- 3.4.1 CADD data files submitted to CPG must meet the following conditions:
 - 1) A **Root** folder is created within the respective Corridor location where applicable, and named by Project or Contract name and Contract number. Coordinate/confirm with respective CPG submittal manager prior to submission.
 - 2) The following must be located in the **Root** Folder
 - a. Title Block Files
 - b. Template/Seed Files
 - c. Consultant-updated Layer list and updated CTB if they are new or have changed (AutoCAD)
 - 3) Files must be in discipline-specific folders, named as CPG_Discipline. The following is a typical subfolder structure used by CPG for all new Projects:
 - a. CPG_Arch Architectural
 - b. CPG_Land Landscape
 - c. CPG_Civil Civil and Geotechnical
 - d. CPG_Elec Electrical, TPSS, and Power Distribution
 - e. CPG_Mech Mechanical
 - f. CPG_Pad Property Alignment
 - g. CPG_Sys Signals, SCADA, Comms, CCTV, Security, Fire Alarm and Fare
 - h. CPG_Struc Structural
 - i. CPG_Track Track/Rail
 - j. CPG_Survey Survey
 - k. CPG_WF&S Wayfinding, and Signage
 - 4) Drawing List (FileList.xls) for all contract drawing sheets and digital files to be included.
 - 5) Legacy CADD files acquired from CPG for reference purposes must also be included with the submission for conducting the CADD file format review of digital files.
 - 6) If a topographic survey is required, then the Consultant or PCo will prepare a Topographic drawing library based on the CPG_Topographic_Feature_Table.xls or submit an alternative feature table to CPG for review. If a Digital Terrain Model (DTM) is required then the

Consultant or PCo will prepare a Civil 3D .dwg or an Inroads .dtm file. If the DTM is prepared in Inroads then a translation application (CADD to Inroads conversion tool) will be required to transfer the applicable CADD feature codes to the Inroads.dtm file. The Consultant or PCo will develop an application for this purpose.

- a. Topographic surveys must also be made available in pdf, and .dwg format if requested by CPG.
- 3.4.2 All milestone submissions must include a complete set of digital files developed by the Consultant or ProjectCo (PCo), including files that have not been modified since the previous submissions.

3.5 CADD Data Submission Review

- 3.5.1 CPG CADD staff and/or Technical Advisors will review all digital file submissions to verify compliance with this *Manual*.
- 3.5.2 Submissions failing to meet requirements will be returned to the Consultant or PCo with a listing of non-compliances that need to be addressed, corrected, and resubmitted.

3.6 Design Review Submission

- 3.6.1 For a design review submittal, the following steps will occur:
 - 1) The Consultant or PCo will prepare the Design Review Package for submission.
 - 2) Ensure that all required stamps (Eg. Progress stamp) are visible in plotted drawings.
 - 3) The Consultant or PCo saves design files in the native digital format and in PDF format, and submits to CPG management and the CPG Submittal Manager for review.
 - 4) The Consultant or PCo saves a drawing listing as a FileList.xls file, and submits to CPG management and CPG Submittal Manager.
 - 5) The CPG CADD Team receives the digital CADD files (.dgn or .dwg or .rvt and PDF) and Drawing Listing (FileList.xls) for review.
 - 6) CPG reserves the right to request files in AutoCAD format (.dwg) regardless of the software platform used to generate the drawings
 - 7) Non-compliances will be noted in a noncompliance report (NCR) and returned to PCo for action.
 - 8) If the native format is a three dimensional format (model), coordinate with CPG regarding compatibility and interoperability requirements (Eg. .dwg versus IFC or COBie file formats).

3.7 Building Permit, As-built, Tender, and Construction Submissions

3.7.1 See section 3.12 for additional Drawings Submissions requirements specific to As-built drawings.

3.7.2 Autodesk AutoCAD

- 1) For submission of files during Tender, Issued for Construction, and As-built stages, verify that the following has been addressed:
 - a. All design work including dimensions and annotations shall be created in model space.
 - b. Dimensions are <u>not</u> permitted to be exploded.
 - c. Use of external reference files (XRefs) should be minimized wherever possible.

- d. XRefs, when possible, shall be attached, not overlaid. Insertion point is to be at 0, 0 unless otherwise impractical
- e. Include all files, both graphic and non-graphic, required for accessing (e.g., raster files, plot style, text styles, etc.)
- f. Submitted CAD drawings shall be purged of all un-referenced data and elements including: line types, blocks, layers, shapes and text styles.
- g. The colour of all drawing elements should be set to BYLAYER, colour shall not be set by object.
- h. Blocks shall be created on Layer 0, and shall not be mirrored, or inserted with scale factor. Insertion point to be at 0, 0 unless otherwise impractical.
- i. 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
- j. Continuous linear elements such as contour lines, or curb lines, shall be constructed with continuous polylines

3.7.3 Autodesk Revit

- 1) For submission of files during Tender, Issued for Construction, and As-built stages, verify that the following has been addressed/provided:
 - a. Provide all linked support models
 - b. Check that all linked reference files (including .dwg if used) are submitted at each submission stage.
 - c. Models shall be compacted and purged of unused elements
 - d. Test all families and parameters prior to submission:
 - i This should be done as the model is developed to ensure that model behaves correctly when they are modified. This is a best practice.
 - ii Where real world examples come in typical sizes, pre-defined types should be generated.
 - iii Standard parameter names should be used whenever possible.
 - e. Ensure compliance with industry best practices for Revit modelling.

3.7.4 Bentley Microstation 2D/3D

- 1) For submission of files during Tender, Issued for Construction, and As-built stages, verify that the following has been completed:
 - a. All external references contained on Sheet files must have the display turned on. Detach any reference files that are not required prior to submission.
 - b. Check that all attached reference files are submitted at each submission stage.
 - c. Delete all graphical elements located outside the Title Block frame. This does not apply to the standard elements contained in the Title Block reference file (CPG_EngBord1.dgn).
- 2) Master files referenced by multiple disciplines must only be submitted once at each submission and located in the folder of the discipline responsible for the file content. This will eliminate the possibility of file duplication, submitted in multiple locations.(Bentley Microstation only)

3.7.5 For Building Permit only:

1) Ensure Qualification and Registration information is correct, visible, signed and submitted to CPG management and the CPG Submittal Manager.

3.7.6 For Tender documents only:

- 1) After a Project has been issued for tender, no revisions can be made without instructions from CPG management.
- 2) When it has been determined that a revision to the drawings is required, an addendum must be issued.

3.7.7 For Issued for Construction drawings only:

- 1) Consultant or PCo verifies that no revisions have been made to the drawings since the final Addendum was issued without specific instructions from CPG management.
- 2) Consultant or PCo submits all applicable digital files (.dgn or .dwg or .rvt and PDF), along with plotted files and support or linked files to CPG.
- 3) CPG forwards the digital files (.dgn or .dwg and PDF) to the CADD Team via Document Control for review.

3.7.8 Final steps for all submittals:

- 1) Confirm the appropriate stamp is visible, reflecting the submission type.
- 2) If a digital professional seal is required, place the seal in the appropriate location in the Title Block.
- 3) Prepare and wet seal full-size hard copy plots (if the seal was not applied electronically), and then sign, date, and submit the hard copies to CPG.
- 4) Once all design review comments are addressed, all final digital files (.dgn or .dwg or .rvt and PDF) and hard copies are submitted, and all required CPG approvals obtained, the documents are authorized for release by CPG.

3.8 Addendum Submission

- 3.8.1 When creating an addendum, follow this procedure:
 - 1) Consultant or PCo advises the CPG Project Manager of proposed revisions.
 - 2) The CPG Project Manager approves the revision and provides the Consultant or PCo with the addenda requirements.
 - 3) Consultant or PCo applies revisions to the drawings.
 - 4) Consultant or PCo applies a revision cloud, delta, and revision notes in the Title Block Revision Box.
 - 5) Consultant or PCo prepares and wet seals full-size hard copy plots (if seal is not applied electronically), and then signs, dates, and submits plots to CPG.
 - 6) Consultant or PCo submits all digital files (.dgn or .dwg or .rvt and PDF) to CPG.
 - 7) CPG forwards the digital files (.dgn or .dwg or .rvt and PDF) to the CADD Team via Document Control for review.

3.9 Subsequent Addendum

3.9.1 When a subsequent addendum revision is required for a drawing that was previously issued for an Addendum, the following must occur:

- 1) Remove the previous cloud, leaving only the delta and the revision information in the Title Block Revision Box as an indicator of the previous Addendum.
- 2) Place a new cloud around the revised area with a consecutive revision numbered delta.
- 3) Enter the Addendum information into the Title Block Revision Box.
- 4) Consultant or PCo submits all digital files (.dgn or .dwg or.rvt and PDF), along with plotted files, to CPG management.
- 5) CPG forwards the digital files (.dgn or .dwg or.rvt and PDF) to the CADD Team via Document Control for review.

3.10 Revision Cloud and Delta

- 3.10.1 Revisions must be identified by a delta and a cloud encompassing the extent of the revision.
- 3.10.2 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:
 - 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). Should a preliminary drawing become a contract drawing, all noted revisions shall be removed from the revision column.
 - 2) 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.

3.11 Subsequent Revisions

- 3.11.1 If a drawing has several revisions, the following must occur:
 - 1) Remove the previous cloud, leaving only the delta and revision number as an indicator of the previous revision.
 - 2) Place a new cloud around the revised area with a consecutive revision numbered delta.
 - 3) Enter the change information into the Title Block revision box.
 - 4) The Consultant or PCo will submit all digital files (.dgn or .dwg or .rvt and PDF), along with the plotted files, to CPG.
 - 5) The CPG Project Manager or CPG Submittal Manager will forward the digital files (.dgn or .dwg or.rvt and PDF) to the CADD Team via Document Control for review.

3.12 As-Built Drawings Submissions Only

3.12.1 See section 3.7 for additional Drawings Submissions requirements that apply to all Building Permit, Tender, Construction as well as As-built, Submissions

- 3.12.2 As-built drawings provide a record of what was actually constructed, incorporating changes made during construction, so that future work may be designed and built without encountering unforeseen situations.
- 3.12.3 After acceptance by CPG, the Consultant or PCo will submit electronic CADD/BIM files (.dgn or .dwg or .rvt and PDF), along with: 1 set of full-size record prints and 2 sets of 11x17 reduced size record prints for compliance review.
- 3.12.4 CPG management will forward the CADD files (.dgn or .dwg or .rvt and PDF), along with record prints, to the Consultant or PCo via Document Control for all changes to be incorporated onto the CADD files.
- 3.12.5 When preparing as-built drawings, follow this procedure:
 - 1) Verify that all change information (including field instructions) is included in the electronic files.
 - 2) Incorporate the Contractor's changes during construction.
 - 3) Remove all revision deltas and clouds.
 - 4) Delete all miscellaneous information or graphics outside the border that are not required.
 - 5) Detach all reference files that are not displayed or required.
 - 6) Ensure the **As-Built Drawing** stamp is visible in the title block.
 - 7) Remove all revision notes and dates that are in the Title Block **Revisions** section.
 - 8) Plot full-size hard copy prints and submit, together with the Contractor's record (as-built) prints, to CPG.
 - 9) Create PDF files (full-size) of each sheet file with their Contract Drawing Number, and submit to the CADD Team.

4. Drawing Standards - General

4.1 Template/Seed Files

- 4.1.1 All CADD files must be created using a common template/seed file as described in Section 3.1.
- 4.1.2 The Seed files to be used will be located in each Project root directory (Eg. .Standards > RES > Seed) or (.Standards > RES > Template).

4.2 Local Coordinate System

- 4.2.1 Coordinates system and File origin shall be confirmed with CPG Project Team and/or Submittal manager prior to commencement of work.
- 4.2.2 Note: This section applies to BIM drawings and to CADD drawings where applicable.
- 4.2.3 In certain cases, it may be applicable to work in a Local Coordinate System where the PSF is 1.0000 and the drawing is rotated to Site North. The drawing transformation parameters for the transformation of the drawings from GCS to LCS and reverse and including a minimum of two check coordinate located in each coordinate system shall be derived by the Survey Lead and provided by the CPG project manager. The transform may be performed manually or by using a built-in CADD Helmert 2D Similarity Transformation application.



4.2.4 The 2D transformation parameters typically transform the drawing from the large GCS values to smaller LCS values (near 0,0) in order to easily distinguish between the two coordinate systems.

Transformation Origin Point for Rotation and Scale - Northing, Easting (m)

Step 1 - Rotation about Transformation Origin Point (Positive rotates drawing clockwise) Decimal Degrees or DD,MM,SS

Step 2 - Scale using PSF about Transformation Origin Point

Step 3 - Move - Northing, Easting (m)

Check Points

Subsequent to the transformation always confirm that the transformation has been applied correctly by using the Coordinate Check points.

Northing, Easting in GCS

Northing, Easting in LCS

4.2.5 The transformation may be reversed – LCS to GCS by changing the signs on each parameter and applying the transformation steps in the reverse order (ie Step 3, Step 2, Step 1). Always use the check points to confirm that the reverse transformation has been performed correctly.

4.3 Geodetic Coordinate System (GCS)

Note: This Section applies to all CADD/BIM drawings.

Unless otherwise approved by CPG, all CADD positional coordinates shall be referenced to the Metrolinx geodetic coordinate system ("GCS"). The Metrolinx GCS is defined as follows:

- Horizontal Datum: North American Datum 1983, Canadian Spatial Reference System v6 adjustment (NAD83 CSRSv6)
- Vertical Datum: Canadian Geodetic Vertical Datum 1928, 1978 adjustment, (CGVD 28:78adj)
- Map Projection: 3-degree Modified Transverse Mercator Zone 10 (MTM z10)

4.3.1 Global Origin (Bentley Microstation only)

- 1) For projects in Toronto, Global Origin = -316474 East, -846474 North and 0 Elevation (as reported within MicroStation V8i Version).
- 2) For projects in other locations, Global Origin = 0, 0, 0 (as reported within MicroStation V8i Version).
- 3) Do not change or work to a different Global Origin for CPG Program or Project drawings.

4) Bentley Microstation Working Units

- a. All Microstation-based CADD and BIM files shall use Units of Resolution according to the Seed/template file unless specified otherwise.
 - i Master/Project Units = metres (m)
 - ii Sub-units = millimetres (mm)
 - iii CADD Advanced Units of Resolution = 100,000 per m
 - iv BIM Advanced Units of Resolution = 1000,000 per m

4.4 Drawing Scale

- 4.4.1 All CADD files reference the Geodetic Coordinate System(GCS) or the Local Coordinate System (LCS) using metric units unless unique circumstances dictate the use of imperial. Any variation from metric must be approved by CPG. Note: The CPG Title Block file contains several bar scales representing commonly used drafting scales.
- 4.4.2 General rules to follow for drawing scale include the following:
 - 1) All scale drawings must be drawn to scale.
 - 2) Commonly accepted scales include: 1:1, 1:5, 1:10; 1:20, 1:25, 1:50: 1:75, 1:100, 1:125, 1:200, 1:250, 1:300, 1:400, 1:500, 1:750, 1:1000, 1:1200, 1:5000, and their 10x multiplications
 - 3) Whenever possible, avoid creating drawing sheets containing multiple scales. If multiple scales must be used on the same drawing sheet, subdivide the drawing into separate areas by the scale being used, and include bar scales for each different scale.
 - 4) Produce Master files ('m') at 1:1 metric scale. (Bentley Microstation only)

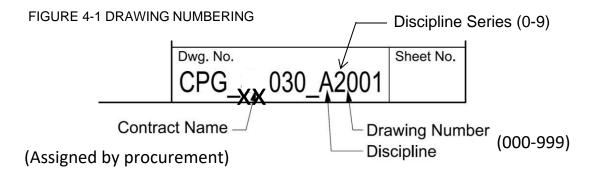
4.5 Units

- 4.5.1 All CADD and BIM files shall use Metric Working Units according to the Seed/template file or as required by specific CPG Project leadership
 - 1) Project Units = metres (m) or millimetres (mm)
 - 2) Sub-units or optional units = millimetres (mm) or as required by CPG Project leadership

4.6 Drawing Number

- 4.6.1 **Guidance**: Drawings that are named in a consistent manner and that follow an agreed-upon convention are easier to navigate and reduces the likelihood of misunderstanding or error. A thoughtfully crafted drawing naming system correlates drawing and sheet numbers in a meaningful way with CADD file names thus increasing ease of use.
- 4.6.2 The drawing number contains a Project-unique number consisting of four distinctive fields, as follows:
 - 1) Contract Name CPG-issued Project designation
 - 2) Discipline Letter identifying the design discipline. See Appendix A "Naming Conventions".
 - 3) Discipline Series number identifying the design discipline drawing series (0-9). This number is used to help partition drawing sets
 - 4) Drawing Number Sequential numerical value identifying the drawing sheet in three digits. Additional fields shall be confirmed with CPG project managers.

5) Drawing order in the contract book shall be established by numbering every sheet (1, 2, 3 of total number of sheets, e.g. 1/28) on all sheets, 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



General rules to follow when assigning drawing numbers include:

- i Letters I, O, and X are not used to prevent confusion between upper case letters and numbers.
- ii Drawing numbers do not need to share common numbers with the Sheet number.
- iii Once a drawing number has been assigned and issued, it must not be modified.
- iv If a drawing is retired from a submission set, its number may not be re-used.
- v If a new drawing is inserted into a submission set, the drawing number must be appended with an alpha character (for example, 1000, 1001, 1001A, 1001B, 1002).

X – Signals, SCADA, Etc.

T – Track or R – Rail

G – Other

W – Wayfinding & Signage

vi Appendix A-1 provides a full list of drawing numbers.

TABLE 0-4: DISCIPLINE DESIGNATORS

- A Architectural C – Civil and Geotechnical M – Mechanical E – Electrical
- Z Survey S – Structur
- P Property
- S Structural

L – Landscape

erty

6) Sheet Number

K – Communications

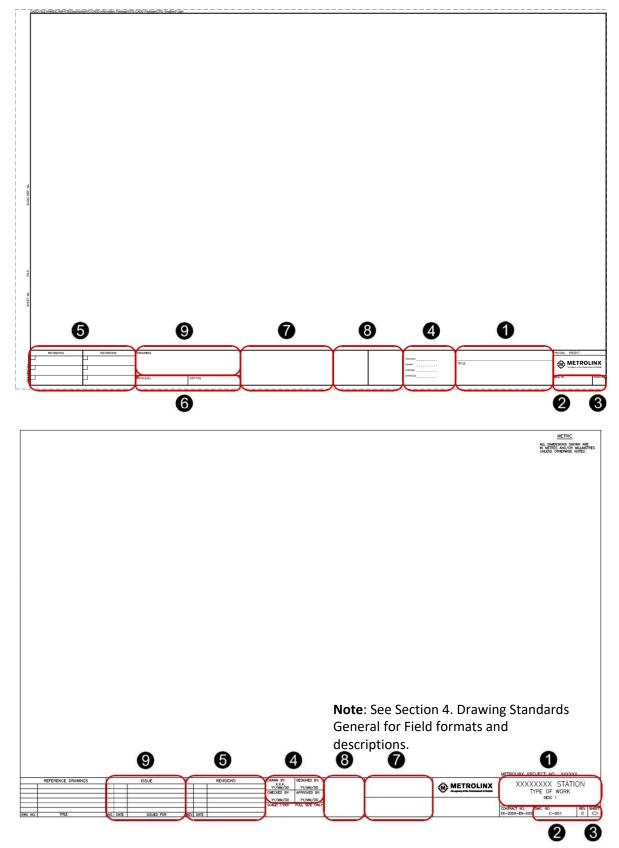
- a. The Sheet number contains a Project-unique three- to five-digit designator (for example, 001, 002, 003...999, 1000, 1000A, and so on).
- b. Sheet numbers are assigned at the 100% Review Pre-final Submission.
- c. General rules to follow when assigning Sheet Numbers include:
 - i Sheet numbers must be in sequential order.
 - ii They do not need to share common numbers with the Drawing number.
 - iii Append the sheet number with an alpha character if a new sheet is inserted into a submission set (for example, 001, 002, 002A, 002B, 003).

4.7 Title Block

- 4.7.1 All drawings must contain a title block (CPG_EngBord1.dwg or CPG_EngBord1.dgn) attached as a reference file. In AutoCAD, the titleblock shall reside in 'Paperspace', not in 'Model Space'. In Revit, files (.rvt) shall have the title block family pre-loaded into the model.
- 4.7.2 The title block file contains elements, such as text and data fields with preset attributes, which may be copied into the active design file and then edited as required (Bentley Microstation).
- 4.7.3 CPG will provide a title block file as part of the CADD Information Package.



Figure 4-2 CPG Standard Title Blocks

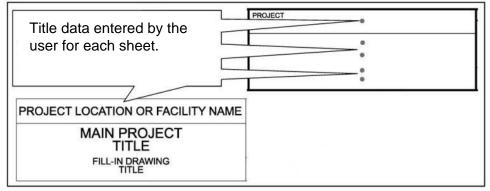


4.7.4 Figure 4-1 shows corresponding fields):

1) Project Title:

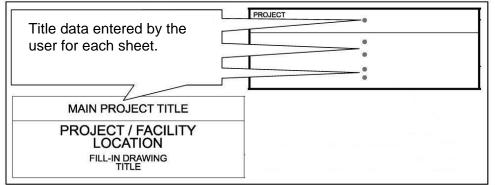
- a. For Projects involving single locations, the **Main Project Title** area in the Title Block file contains the following information fields ():
 - i Project Location or Facility Name
 - ii Main Project Title
 - iii Drawing Title

FIGURE 4-3 MAIN PROJECT SINGLE LOCATION



- b. For Projects involving multiple locations, the **Main Project Title** area in the Title Block file contains the following information fields (Figure 4-3):
 - i Main Project Title
 - ii Project Location or Facility Name
 - iii Drawing Title

FIGURE 4-4 MAIN PROJECT MULTIPLE LOCATIONS



2) **Drawing Number** – See section 4.6 for detailed description

3) Sheet Number – See section 4.6.26) for detailed description

4) File Creation and Checked Field

- a. This area of the Title Block file contains the names of the individuals responsible for the Designed, Drawn, Checked, and Approved tasks, and the dates these tasks were performed.
- b. Enter the name as first name initial (period) last name (for example, J.SMITH).
- c. Enter the date as YYY/MM/DD (for example, 2016/01/01).

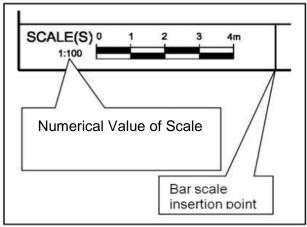
5) Revision Box Data Fields

- a. Revisions made after tender must be tracked in the **Revision Box** area of the Title Block file.
- b. Revisions are numbered, dated, and briefly described by an Addendum number or Contract Change number, as outlined in Section 3.8.

6) Bar Scales

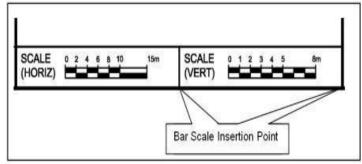
- a. The basic scale used on each drawing shall be noted numericaly and shown graphically where indicated in the titleblock, unless noted otherwise. Scale shall be indicated on all scale drawings.
- b. Single Bar Scale The Bar Scale area of the Title Block file contains a graphical bar and corresponding numerical value that represents the drafting scale used when plotted at a full drawing size.

FIGURE 4-5 BAR SCALE (SINGLE SCALE DRAWINGS)



c. Dual Bar Scale - If the information placed on the drawing sheet uses vertical and horizontal scales, turn off the level "tc_Border_Scale Text," and turn on the level "tc_Horiz_Vert_Scales." Copy the appropriate bar scales that are located in the Title Block file (Section 4.10) and place accordingly (Bentley Microstation Only).

FIGURE 4-6 BAR SCALE (DUAL SCALE DRAWINGS)



d. If the information placed on the drawing sheet uses multiple scales, an "AS SHOWN" is entered in the border area and the appropriate bar scales are placed under the title marker for each drawing.



e. For sheets that contain drawings that are not all to scale and do not have a numeric dimension value, an "N.T.S." is entered in the border area in place of "ASSHOWN." Standard bar scales are located in the Title Block file (Bentley Microstation).

SCALE(S) AS SHOWN Place "AS SHOWN" or "N.T.S." In the Scale Box Area. SECTION EDIT TEXT FOR DESCRIPTION Place a bar scale for each Drawing / Detail on the sheet.

FIGURE 4-7 BAR SCALE (MULTIPLE SCALE DRAWINGS)

7) Consultant's Identification Box

- a. Place Consultant's name, logo, and contact information in this location of the Title Block file.
- b. The Subconsultant's logo may be included within the Title Block if required.

8) Professional Seal(s)

- a. Architectural
 - i An Architect's seal I required in accordance with Regulation 27 under the Architects Act, for those documents within an Architect's required scope accompanying application for building permit or to be used to govern construction, enlargement, or alteration of a building as stated in the Regulation.
 - ii In addition to the Building Permit Application Drawings, those documents which govern construction, enlargement or alteration of a building of Architectural scope include sketches and drawings accompanying applications for site plan control, committee of adjustment, other authorities having jurisdiction, site instructions, change orders or change directives, as described by the Ontario Association of Architects (OAA).
- b. Engineering
 - Professional Engineers Ontario (PEO) requires final engineering drawings to be sealed by a registered professional engineer. PEO defines "final" as "final for the purposes intended." Final drawing submissions are clarified in the next paragraph. PEO requirements will be followed for all electronic and hard copy drawing submissions for CPG Projects.
 - ii Final drawings will be sealed with the engineer's P.Eng. stamp and signature for Reference Concept Design (RCD), Request to Qualify and Quote (RQQ), Building Permit Applications, Issued for Tender (IFT), and Issued for Construction, and Record drawings. The engineer's seal is not required on drawings submitted for interim technical review during design development (that is, 10%, 30%, 60%, or 90% completion).



9) **Progress Stamp**

- Progress stamps are used to identify the Project design stage at each milestone or a. submission. CPG management will instruct the Project Team to display the appropriate progress stamp.
- At all times, there must be a progress stamp visible on drawings, and it must be consistent b. throughout the entire document set.
- c. Shows standard progress stamps used at CPG.

FIGURE 4-8 STANDARD PROGRESS STAMPS

ISSUED FOR	100% REVIEW
DESIGNATED	DRAWING
SUBSTANCE SURVEY	NOT FOR CONSTRUCTION
Level CPG_Stamp_1	Level CPG_Stamp_11_100%
10% REVIEW	TENDER
DRAWING	DRAWING
NOT FOR CONSTRUCTION	NOT FOR CONSTRUCTION
Level CPG_Stamp_11_10%	Level CPG_Stamp_5
30% REVIEW DRAWING NOT FOR CONSTRUCTION Level CPG_Stamp_11_30%	AS-BUILT DRAWING Level CPG_Stamp_8
60% REVIEW	ISSUED
DRAWING	FOR
NOT FOR CONSTRUCTION	CONSTRUCTION
Level CPG_Stamp_11_60%	Level CPG_Stamp_9
100% REVIEW	ISSUED FOR
DRAWING	BUILDING PERMIT
NOT FOR CONSTRUCTION	NOT FOR CONSTRUCTION
Level CPG_Stamp_11_100%	Level CPG_Stamp_10
ISSUED FOR INFORMATION ONLY NOT FOR CONSTRUCTION Level CPG_Stamp_6	STANDARD Level CPG_Stamp_12
CONSTRUCTION REVIEW DRAWING NOT FOR CONSTRUCTION Level CPG_Stamp_7	DIRECTIVE Level CPG_Stamp_13

Standard Graphical Elements 4.8

- 4.8.1 The Title Block file has the standard graphical elements along the right-hand side that are to be copied into the active design file, placed with proper levels, and revised as required.
 - 1) Elements included are ():

a. Standard North Arrow

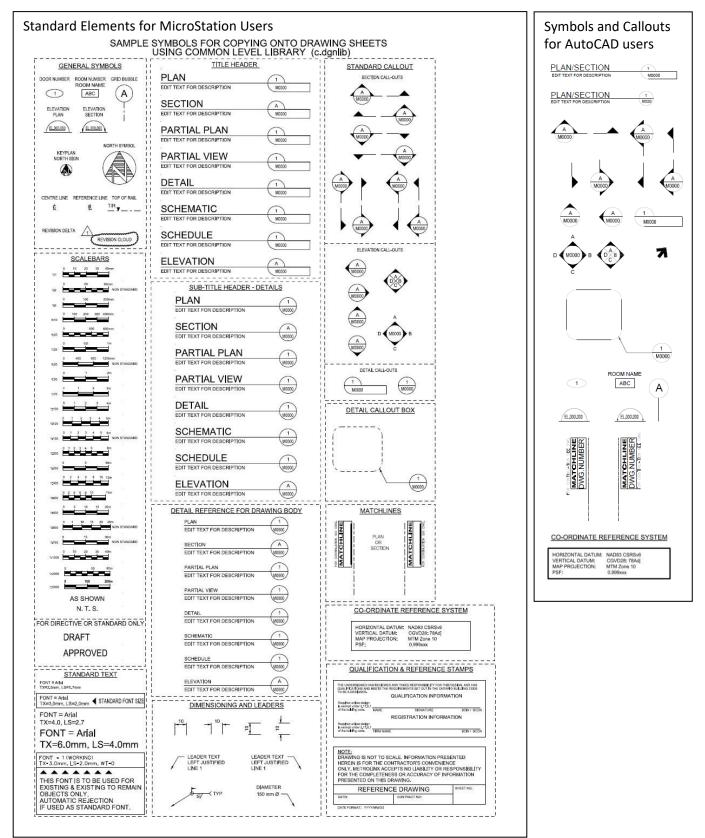
- d. Section Callouts
- b. Bar Scales
- g. Leader Lines and Callouts

- e. Text and Font Standards
- h. Matchlines

- c. Title Headers
- f. Revision Cloud and Delta



Figure 4-9 Standard Elements



4.8.2 Orientation

- 1) General rules to follow for the orientation of drawings include:
 - a. Plans must be oriented so that stationing progresses from left to right.
 - b. North points to the top of the sheet whenever possible.
 - c. All plan views are oriented in the same direction.
 - d. Notes and dimensions are to be read from bottom or right-hand side of the sheet.
 - e. Do not rotate the CADD files; instead, rotate the views to orient the drawing horizontally or vertically.
 - f. Do not move, scale, or rotate plan view data.
 - g. Do not move away from proper World Coordinates or Global Origin, as discussed in Section 5.3.
 - h. Do not scale or rotate the referenced Title Block file.
 - i. All elevation drawings and longitudinal sections must not be rotated (set View Rotation setting to Top), with the exception of plan or part plan drawings that can be rotated to align with the station layout or alignment drawings.

4.8.3 Line Work

- 1) **Guidance**: 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
- 2) **Line Weights:** Line weights shall show a clearly visible difference in plotted line weights on both full- and half- size plots.

3) Line Styles

- a. General rules to follow for line styles include:
 - i Line styles, like line weights, aid in communicating different elements in a drawing. The standard line styles, shipped with AutoCAD, Revit, or Microstation must be used. Include legends where required to aid clarity.
 - ii Custom line styles should be avoided; no custom line style will be used without approval from CPG.
 - iii If a custom line style is used, a legend must be included, and a digital file containing the definition of the line style must be included with each digital data submission.

4) Autodesk AutoCAD

a. Linetype and lineweight shall be BYLAYER

4.8.4 Text Settings

- 1) General rules to follow for text settings include:
 - a. The CPG Program standard font for the annotation of drawings is True Type Font Arial.
 - b. Annotations, including general notes, data fields, and tags, will all be capital letters.
 - c. Active text heights (as well as other font attributes) can be set by matching the text samples located on the right side of the Title Block file (Bentley Microstation only).

- d. Use different text heights as follows:
 - i 2.5 mm Use in areas where the default text size does not fit (avoid this situation, if possible).
 - ii 3.0 mm Use as the default size for notes, dimensions, and common body text.
 - iii 4.0 mm Use for subtitles and minor titles.
 - iv 6.0 mm Use for major titles.
- e. Use only fonts and heights indicated herein.
- f. All text will be placed with left justification.
- g. Do not underline notes.
- h. Do not place notes over other graphics.
- i. Place all annotations (including dimensions, notes, and titles) so they are legible and fully readable when plotted at half size.
- j. Reduce Title Block text width if required to fit within the Title Block box.

4.8.5 Dimension Settings

- 1) General rules to follow for dimension settings include:
 - a. Show all dimensions in millimetres (mm), except for elevations, chainages, alignments, and site drawings, which are shown in metres (m).
 - b. Use automatic (true) dimensioning I.e real measurements; Manual input or override is not permitted.
 - c. Use filled arrowheads for dimension terminators.
 - d. Settings for dimensions to be used in all CPG drawings are preset in the Template/Seed file described in section 3.2.

4.8.6 Callouts

- 1) Callouts are symbols placed in a drawing to direct the reader to another location in the document package.
- 2) General rules to follow for callouts include:
 - a. Do not drop callouts.
 - b. Do not revise the top line.
 - c. Do not scale or modify properties in any way (including text style and level).
 - d. If additional space is required for the drawing number field, stretch the reference bubble 'tail' to allow for the additional drawing number entries.

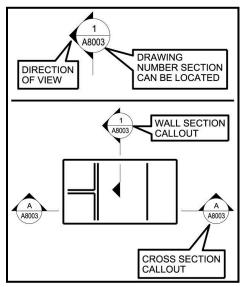
3) Guidance:

- a. Sections: General rules to follow for section cuts include:
 - i Wherever possible, cut sections looking up and to the left unless another direction provides better clarity.
 - ii Look in the direction of increasing grid references.
 - iii For elevations and cross-sections, identify sections with capital letters, omitting the letters "O" and "I."
 - iv For wall sections, identify sections with Letters.



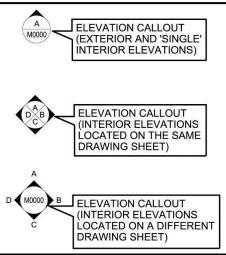
- v Details are to be identified by Numbers.
- vi Identify the drawing number where the section can be located in the bottom portion of the callout.
- vii Section cut lines do not need to be continuous as long as the route is clear.

FIGURE 4-10 SECTION CALLOUTS



b. Elevations: Elevation callouts using numbers direct the reader to drawings of both interior and exterior elevations.

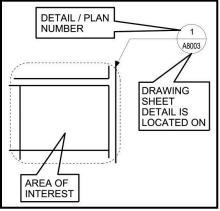
FIGURE 4-11 ELEVATION CALLOUTS



c. Enlargement plans: To clarify design intent, plan enlargements and details are used and identified using a callout similar to that shown in: Figure 4-12 Plan Enlargement Callouts.



FIGURE 4-12 PLAN ENLARGEMENT CALLOUTS



4.8.7 Annotations

- 1) General rules to follow for annotations include:
 - a. Place all text, dimensions, callouts, Title Block information (including titles, drawing and sheet numbers, and drawing creation information) in the location most appropriate for the selected software (Eg. Annotation Layers in AutoCAD, Model/drawing view in Revit, in the Sheet file and not in the Master files for Bentley Microstation).
 - b. Place annotations so they do not obscure other graphics.
- 4.8.8 **North Arrow:** If the Sheet file requires a north arrow (for example, site plans, floor plans, and plan details), copy the North Arrow from the right-hand side of the Title Block file and paste into the top right-hand side of the active Sheet file, and then rotate the arrow as required.

4.9 Plotting

4.9.1 The CPG plotting environment uses the following modified pen tables/assignments for largeformat and tabloid-size devices:

1) Autodesk AutoCAD

- a. Given the small number of pen styles provided/required by CPG, it is understood that new pen styles will need to be added. If new pen styles are added, CTB must be provided by PCo or consultant for all digital submissions. Otherwise, the following CTB files are available:
 - i bw.ctb: Colour table for black and white plotting (preferred)
 - ii color.ctb: Colour table for colour plotting

2) Autodesk Revit

a. N/A – Utilize Object Styles and line types as found in template file

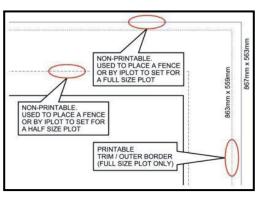
3) Bentley Microstation 2D/3D

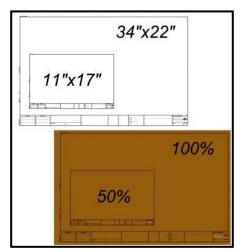
- a. tds600.pen: Pen table for full-size plotting
- b. Vhalf.pen: Pen table for half-size plotting
- 4.9.2 The Title Block file contains non-print plotting guides, as follows (and):
 - 1) Outer border 867 mm x 563 mm (solid line, non-printable)



2) Inner border 863 mm x 559 mm (dashed line, printable 34 inches x 22 inches ANSI D)

FIGURE 4-13 PLOTTING GUIDE





5. CADD Requirements

5.1 Dimensions and Chainage

5.1.1 All CADD drawing dimensions and alignment chainages shall be illustrated as ground measurements. For CADD drawings referencing a Geodetic Coordinate System (GCS), the grid distances shall be converted to ground distances by applying the Project Scale Factor (PSF) where.

Ground Distance = Grid Distance / PSF

- 5.1.2 The PSF will be computed by the CPG Survey Lead based on the GCS and provided by the CPG Project Manager.
- 5.1.3 The PSF may vary along the extent of the project, in particular when the project extents run in an east / west direction. For projects extending more than 10 km's east / west then multiple PSF's may be provided for designated sections (areas) along the route.
- 5.1.4 The PSF has a minimal affect on short distance measurements. Dimensions not exceeding 150-metre (m) for MTM, or 50-metre (m) for UTM may not require a grid to ground dimension conversion.
- 5.1.5 Drawings that have been transformed to a Local Coordinate System (LCS) with a PSF = 1 do not require dimensions to be converted to ground distances. See Section 6.9.2 for transformation of drawings from GCS to LCS.

5.2 File Naming Convention

5.2.1 Naming conventions for electronic drawing files allow CADD users to determine the contents of a drawing without actually displaying the file. They also provide a convenient and clear structure for organizing drawings.

FIGURE 4-14 PLOTTING GUIDE SIZING

5.2.2 Guidance:

- 1) Limit file names to a maximum 32 characters (before **.ext**).
- 2) Use A-Z Latin alphabet characters in upper and lower case.
- 3) Use numerical characters.
- 4) Avoid and omit characters that can be confused with others (that is, uppercase "O," uppercase "I," and lowercase "L").
- 5) Use an underscore to separate different fields in file names (for example, Field1Field2_Field3_Field4.dgn or .dwg).
- 6) A hyphen is acceptable between the Discipline Series and the drawing number field.
- 7) Do not use spaces, and special characters are not to be used.

5.2.3 Line Prefix and Location Code

- 1) Consultants are required to use a prefix to identify the corridor the work is being submitted for, as follows:
 - a. This prefix will consist of one, two, or three characters.
 - b. This prefix will be provided by CPG.
- 2) If applicable, PCo/Consultants will also be required to include a Location Code within the file name to identify the location along the specific corridor.

5.2.4 Naming Fields

1) There are 2 main options for naming digital drawing files. Each option will need to be varied slightly to accommodate BIM file naming. See A.4 for Suggested BIM file naming variations.

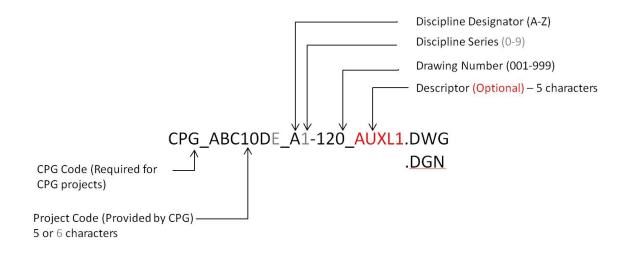
2) Option 1 – Currently used on LRT projects.

- CADD file names contain distinctive Naming Fields (that is, CPG_Field1Field2_Field3_Field4.dgn) to easily identify discipline, file type, drawing group, and drawing description.
- b. For a full list, see the CADD Naming Convention Matrix in Appendix A2.

3) Option 2 – Acceptable for current GO Transit projects

- a. CADD file names contain distinctive Naming Fields (that is, CPG_Field2_Field3Field4-Field5_Field6.dgn or .dwg) to easily identify discipline, file type, drawing group, and drawing description.
- b. For a full list, see the CADD Naming Convention Matrix in Appendix A3.





5.3 Autodesk AutoCAD

5.3.1 Pen assignment & standard GO transit drawing sheet – ANSI /ISO A1 size (unit in metric)* all files shall be saved in Autocad version 2012 format unless noted otherwise. See Appendix B.1.1 for additional.

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 – at 0.25mm or as required by the Consultant.

- 5.3.2 Layers, Naming, and Organization
 - 1) ProjectCo and/or the Consultant shall name layers according to the "AIA CAD Layer Guidelines" Version 3 or later.
 - a. Use of optional fields is at discretion of ProjectCo/Consultant but shall be in conceptual compliance with the Standard and the Principles outlined in 5.3.2 subsection 2) below.

2) Principles

- a. CADD drawings in AutoCAD shall be structured clearly using Layers.
- b. Elements in the CAD file must be allocated according to their correct Layer. Eg. Doors must be assigned to Door Layer, Property Line elements shall be assigned to a Layer for Property Lines, etc.

- c. The organizational structure shall be understandable by end-users. I.e Layers shall be named so that the owner and any subsequent consultants may use and understand the files without requiring additional clarification.
- 3) Additional guidance for layers can be found in other parts of this *Manual*, including but not limited to sections: 3.7.2, 4.8.3, 4.8.7.
- 5.3.3 Use "e-Transmit" for submission or obtain approval from CPG for alternative document submission strategy.
 - 1) Include all related attachments and submit 'ctb' file (if modified from CPG-provided template) to CPG project group with each drawing submission.

5.3.4 Titleblocks

- CPG will supply the latest title block in electronic format both in block and layout template settings for Project Co/ Consultant to use as default. Please see following AutoCAD-specific requirements below:
 - a. Any proposed modifications must be submitted for approval by CPG prior to drawing production.
 - b. The layout of the title block, including the reference drawings and revision columns, shall be as indicated on Figure 4-2 CPG Standard Title Blocks.
 - c. Please insert and edit attribute w/attedit command.
 - d. DO NOT explode or rename block or treat as external reference in order to maintain the attribute's integrity.
 - e. Insert block @0,0,0 Original scale: 1 to 1 mm
 - f. Drawing size: See section 4.7
- 5.3.5 Signature Page & Title Page Templates
 - i CPG will supply Signature Page templates and Title Page templates for consultant use. (.dwt file can be saved in user's AutoCAD application template location for quick layout creation)
 - ii Filenames of provided files will be as follows:
 - A. [Client entity]-[ANSI or ISO 216 A-Series page size]-signsheet.dwg

Example "CPG-A1-signsheet.dwg"

B. [Client entity]-[ANSI or ISO 216 A-Series page size]-titlepage.dwg

Example "GO-ANSI-D-signsheet.dwg"

- iii Copy drawing file and rename to suit. DO NOT explode or rename block.
- iv Edit attribute w/attedit command.
- For consultants preparing work for GO Transit, use Drawing size 'ANSI D' 558.8 mm x 863.6 mm (22" x 34") Plot to limits.
- vi Layer: 'BORDER_NOT_PLOT' plotting function has been disabled; Do not change the setting.

5.4 Bentley Microstation 2D/3D

- 5.4.1 Levels
 - 1) Each element of a design should be placed on the corresponding level according to the structure in place for each discipline.
 - 2) Elements can either be placed with their own independent symbol properties (colour, weight, style, independent of the level library) or placed to use the symbology defined by the level library (placement ByLevel). The ByLevel option for placing elements is the most effective way to ensure file contents conform to the level standards.
 - 3) Modification of levels within the standard drawing library is not permitted.
 - 4) Any additional level requirements must be submitted to the CPG CADD Manager for approval and possible inclusion into the standard drawing library files.
 - 5) Level structures for new drawings are supplied by drawing library files. These files contain standardized, preset level names and numbers, level descriptions, and graphical attributes (colour, weight, and style).
- 5.4.2 CPG will provide the standard drawing libraries, as well as the CPG drawing library for the Title Block file (*.dgn), as shown in Appendix A-4.

5.4.3 Master Files -'m' and 'mx'

- 1) A Master file contains all graphical data for a specific area of a Project and is drawn at full scale (scale 1:1).
- 2) Master files have no limits as to the extent of area they encompass.
- 3) Whenever possible, draw graphic elements within the Master file and then reference them into various Sheet files to create the 'ready-to-plot' file.
- 4) Each discipline will have their own Master files, which will contain the data associated with their respective discipline.
- 5) Depending on the size of the Project, each discipline will have a number of Master files that they are responsible to create.
- 6) Some rules to follow when creating Master files include:
 - a. Use the Seed file (CPG_Seed2d.dgn) to create all Master files.
 - b. Include the 'm' (master) or 'mx' (master existing) designation when naming Master files (Section 4.9, CADD File Naming Convention).
- 7) See Appendix B.2 for additional Bentley Microstation-specific requirements and guidance.

6. BIM Requirements

6.1 Context

- 6.1.1 Use of BIM in facilities planning, design, construction, maintenance and operations provides tangible benefits and significant cost savings, and supports CPG's core values of accountability, efficiency, collaboration, communication, and excellence.
- 6.1.2 Designers using BIM will comply with this Manual and the following BIM standards (included):
- 1) **CPG BIM Implementation Plan** Defines BIM implementation software, standards, and requirements that will be followed during CPG facility design and construction contracts.

METROLINX

2) **CPG BIM Execution Plan Template** - Designers will prepare and execute a BIM Execution Plan in accordance with CPG's BIM standards. The BIM Execution Plan will be maintained throughout the contract.

6.2 BIM Object Standards and Interoperability

- 6.2.1 The National Building Specification (NBS) defines Building Information Modelling (BIM) as "the means by which everyone can understand a building through the use of a digital model".
 According to NBS, "Modelling an asset in digital form enables those who interact with the building to optimise their actions, resulting in a greater whole life value for the asset." (NBL)
- 6.2.2 Given that each BIM platform vendor has their own approach to information handling, it is important to set minimum requirements for information transfer in order to ensure that the content in the database is useful at all points from initial design through construction to maintenance and operations regardless of the selected platform. Ultimately, standardization of BIM objects is essential in order to achieve the level of collaboration and interoperability that makes the use of BIM worthwhile for the complete lifecycle.
- 6.2.3 Principles of Interoperability
 - 1) Readability As a basic requirement, it is essential to package information such that it is possible to hold and exchange relevant data between different software applications
 - 2) Consistency creating digital assets using a consistent kit of parts will yield all of the benefits that standardisation brings, thus it is important that a standardised approach be considered.
 - 3) Relevance In order for the digital model to remain relevant throughout the lifecycle, it must be updated so that the legacy data does not become obsolete and un-usable. In other words, it must be possible to update the model/database.
- 6.2.4 Compliance with Industry Foundation Classes (IFC) and Construction Operations Building Information Exchange (COBie)
 - 1) The BIM authoring software shall be compliant with the Industry Foundation Classes (IFC) Coordination View (buildingSMART 2013) and shall be able to export to the Construction-Operations Building information exchange (COBie) format, which is based on the IFC FM Handover View.
 - 2) The major BIM authoring software applications are IFC and COBie compliant. If ProjectCo/Consultant are unsure whether the BIM authoring software meets this requirement or how to export to IFC and COBie formats, contact the BIM authoring software vendor.
 - 3) ProjectCo and/or Consultant(s) shall confirm specific Interoperability requirements (if any) with CPG Project team prior to beginning work.
- 6.2.5 Reference Standards for Interoperability:
 - Industry Foundation Classes (IFC) is the leading interoperability standard, supported by all major BIM vendors and supported by approximately 150 software applications worldwide. It is developed and maintained by buildingSMART International as its "Data standard". As a data format IFC is neutral (not the product of or favouring any particular vendor) and nonproprietary.
 - 2) COBie is a subset of the IFC standard that was selected as the model for the NBS BIM Object standard. It is a simplified, non-geometric sub-set of IFC. This is a relational database that, in its most simple form, can be a spreadsheet.
 - 3) NBS BIM Object Standard v1.3 A standard that defines how objects are created and named to ensure interoperability of objects in the BIM environment.

- 6.2.6 Open Standards and Collaboration
 - 1) CPG encourages the use of open standards and collaboration tools to facilitate interoperability among Designers, between Designers and Contractors, and between Designers and the Owner.

6.3 BIM Utilization

- 6.3.1 ProjectCo/Consultant and their consultants shall use BIM authoring software to generate BIMs that include all of the geometry, physical characteristics, and data needed to describe the design and construction work of the Project.
- 6.3.2 The BIM content is the geometric, physical characteristics, and data needed to describe the design and construction work of the building project. The Project Team shall identify the BIM content required to meet the project needs and the deliverable requirements at each design phase in the BIM Execution Plan.
- 6.3.3 ProjectCo/Consultants shall refer to executed LOD templates as stipulated in the Contract/Project Agreement for each project as a plan for developing the model.

6.4 BIM-based Analyses

- 6.4.1 Unless otherwise noted, all analyses are to be based on the BIM. During the Project, the BIMs developed by ProjectCo/Consultant and their consultants shall be used to:
 - 1) Perform program validation Designers shall use the Space Inventory produced to validate that the Design complies with the General requirements of the Owner's Program as set out in the project agreement and/or the PSOS.
 - 2) Generate input for energy modelling/analysis
 - 3) Identify and resolve interferences between disciplines.
 - 4) Where applicable, generate schedules and inventories including: space inventories, equipment schedules, etc.
- 6.4.2 For the Design Development and Construction Documents phases, the Designer and the Designer's Consultants shall use an automated interference checking application to identify and resolve interferences among all of the disciplines creating BIMs and submit a report summarizing the status of the 3D building systems coordination effort. Description of the automated interference checking process shall be included in the BIM Execution Plan developed by ProjectCo/Consultant and reviewed by CPG.

6.5 Well-Structured BIM

- 6.5.1 Parametric links shall be maintained within the models to ensure the automatic extraction of Plans, Sections, Elevations, Schedules, and 3D views. All drawings at 1/4" = 1'-0" scale or smaller shall be representations of the BIM. For engineering disciplines, model all pipes, conduits, or bundles 2" or greater in diameter.
- 6.5.2 Use correct object and spatial classifications that support the IFC format, extraction of COBie data, and energy analysis if required.

6.6 3D Existing Condition Models

6.6.1 Existing condition models must be developed to LOD300 minimum, and contain model elements feature-coded to CPG BIM standards. All submitted data shall be viewable and compatible with the current version of Metrolinx Design review software.

6.7 Model Files

- 6.7.1 A Model file is a unique file type used on a BIM Project; it contains 3D graphical data, as well as the attribute data associated with each element.
- 6.7.2 Model files are created at full scale (1:1).
- 6.7.3 Model files have no limits to the extent of the area they encompass.
- 6.7.4 Each discipline will have discipline-specific Model files, containing the data associated with their respective discipline.
- 6.7.5 Depending on the size of the Project, each discipline will have a number of Model files that they are responsible to create.
- 6.7.6 CPG BIM Model File Types are outlined in Appendix A.4.

6.8 **BIM File Naming Convention**

- 6.8.1 BIM file naming follows the CADD File Naming Conventions (Appendix A.3) and are similar to the CADD Naming Conventions, but with the following additions or modifications:
 - 1) Field 1 Discipline Designator: Contains the Discipline Designator for the Model file.
 - 2) Field 2 Model Type: Contains BIM file type designations specific to the type of model and status of the objects within the model.
 - 3) Field 3 Model Contents: Describes the content of the discipline-specific elements being modelled.

6.9 BIM Standards – Software specific

6.9.1 **Autodesk Revit** or similar

- 1) Model Structure
 - a. CPG may provide the required BIM Worksets, linestyles and object styles in a project template file. ProjectCo/Consultant shall submit proposed worksets to CPG for review and approval.
 - b. At a minimum, a workset shall be created for each linked discipline model in addition to separate worksets for: Interiors, Shell, Site, Core, and FF&E.
 - c. Modification of worksets within the standard are not automatically permitted and must be justified and approved by CPG.
 - d. Each element of a discipline model should be placed in the appropriate workset for that element
 - e. Each discipline model must be linked into the 'container model' and assigned to its respective workset.

6.9.2 Bentley Microstation

- 1) Model Structure
 - a. CPG will provide the required BIM level libraries as part of the Project kickoff CADD Information Package.
 - b. Modification of levels within the standard level libraries is not permitted.
 - c. Each element of a model should be placed on the corresponding level or layer according to the structure in place for each discipline.

- d. Elements can either be placed with their own independent symbology (colour, weight, and style, independent of the level library) or placed to use the symbology defined by the level library (placement ByLevel). The "ByLevel" option for placing elements is the most effective way to ensure file contents conform to the level standards.
- 2) Model Files
 - a. Master files (extractions) are created from Model files and should be referenced into various Sheet files to create the 'ready-to-plot' file.
 - b. Some rules to follow when creating Model files include:
 - i Use the discipline-specific Seed file to create Model files.
 - ii Discipline Master Models should be maintained so that the Project Master Model is always an accurate representation of the all-inclusive model.
- 3) Cells and Cell Libraries
 - a. A cell is a combination of elements linked together as one symbol that can be placed into a drawing.
 - b. These standard cells are grouped (by using file models) in specific discipline cell libraries (with a .cel file extension).
 - c. The most current cell libraries will be provided by CPG as part of the CADD Information Package.
 - d. Do not make any changes to the symbols or cell libraries.
 - e. General rules to follow when using cells include:
 - i Only use cells contained in the approved cell libraries or located in the right-hand side of the Title Block file.
 - ii Do not use shared cells.
 - iii Do not drop cells.

Appendix A Naming Conventions

A.1. Drawing Numbering Convention - Examples

MAPPING, ALIGN	MAPPING, ALIGNMENT, PROPERTY, and SURVEY	
Location or P	Location or Property	
G0XXX	Mapping, Alignment, Property and Survey General Drawings, Notes and Abbreviations	
G0XXX	Existing Topography	
G0XXX	Property Requirements	
Control and Topographic Surveys		
G2XXX	Horizontal and Vertical Control	
G2XXX	Topographical Survey	
Alignment		
G3XXX	Track Alignment	
G3XXX	Alignment Information	
Construction Layout		
G4XXX	Site Works, New Construction	
G4XXX	Road Profiles	
G4XXX	Construction Layout Plan	
G4XXX	Construction Layout Information	
G4XXX	Site Layout Details	
G4XXX	Site Elevations	
CIVIL		
General		
COXXX	Civil, General Drawings, Notes and Abbreviations	
COXXX	Site Access and Work Area	
COXXX	Erosion Control	
Hoarding, Rei	movals, Traffic & Construction Staging	
C2XXX	Removals	
C2XXX	Traffic Maintenance Plans - Traffic Staging	
C2XXX	Pavement Markings and Signage - Per Stage	
C2XXX	Traffic Maintenance Plans	
C2XXX	Avenue Detour Alignment Data	
C2XXX	Temporary Traffic Signals	
C2XXX	Construction Staging Plan	

Grading, Pavi	ng & Restoration
C4XXX	Site Grading Plan
C4XXX	Pavement Restoration - Traffic Staging
C4XXX	Pavement Markings and Signage
C4XXX	Pavement Details
C4XXX	Special Details
C4XXX	Pavement Markings
C4XXX	Streetscape Plan
C4XXX	Streetscape Detail
UTILITIES	
U1XXX	Utilities, General Drawings, Notes and Abbreviations
U1XXX	Existing Utilities
U1XXX	Composite Utility Relocations
U1XXX	Storm Sewer Relocation and Reinstatement
U1XXX	Sanitary Sewer Relocation and Reinstatement
U1XXX	Watermain Relocation and Reinstatement
U1XXX	Watermain Profiles
U1XXX	Hydro Relocation and Reinstatement
U1XXX	Cable Relocation And Reinstatement
U1XXX	Consumers Gas Relocation and Reinstatement
U1XXX	Consumers Gas - Road Crossing Profile
GEOTECHNICAL	
GT0XX	Geotechnical, General Drawings, Notes and Abbreviations
GT1XX	Monitoring & Instrumentation Plan
GT1XX	Settlement Array Details and Legend
GT1XX	Monitoring Instrument Locations
GT1XX	Instrumentation Details
ARCHITECTURAL	
Legends, Abb	reviations, Wall Types
AAXXX	Architectural, General Drawings, Notes and Abbreviations
AAXXX	Location Plan
AAXXX	Wall & Ceiling Types
AAXXX	Ontario Building Code Matrix
AAXXX	Under Platform Floor - Life Safety Plan

AAXXX	Service Floor - Life Safety Plan
AAXXX	Concourse Floor - Life Safety Plan
AAXXX	Upper Concourse Floor - Life Safety Plan
AAXXX	Ground Floor - Life Safety Plan
AAXXX	Life Safety Sections
AAXXX	Building Assembly and Material Types
Landscaping [Drawings
ALXXX	Overall Site Grading Plan
ALXXX	Overall Seeding and Sodding Plan
ALXXX	Sectional Grading Plan
ALXXX	Entrance Layout & Grading Plan
ALXXX	Grade Level - Landscape, Secondary Entrance
ALXXX	Grade Level - Landscape, Main Entrance
ALXXX	Grade Level - Landscape, Automatic Entrance
ALXXX	Overall Planting Plan
ALXXX	Planting Plan - Section
ALXXX	Planting Plan - Entrance
ALXXX	Planting Plan & Stormwater Management Pond
ALXXX	Landscape Sections
ALXXX	Planting Details
ALXXX	Landscape Details
ALXXX	Layout Plan Bike Rack Area
Site Plans	
A1XXX	Architectural Site Plan
A1XXX	Site Plan - Sections
Key Plans	
A15XX	Area Plan
A15XX	Grade Level Key Plan
A15XX	Concourse, Platform & Substation Key Plans
A15XX	Fire Separation- Key Plans & Code Analysis
A15XX	Fire Separation- Key Sections & Egress Calculations
A15XX	Grade Level Vents - Plan, Elevations & Details
A15XX	Platform Level - Plan
A15XX	Concourse Level - Plan
A15XX	Concourse Level - Main & Secondary Entrance Plan
AIJAA	



A15XX	Substation Level - Plan	
A15XX	Main Entrance Plan	
A15XX	Main Entrance Elevations	
A15XX	Main Entrance – Cross-section	
A15XX	Automatic Entrance Plan	
A15XX	Automatic Entrance Elevations	
A15XX	Automatic Entrance - Section	
A15XX	Secondary Entrance - Plans and Elevations	
A15XX	Vent Elevation and Plans	
Floor & Roof	Plans	
A2XXX	Platform Floor Plan	
A2XXX	Service Level Floor Plan	
A2XXX	Concourse Floor Plan	
A2XXX	Main Entrance Roof Plan	
A2XXX	Automatic Entrance Roof Plan	
A2XXX	Enlarged Plans for Public Restrooms (if required)	
A2XXX	Enlarged Plans for Staff Rooms (if required)	
Reflected Ceiling Plans, Floor Finishing Plans & Furniture Layout		
A3XXX	Platform Level - Reflected Ceiling Plan	
A3XXX	Concourse Level - Reflected Ceiling Plan	
A3XXX	Main Entrance Reflected Ceiling Plan	
A3XXX	Platform Level - Floor Pattern Plan	
A3XXX	Concourse Level - Floor Pattern Plan & Details	
A3XXX	Secondary Entrance - Floor Pattern Plan	
A3XXX	Automatic Entrance Reflected Ceiling Plan	
A3XXX	Automatic Entrance - Floor Pattern Plan	
A3XXX	Main Entrance Floor Pattern Plan	
A3XXX	Exterior Paving Plan	
A3XXX	Main Entrance - Exterior Paving Pattern Plan	
A3XXX	Secondary Entrance - Exterior Paving Plan	
A3XXX	Automatic Entrance - Exterior Paving Pattern Plan	
Exterior Elev	ations & Interior Elevations	
A4XXX	Platform Interior Elevations	
A4XXX	Concourse Interior Elevations	
A4XXX	Main Entrance Interior Elevations	

A4XXX	Secondary Entrance Interior Elevations	
A4XXX	Automatic Entrance Interior Elevations	
A4XXX	Fence Details	
Building Sect	Building Sections	
A5XXX	Whole Building Sections as Required – Coordinate/Confirm w/ CPG	
Other Drawings as Required		
A6XXX	Unassigned – use series as required - Coordinate/Confirm w/ CPG	
A7XXX	Unassigned – use series as required - Coordinate/Confirm w/ CPG	
All Details (Plans & Sections & Elevations Including Stairs, Elevators & Escalators)		
A8XXX	Platform & Concourse Levels, Longitudinal Section	
A8XXX	Main Entrance - Escalator Section	
A8XXX	Firefighters' Access - Plan, Section & Details	
A8XXX	Platform Level - Detailed Plans	
A8XXX	Platform Level - Elevations	
A8XXX	Concourse Level - Detailed Plans	
A8XXX	EAS Cabinet Details	
A8XXX	Substation Service Stair - Plans & Sections	
A8XXX	Substation Service Stair - Details	
A8XXX	Secondary Entrance - Stair Plan and Sections	
A8XXX	Main Entrance - Stair, Escalators - Plan and Sections	
A8XXX	Main Entrance Escalator - Details	
A8XXX	Platform & Concourse Levels - Escalator Plans & Sections	
A8XXX	Escalators Details	
A8XXX	Glazed Screen Details	
A8XXX	Typical Escalator Details	
A8XXX	Platform & Concourse Levels - Stair Plans & Sections	
A8XXX	Automatic Entrance - Stair Plan & Sections	
A8XXX	Platform Level - Service Ramp Elevations & Details	
A8XXX	Plenum Handrail Details	
A8XXX	Platform Level - Interior Wall Sections & Details	
A8XXX	Platform Level - Ceiling Details	
A8XXX	Platform Level - Floor Finish Details	
A8XXX	Floor Details	
A8XXX	Concourse Level - Wall Sections & Details	
A8XXX	Concourse Level - Stair and Balustrade Details	

A8XXX	Concourse Level - Attendant's Booth Plan, Elevations & Details
A8XXX	Concourse Level - Attendant's Booth Plans & Interior Elevations
A8XXX	Concourse Level - Attendant's Booth Section & Details
A8XXX	Concourse Level - Attendant's Anteroom & Washroom Interior Elevations
A8XXX	Concourse Level - Staff Washroom Detailed Plan, Interior Elevations & Details
A8XXX	Substation Level - Washroom
A8XXX	Fare Barrier and Fare Collection Equipment
A8XXX	Automatic Entrance Fare Barrier Details
A8XXX	Secondary Entrance Section & Details
A8XXX	Main Entrance Wall Sections
A8XXX	Main Entrance Plan Details
A8XXX	Main Entrance & Substation Details
A8XXX	Automatic Entrance Wall Sections
A8XXX	Automatic Entrance Plan Details
A8XXX	Elevators - Plan & Details
A8XXX	Typical Elevator Details
A8XXX	Entrance Buildings - Typical Details
A8XXX	Door & Door Frame Schedules
A8XXX	Room Finish Schedules
A8XXX	Standard Details - Gates & Barriers
A8XXX	Standard Details - Barriers & Handrails
A8XXX	Standard Details - Handrails
A8XXX	Standard Details - Gates Handrails, Doors & Frames & Miscellaneous
A8XXX	Window and Storefront Schedules, Elevations, and Details
A8XXX	Roof details and Fall Arrest Details
Schedules &	Millwork
A9XXX	Door Schedule, Door & Frame Types & General Notes
A9XXX	Door & Frame Details
A9XXX	Concourse Door & Frame Details
Signage Loca	ation Plans
A95XX	Site Signage Plan
A95XX	Platform Signage Plan
A95XX	Concourse Signage Plan
A95XX	Entrance Signage Plan
A95XX	Elevators Signage Partial Plans

A95XX	Stairs Signage Partial Plans
A95XX	Signage Mounting Section Elevation
A95XX	Signage Special Areas
A95XX	Signage Non Standard Details
A95XX	Miscellaneous signage for Safety, Security, Privacy, Bylaw, Civil Rights, and General Information
STRUCTURAL	
General	
S0XXX	Structural General Drawings, Notes, and Abbreviations
S0XXX	Structural Key Plan & Profiles
S0XXX	Track Level - Plan & Profile
S0XXX	Platform and Concourse Levels - Key Plans
S0XXX	Upper Concourse & Roof Levels - Key Plans
S0XXX	Structural Tolerances
Station Running Structure	
S1XXX	Station Track Level Plan
S1XXX	Station Platform Level Plan
S1XXX	Station Concourse Level Plan
S1XXX	Station Roof Level Plan
S1XXX	Station Service Level Plan
S1XXX	Station Longitudinal Section
S1XXX	Station Cross-section Concrete Details
S1XXX	Station Cross-section Reinforcing Details
S1XXX	Invert and Roof Reinforcing Plan & Details
S1XXX	Concourse Reinforcing Plan and Details
S1XXX	Station End-wall Reinforcing Elevation and Details
S1XXX	Station Side-wall Reinforcing Elevation and Details
S1XXX	Station Shafts Sections & Details
S1XXX	Column Schedule
Station Entr	ances
S2XXX	Automatic Entrance - Concourse and Concourse Roof Plans
S2XXX	Automatic Entrance - Grade Plan
S2XXX	Automatic Entrance Roof Plan and Details
S2XXX	Automatic Entrance Longitudinal Section
S2XXX	Automatic Entrance Section and Details

S2XXX	Automatic Entrance Reinforcing Details
S2XXX	Automatic Entrance - Beam Schedule
S2XXX	Beam Reinforcing Section & Details
S2XXX	Standard Drawings
S2XXX	Lintel Schedule
S2XXX	Secondary Entrance Plan & Section
S2XXX	Secondary Entrance - Sections
S2XXX	Secondary Entrance Reinforcing Details
S2XXX	Main Entrance Location Plan
S2XXX	Main Entrance Foundation Layout
S2XXX	Main Entrance Foundation Sections
S2XXX	Main Entrance Ground Floor Plan
S2XXX	Main Entrance Substation Floor Plan
S2XXX	Main Entrance Upper Concourse Floor Plan
S2XXX	Main Entrance Vent Shaft
S2XXX	Main Entrance Sections
S2XXX	Main Entrance Roof Plan
S2XXX	Main Entrance Foundation Reinforcing
S2XXX	Main Entrance Drilled Pier Reinforcing
S2XXX	Main Entrance Tie Beam Reinforcing
S2XXX	Main Entrance Wall Sections - Reinforcing
S2XXX	Main Entrance Upper Concourse Invert Reinforcing
S2XXX	Main Entrance Control Room Reinforcing
S2XXX	Main Entrance Ground Floor Reinforcing
S2XXX	Main Entrance Substation Floor Reinforcing
S2XXX	Main Entrance Columns
S2XXX	Main Entrance Roof Reinforcing Plan & Sections
S2XXX	Main Entrance Stair & Escalator Sections
S2XXX	Main Entrance Stair & Escalator reinforcing
S2XXX	Main Entrance Service Stair - Concrete Layout
S2XXX	Main Entrance Service Stair - Reinforcing Details
Running Struc	cture Vent Shafts, EEBs
S4XXX	Crossover - Plan and Longitudinal Section
S4XXX	Crossover - Concrete and Reinforcing Sections
S4XXX	Crossover - Sump Pit Reinforcing Section and Details

S4XXX	
34^^^	Crossover Drop Site - Plan & Longitudinal Section
S4XXX	Crossover Drop Site - Concrete Sections
S4XXX	Crossover Drop Site - Reinforcing Sections
S4XXX	Crossover - Tunnel Interface Details
S4XXX	Exhaust Relief Shaft - Concrete
S4XXX	Tunnel Ventilation Shaft - Concrete
S4XXX	Ventilation Shaft - Plan & Sections
S4XXX	Ventilation Shaft - Reinforcing Details
S4XXX	Exhaust Discharge Vent
S4XXX	Firefighters' Access - Plan & Sections
S4XXX	Firefighters' Access - Reinforcing Details
S4XXX	Outside Air Intake Shaft - Concrete & Reinforcing Details
S4XXX	Stair - Reinforcing Details
S4XXX	Automatic Entrance Stair - Reinforcing Details
S4XXX	Concourse Level - Part Plan
S4XXX	Miscellaneous Structural Details
S4XXX	Structural Key Plan at Slab Invert Level
S4XXX	Isolated Track Slab - Sections
S4XXX	Reinforcing Details at Expansion Joints and Curbs
S4XXX	Reinforcing Details at Maintenance Hole
S4XXX	Reinforcing Details at Serviceway Cutout
S4XXX	Miscellaneous Details
S4XXX	Reinforcing Details at Recess Opening
S4XXX	Track Drainage Pump Sump - Plan & Details
S4XXX	Track Drainage Pump Sump - Sections
Retaining Walls	S
S6XXX	Retaining Walls - Plan & Details
S6XXX	Retaining Walls - Sections
S6XXX	Underpinning
Excavation Sup	pport System
S7XXX	Excavation Support System and Decking
S7XXX	Excavation Support System - Sections
S7XXX	Excavation Support System - Schematic Tunnel Liner Removal Sequence
S7XXX	Excavation Support System - Main Entrance



Demolitions	
S8XXX	Demolitions - Plan & Detail
MECHANICAL	
General	
M00XX	Mechanical General Drawings, Notes, and Abbreviations
M00XX	Mechanical Legend & Symbols
M00XX	Mechanical Site Plan
M00XX	Overall Under Platform Level Plan
M00XX	Overall Platform Level Plan
M00XX	Overall Concourse Level Plan
M00XX	Overall Entrance Level Plan
Water Piping	
M10XX	Water Piping Under Platform Level Plan
M10XX	Water Piping Platform Level Plan
M10XX	Water Piping Concourse Level Plan
M10XX	Water Piping Entrance Level Plan
M12XX	Water Piping Sections
M12XX	Water Piping Installation Details
M13XX	Water Piping Schematics
M13XX	Plumbing System Control Schematics
M136X	Plumbing System Equipment Schedules
Drainage Pipir	າg
M20XX	Drainage Piping Under Platform Level Plan
M20XX	Drainage Piping Platform Level Plan
M20XX	Drainage Piping Concourse Level Plan
M20XX	Drainage Piping Entrance Level Plan
M22XX	Drainage Piping Sections
M22XX	Drainage Piping Installation Details
M23XX	Drainage Piping Schematics
M23XX	Drainage System Control Schematics
M236X	Drainage System Equipment Schedules
Fire Protection	n
M30XX	Fire Protection Under Platform Level Plan
M30XX	Fire Protection Platform Level Plan
M30XX	Fire Protection Concourse Level Plan

M30XX	Fire Protection Entrance Level Plan
M32XX	Fire Protection Sections
M32XX	Fire Protection Installation Details
M33XX	Fire Protection Standpipe Schematic
M33XX	Fire Protection Sprinklers Schematic
M336X	Fire Protection Equipment Schedules
HVAC	
M50XX	HVAC Under Platform Level Plan
M50XX	HVAC Platform Level Plan
M50XX	HVAC Concourse Level Plan
M50XX	HVAC Entrance Level Plan
M52XX	HVAC Sections
M52XX	HVAC Installation Details
M53XX	HVAC Airflow Schematics
M53XX	HVAC Controls Schematics
M536X	HVAC Equipment Schedules
Hoist & Lift	ing System
M60XX	Hoist and Lift Equipment Platform Level Plans
M60XX	Hoist and Lift Equipment Concourse Level Plans
M60XX	Hoist and Lift Equipment Entrance Level Plans
M62XX	Hoist & Lifting Sections, Installation Details and Equipment Schedules
M63XX	Hoist & Lifting System - Schematics
Tunnel Ven	tilation System
M70XX	Tunnel Ventilation System Platform Level Plan
M70XX	Tunnel Ventilation System Entrance Level Plan
M72XX	Tunnel Ventilation System Sections
M72XX	Tunnel Ventilation System Installation Details
M73XX	Tunnel Ventilation System Schematics
M736X	Tunnel Ventilation System Equipment Schedules
M736X	Tunnel Ventilation System Operation Mode Tables
	Services: Combined Service Drawings (CSD) Iral E&M Drawings (SEM)
M80XX	CSD Platform Level Plan
M80XX	CSD Concourse Level Plan
M80XX	CSD Entrance Level Plan

M80XX CSD S	
	Platform Level Plan
M80XX SEM C	Concourse Level Plan
M80XX SEM E	ntrance Level Plan
M80XX SEM S	Sections
ELECTRICAL	
General	
E0XXX Electric	cal, General Drawings, Notes and Abbreviations
E0XXX Crosso	overs Pull Box Details
	nd Running Structure, Emergency Alarm Station I Mounting Details
E0XXX Station	Interior EAS Cabinet
E0XXX Electric	cal Abbreviations
E0XXX Tractio	n Power Conduit Details
E0XXX Lightin	g Detail
E0XXX Condu	it Details
E0XXX Closed	Circuit Television (CCTV) and Intercom Details
E0XXX Public	Address (PA) System Details
E0XXX Escala	tor Pits - Conduit Layouts
E0XXX System	ns Layout - Platform Level Plan
E0XXX System	ns Layout - Concourse Level Plan
E0XXX System	ns Layout - Upper Concourse Level Main Entrance Plan
E0XXX System	ns Layout - Substation Level Plan
E0XXX System	ns Layout - Grade Level Main & Secondary Entrance Plan
E0XXX System	ns Layout - Grade & Concourse Level Automatic Entrance Plan
E0XXX Comm	unications - Upper Concourse Level Plan
E0XXX Comm	unication Room Details
Power Supply	
E1XXX Power	- Platform Level Plan
E1XXX Power	- Concourse Level Plan
E1XXX Power	- Upper Concourse Level Main Entrance Plan
E1XXX Power	- Substation Level Plan
E1XXX Power	- Grade Level Main & Secondary Entrance Plan
E1XXX Power	- Grade & Concourse Level Automatic Entrance Plan
E1XXX Norma	I Power Single Line Diagram

E1XXX	Emergency Power Distribution Single Line Diagram
E1XXX	MCC Single Line Diagram
E1XXX	Power Panel Single Line Diagram
Lighting	
E2XXX	Lighting - Platform Level Plan
E2XXX	Lighting - Concourse Level Plan
E2XXX	Lighting - Upper Concourse Level Main Entrance Plan
E2XXX	Lighting - Substation Level Plan
E2XXX	Lighting - Grade Level Main & Secondary Entrance Plan
E2XXX	Lighting - Grade & Concourse Level Automatic Entrance Plan
E2XXX	Lighting Details
E2XXX	Lighting & Receptacles - Crossover Track Level Plan
Grounding Set	ries
E3XXX	Embedded Conduit - Platform Level Plan
E3XXX	Embedded Conduit - Concourse Level Plan
E3XXX	Ceiling Embedded Conduit - Concourse Level Main Entrance Plan
E3XXX	Embedded Conduit - Substation Level Plan
E3XXX	Embedded Conduit - Substation Main & Secondary Entrance Plan
E3XXX	Embedded Conduit - Grade & Concourse Level Automatic Entrance Plan
E3XXX	Duct Bank & Embedded Conduit - Crossover Track Level Plan
E3XXX	Embedded Conduits - Sections
E3XXX	Embedded Conduit Details
E3XXX	Escalator & Elevator Details
E3XXX	Transformer Yard Grounding
E3XXX	Hydro Switch Base, Duct Bank & Hand Hole Details
E3XXX	Substation Embedded Conduit Details
E3XXX	Platform Pull Room Details
E3XXX	Electrical Rooms Grounding Layout
E3XXX	Electrical Rooms Sections & Elevations
E3XXX	Duct Bank Details
E3XXX	Pump Room Details & Sections
E3XXX	Electrical Rooms Conduit Layout
E3XXX	Firefighters' Access Sections
E3XXX	Collector's Booth & Miscellaneous Details
20,000	



Fire Alarm Se	ries							
E5XXX	Station H.V.A.C. Room - Fire Alarm Detail							
E5XXX	Schematic Diagram							
E5XXX	Interconnection List							
E5XXX	Ventilation Control Panel Layout							
E5XXX	Fire Alarm Riser Diagram							
E5XXX	Ventilation System Riser Diagram							
Telephone Se	ries							
E6XXX	Telephone Riser Diagram							
PA & CCTV Se	eries							
E65XX PA Termination Cabinet								
E65XX	Dynamic Information Display and Advertising Riser Program							
E65XX	Passenger Assistance Intercom (PAI) Riser Diagram							
E65XX	P.A. System Riser Diagram							
E65XX	CCTV Terminal Cabinet Layout							
E65XX	Intercom Terminal Cabinet Layout							
E65XX	CCTV Riser Diagram							
E65XX	SCADA/PLC Conduit Riser Diagram							
E65XX	CACF Panel Layout							
Schedules	•							
E9XXX	Conduit Schedules							
E9XXX	Motor Schedule							
E9XXX	Cable Schedules							
E9XXX	Heat Tracing Schedules							
E9XXX	Panel Schedules							
E9XXX	PAI Conduit Schedule							
E9XXX	PA System Riser Zoning Schedule							

A.2. CAD File Naming Conventions (Bentley)

Line Prefix	CPG Project Location Code	Field 1 – Discipline Designator	Fi	eld 2 – Drawing Type		Field 3 – Sectio	n Designa	ition		Field 4 – Drawing Desc	ription (wh	ere applicable)	Numerical Designator	Extension
Prefix Defining which Line the package belongs to	3-digit code Unique to each location, Followed by an underscore	Alpha designator of the discipline		Letters signifying the type of deliverable swed by an underscore		2 to 5 Letter Section followed by a			2 to 5 Letters Describing the Drawing Contents followed by an underscore					
CPG_ABC	XXX_	х	XX_	53.	XXXXX_ XXXXX_								XX	.dgn
See Project	See Project	A – Architectural	m	Master File	Archite	ectural	Trackw	ork	Archite	ctural	Structur	al	01-99	
Agreement for	Agreement for	Legends, Abbreviations, Wall Types,	mx Master File Existing		det	Misc. Detail Drawings	dlist Drawing List		1F/2F	Floor Level Drawings	1F/2F	Floor Level Drawings	8	6
Line Prefix	Location Codes	Landscaping Drawings, Site Plans, Key Plans,	md	Master File Demolition	demo	Demolition Drawings	gnote	General Notes	bplt	Bus Platform	bplt	Bus Platform	i.	
		Floor and Roof Plans, Reflected Ceiling Plan,	mr	Master File Remaining dl	dlist	Drawing List	tdet	Typical Details	cncrs	Concourse Level	cncrs	Concourse Level		
		Floor Finishing Plans, Furniture Layout, Exterior and Interior Elevations, Millwork, Schedules,	S	Sheet File	elev	Elevation Drawings	kpln	Key Plans	Idsp	Landscape Drawing	fdn	Foundation Drawing	8	
		Signage Location Plans	W	Working File	esc	Escalator Drawings	pin	Floor Plans	roof	Roof Plan	ftg	Footing Drawing	2	
			K	Sketch File	elvr	Elevator Drawings	sec	Sections	rprg	Repair Garage	bm	Beam Drawing		
		C – Civil	p	Preliminary File	ffp	Floor Finish Plans	elev	Elevations	trffc	Traffic Office	col	Column Drawing	5	
		Geotechnical, Utilities, Property,	P	and the stand based	fsp	Fire Seperation Plans	det	Details	site	Site Plan	rwall	Retaining Wall		
		Traffic and Construction Staging, Mapping,			furn	Furniture Plans	sch	Schedules	st	Street Level	shore	Shoring Drawing	1	
		Grading, Paving, Restoration, Surveys			grid	All Building Grid Lines	pinel	Plan + Elevations	splt	Station Platform	Y2345	Tunnel Structure Drawing	6	
		M – Mechanical			pinfo	Project Info, OBC Matrix	secel	Section + Elevations	North			runner structure bruwing	8	
		Water Piping, Draining Piling, Fire Protection,			pin	Floor Plans	Secci			Directions	Signal		2	
		HVAC, Hoist and Lifting System, Tunnel			sec	Sections	Commu	Communications		Directions	pin	Plan Drawing	8	
		Ventilation System			rcp	Reflected Ceiling Plan	112 216 22 12	SCADA Drawing	East West	Directions	sec	Section Drawing	2	
					sch	Schedules	CCTV	CCTV Drawing	wall	Wall Sections	cnsl	Console Drawing	8	
		E – Electrical	1		sign	Signage	PA	PA Drawing	part	Partial Plan Drawings	panel Panel Drawing			
		Power Supply & Distribution, Traction Power,	1				Radio Radio/Antenna				rm	Rooms		
		Traction Electrication, Corrosion Control,			Mecha	nical net LAN Drawing		LAN Drawing	Mechanical		lyout	Layouts	8	
		Systems Integration, Fire Alarm, Fare Collection,			wp	Water Piping	alarm	Fire Alarm Drawing	dlist	Drawing List	sign	Signs		
		Lightning Protection, Grounding			dp	Drainage Piping	TD	Telephone + Data	Lgnd	Legend & Symbols	schm Schematics			
		K – Communications			fp	Fire Protection	Electrical		kpln	Keyplan		36		
		SCADA, CCTV, PA, Radio, LAN, Data & Voice			sp	Service Piping			pln	Plans	Electrica			
		S – Structural			hv	H.V.A.C.	Itg	Lighting	sec	Sections		Area to be indicated as		
		Station Running Structure, Station Entrances,			hl	Hoist and Lift Equip.	ptrac	Power - Traction	part	Partial Plan Drawings	AREA	applicable (ie - Traffic		
		Running Structure Vent Shafts, EEBs, Retaining			tvent	Tunnel Ventilation	fa	Fire Alarm System	schm	Schematics		Office)	2	
		Walls, Excavation Support System, Demolitions,					lp	Lightning Protection		h.			•:	
		Waterproofing			Structu	ıral	pwr	Power	Field 5	- (where applicable)				
		P – Property	1		dlist	Drawing List	fc	Fare Collection	XXXXXX					
		Location/Property, Construction Layout	1		gnote	General Notes		5.2 C	Mechar	Mechanical				
					tdet	Typical Details	Signal		bplt	plt Bus Platform				
		X – Signal	1		pln	Floor Plans	gen	General	st	Street Level				
		Interlocking, Code System, Signaling Control,	1		sec	Sections	intrl	Interlocking	roof	Roof Level	1			
		Signal, Circuit			elev	Elevation Drawings	code	Code System	cncrs					
		T – Track	1		det	Detail Drawings	cntrl	Control System	bstr	Buss / Street Car Transfer				
		Trackwork, Traction Power	1		sch	Schedules	sgl	Signal	rprg	Repair Garage	1			
		Z – Survey			hrdg	Hoarding Drawings	comm	Communication	serv	Service Area				
		Mapping & Alignment, Topographic Surveys	1		stg	Staging Drawings	cir	Circuit	stor	Storage Bay	14			
					1000	Constraint Provide Const	10/20-7	A CONTRACTOR OF A CONTRACTOR OFONTO OFONTO OFONTA CONTRACTOR OFONTO OFONTO OFONTA CONTRACTOR O	and the second		-			
		G – Other												
		General, Vehicles, Specialty Work, Drawing Lists	1		1		1	1	1		1			

Capital Projects Group - CAD Naming Convention

* Lists given for Field's 3 and 4 should not be considered "complete" or "comprehensive".

A.3. CAD File Naming Conventions (Smaller File Option - AutoCAD)

						Capit	al Projec	ts Group – CAD Naming (Conventi	on					An agency of th	a Government or Ontano						
Line Prefix	CPG Project/ Location Code	Field 1 – Discipline Designator & Series (Alphanumeric)	Character	Field 2 Drawing Number			Fiel	d 3 – Drawing Type				Field 4 – Drawing I	Descriptio	n (Optional)	Numerical Designator	Extension						
Prefix Defining which Line the package belongs to	5-6-digit code Defining which Line & location the package belongs to Followed by an underscore	Alphabetic Discipline Designator 1 digit	Numeric Designator 1 digit followed by a hyphen	Drawing Number 3 digits		2 to	2 to 5 Letter Section defined designation 2 to 5 Letters Describing the Drawing Contents followed by an underscore followed by an underscore								na na sana sa kata na kata na kata na kata na kata na tana na kata na kata na kata na kata na kata na kata na k						Optional 2-Digit Numerical Designator	
CPG_	XXXXXX_	X	N-	NNN	XXXXX						XXXXX_		.		XX	.dwg						
See Project	See Project	A – Architectural	0-9	001-999	Archite	ctural	Mecha	nical	Commi	unications	Archited	tural	Structu	ral	01-99	.dgn						
Agreement for Line	Agreement for Location	Legends, Abbreviations, Wall Types, Landscaping Drawings (if included in			det	Misc. Detail Drawings	dlist	Drawing List	SCAD A	SCADA Drawing	1F / 2F	Floor Level Drawings	1F/2F	Floor Level Drawings								
Prefix	Codes	Architectural set), Site Plans, Key Plans,			demo	Demolition Drawings	Lgnd	Legend & Symbols	CCTV	CCTV Drawing	bplt	Bus Platform	bplt	Bus Platform								
2		Floor and Roof Plans, Reflected Ceiling			dlist	Drawing List	kpln	Keyplan	PA	PA Drawing	cners	Concourse Level	cners	Concourse Level								
		Plan, Floor Finishing Plans, Furniture Layout, Exterior and Interior Elevations,			elev	Elevation Drawings	pin	Plans	Radio	Radio/Antenna	ldsp	Landscape Drawing	fdn	Foundation Drawing								
		Millwork, Schedules, Signage Location			esc	Escalator Drawings	sec	Sections	net	LAN Drawing	roof	Roof Plan	ftg	Footing Drawing								
		Plans (if included in Architectural)			elvr	Elevator Drawings	part	Partial Plan Drawings	alarm	Fire Alarm Drawing	rprg	Repair Garage	bm	Beam Drawing								
		C – Civil			ffp	Floor Finish Plans	schm	Schematics	TD	Telephone + Data	trffc	Traffic Office	col	Column Drawing								
		Geotechnical, Utilities, Property,			fsp	Fire Separation Plans	wp	Water Piping	100000		site	Site Plan	rwall	Retaining Wall								
		Traffic and Construction Staging, Mapping,			furn	Furniture Plans	dp	Drainage Piping	Electric	cal	st	Street Level	shore	Shoring Drawing								
		Grading, Paving, Restoration, Surveys			grid	All Building Grid Lines	fp	Fire Protection	ltg	Lighting	splt	Station Platform	Y2345	Tunnel Structure Drawing								
		M – Mechanical			pinfo	Project Info, OBC Matrix	sp	Service Piping	ptrac	Power - Traction	North	Directions	1.000									
		Water Piping, Draining Piling, Fire			pin	Floor Plans	hv	H.V.A.C.	fa	Fire Alarm System	South	Directions	Signal									
		Protection, HVAC, Hoist and Lifting System,			sec	Sections	sp	Service Piping	lp	Lightning Protection	East	Directions	pln	Plan Drawing								
		Tunnel Ventilation System			rcp	Reflected Ceiling Plan	hv	H.V.A.C.	pwr	Power	West	Directions	sec	Section Drawing								
		E – Electrical			sch	Schedules	hl	Hoist and Lift Equip.	fc	Fare Collection	wall	Wall Sections	cnsl	Console Drawing								
		Power Supply & Distribution, Traction			sign	Signage	tvent	Tunnel Ventilation		-	part	Partial Plan Drawings	panel	Panel Drawing								
		Power, Traction Electrication, Corrosion							Signal]		rm	Rooms								
		Control, Systems Integration, Fire Alarm,			Structu		Trackw	rork	gen	General	Mechani		lyout	Layouts								
		Fare Collection, Lightning Protection, Grounding			dlist	Drawing List	dlist	Drawing List	intrl	Interlocking	bplt	Bus Platform	sign	Signs								
					gnote	General Notes	gnote	General Notes	code	Code System	st	Street Level	schm	Schematics								
		K - Communications			tdet	Typical Details	tdet	Typical Details	cntrl	Control System	roof	Roof Level										
		SCADA, CCTV, PA, Radio, LAN, Data & Voice			pln	Floor Plans	kpln	Key Plans	sgl	Signal	cners	Concourse Level										
		L – Landscaping			sec	Sections	pln	Floor Plans	comm	Communication	bstr	Buss / Street Car Transfer Repair Garage	-									
		Planting plans, planter details, Elevations			elev	Elevation Drawings	sec	Sections	cir	Circuit	rprg		Flarts	-1								
		S – Structural			det	Detail Drawings	elev	Elevations			bstr	Buss / Street Car Transfer	Electric									
		Station Running Structure, Station Entrances, Running Structure Vent Shafts,			sch	Schedules	det	Details			serv	Service Area	AREA	Area to be indicated as applicable (ie – Traffic Office)								
		EEBs, Retaining Walls, Excavation Support			hrdg	Hoarding Drawings	sch	Schedules Plan + Elevations			stor	Storage Bay		applicable (le – frame office)								
		System, Demolitions, Waterproofing			SIR	Staging Drawings	pinel secel	Section + Elevations														
		P - Property					Secei	Section + Lievations	8													
		P – Property Location/Property, Construction Layout																				
		X – Signal																				
		Interlocking, Code System, Signaling																				
		Control, Signal, Circuit																				
		T – Track or R –Rail																				
		Trackwork, Traction Power																				
		Signage Design, Signage Location Plans,																				
		Signage Details, etc. Z – Survey																				
		Mapping & Alignment, Topographic																				
		Surveys																				
		G – Other																				
		General, Vehicles, Specialty Work, Drawing																				
		Lists																				



A.4. BIM Model File Naming Conventions

Capital Projects GROUP - BIM Standards

					Model File Naming C	onventio							
sultant Prefix	Field 1 - Discipline Designator		Field 2 - Model Type				Field 3 - Model Contents				Field 4 - Floor Designator	User Defined	Exter
ultant Prefix owed by an derscore	Alpha designator of the discipline followed by an underscore		ters signifying the type of model followed by an underscore	(00)	4 to 5 lette	ers descri	bing contents of the model followed by an underso	lev	ers/numbers that signify the floor el in the building followed by an lerscore. <u>Levels are modified per</u> <u>project.</u>	Letters/numbers that are user-definable. These can be used for zones in the project.			
1	xx	xx		xxxx						F1		U1	.dgr
	A Architectural	SM	Site Model	Archite	ctural	Electric	al	Civil/Util	ities	F1	First Floor	U1	
	Legends, Abbreviations, Wall Types	MM	Project Master Model	EXTR	Exterior Skin	POWER	Power System	TPUR	Temporary Utilities Relocation	F2	Second Floor	1	
	Landscaping Drawings, Site Plans, Key Plans	DM	Discipline Master Model	INTR	Interior Construction	LTGS	Lighting System	EXSU	Existing Utility	LM	Lower Mezzanine	2	
	Floor and Roof Plans, Reflected Ceiling Plans	XM	Model of Existing	ROOF	Roof	GRND	Grounding System	NEWU	New Utilities	UM	Upper Mezzanine	-A	
	Floor Finishing Plans, Furniture Layout	PM	Model of Proposed	SPAC	Spaces	AFCS	Automatic Fare Control System	TRAF	Traffic Management	PL	Platform	-В	8
	Exterior and Interior Elevations, Millwork	TM	Model of Temporary	ORE	Core/Vertical circulation, restrooms	TPOW	Traction Power	PAVR	Paving and Restoration	CN	Concourse	-C	
	Schedules, Signage Location Plans			PEDS	Platform Edge Doors	TELE	Traction Electrification	PAVM	Paving Marking	TI	Track Level		8
	C Civil	8		FINS	Finishes	CCNT	Corrosion Control	CHRD	Hoarding	CW	Cat Walk	1	
	Geotechnical, Utilities, Trackwork, Traffic	-		REST	Restorations	BSRV	Buried Services: Power, Lighting & Systems	CSTG	Staging	RF	Roof	1	
	and Construction Staging, Grading,			LAND	Landscape	BACS	Building Automation Control System	GEOT	Geotechnical	SL	Service Level	1	
	Paving, Restoration			SITE	Site	BGDS	Building Gas Detection System					1	
	M Mechanical	-		ARCP	Reflected Ceiling Plan	0000	Building das betechningisterin	×		-			
	Water Piping, Draining Piling, Fire Protection			FURN	Furnishings	- F		Mapping	, Alignment, Property and Survey				
	HVAC, Hoist and Lifting System, Tunnel			MWRK	Millwork	Commi	inications		Alignment Compilation				
	Ventilation System			SIGN	Signage	TELS	Telephone System	MTAD	Alignment Design				
	E Electrical	-				FDAS	Fire Detection/Alarm System	MTAS	Alignment Survey				
	Power Supply, Lighting, Grounding Series			32		CCTV	Closed Circuit Television System	MTBC	Building Compilation				
	Traction Power, Traction Electrification			Mecha	nical	CLKS	Clock System	MTBS	Building Survey				
	Corrosion Control, Systems Integration, Fire Alarm, Telephone			FSPR	Fire Sprinkler Systems	PADS	Public Address System	MTCC	Control Compilation				
	Public Address and CCTV Systems, Signals, Fare Collection			FSIG	Fire Suppression Intert Gas	SECS	Security System	MTDC	Design Compilation	8			
	S Structural			FSTD	Fire Standpipes	PAGS	Paging System	MTGC	Gridline Compilation				
	Station Running Structure, Station Entrances, Running	-		HVEX	HVAC Exhaust Air Fan	DACS	Data Communication System	MTGS	Gridline Survey				
	Structure Vent Shafts, EEBs			HVRT	HVAC Return Air Fan	TVDS	Television Distribution System	MTMC	Mapping Compilation				
	Retaining Walls, Excavation Support System			PDWS	Plumbing: Domestic Water Supply	FOPL	Fiber Optics Layout	MTPC	Property Compilation				
	Demolitions, Waterproofing			PSAN	Plumbing: Sanitary Line	INCS	Instrumentation and Control System	MTPS	Property Survey				
	P Mapping. Alignment, Property & Survey	-		PSTM	Plumbing: Storm Line	SINT	System Integration	MTTC	Topographical Compilation				
	Location/ Property, Topographic Surveys,			PLUB	Plumbing: Lubrication Equipment Systems	SCADA	SCADA System	MTTM	Terrain Model				
	Alignment, and Construction Layout			TPLF	Temporary Plumbing Facilities	RADIO	Radio and Antenna System	MTTS	Topographical Survey	5			
	G Other	-		THVS	Tunnel Ventilation System	FOPL	Fiber Optics Layout	MTUC	Utility Compilation				
	General, Vehicles, Specialty Work, Drawing Lists	5		THVF	Temporary HVAC Facilities	NWRK	Industrial LAN System	MTUS	Utility Survey	8			
33				EQPM	Equipment, Elevators, Escalators, Bus Lifts, etc.	-			,,				
						-		Structura	I/Waterproofing				
				2)	2;	System	s	FNDN	Foundation				
						SGNL	Signals System	FLDR	Floor Framing				
				8		INGS	Instrumentation and Control System	REFR	Roof Framing	-			
						SPWR	Systems Power System	SLAB	Slabs				
						NTLK	Interlocking System	WALL	Structural Walls	1			
						CODE	Code System	GRID	Grid Layout	8			
						COMM	Communications System	TFDS	Temporary Foundation Support				
						CRTS	Circuit System	TSTS	Temporary Structural Support	-			
						CNSC	Consoles	WP	Waterproofing	ž.			
						PANL	Panels	SHRD	Structural Hording	-			
						SSGN	Signs	SSTG	Structural Staging				
						33014	015113	RWAL	Retaining Walls	-			
								NWAL	incratting wans	-			

SHRE

Shoring



Appendix B - Additional Guidance

B.1. AutoCAD

B.1.1. Pen Styles and Layers for use on GO transit projects, to be confirmed with CPG prior to start of work.

Name	Colour	Pen Type
Access (Vellow No. 2)		2
Access (Yellow, No. 2)		3
Bike Shelter (Green, No.3)		
Bldg_Station (Magenta, No. 6)		6
Bldg_Miscelinious (White, No. 7)	_	-
Bollard (Light Grey, No. 9)		9
CCTV (Red, No. 1)	_	1
Curb (Light Grey, No. 9)	-	9
Curb_End (Grey, No. 8)		8
CLF-Fence (Red, No. 1)		1
Drainage (Light Grey, No. 9)		9
Elevator (Red, No. 1)		1
Grading (Grey, No. 8)		8
Landscaping (Grey, No. 8)		8
Line marking (Red, No. 1)		1
Manhole (Light Grey, No. 9)		9
Mini-Platform (Green, No. 3)		3
North (Red, No. 1)		1
PA (Red, No. 1)		1
Platform (White, No. 7)		7
Presto (Light Grey, No. 9)		9
Property (Blue, No. 5)		5
Sidewalk (Grey, No. 8)		8
Signage (Light Grey, No. 9)		9
Shelter (Green, No. 3)		3
Stairs (Red, No. 1)		1
Structure (Cyan, No. 4)		4
Storm (Grey, No. 8)		8
Track (Yellow, No. 2)		2
Transformer (Light Grey, No. 9)		9
Tunnels (Red, No. 1)		1

B.2. Bentley Microstation

CADD Requirements to be confirmed with CPG prior to start of work

- B.2.1. Sheet Files -'s'
 - 4) A Sheet file is a selected view or portion of the Master file(s) assembled within a border to create the ready-to-plot file.
 - 5) Sheet files should contain all text, notes, dimensions, and other information pertinent to the Project that cannot be located within the Master files.
 - 6) Some rules to follow when creating Sheet files include:
 - a. Use the Seed file (CPG_Seed2d.dgn) to create all Sheet files.
 - b. Include the 's' designation when naming Sheet files (Section 4.9, CADD File Naming Convention).
 - c. Verify every Sheet file contains a visible Title Block attached as a reference file.
 - d. Every Sheet must include a drawing title, drawing number, sheet number (when assigned), and scale.
 - e. Do not reference Sheet files into other Sheet files.
 - f. Ensure only one "Layout" exists in each Sheet File.

6.9.3 Working Files – 'w'

- 1) A Working file is equivalent to a Master file but is not intended to be included in final Project data sets.
- 2) Working files include copies, variations, superseded versions, data provided for information, and any other temporary Master files.
- 3) Some rules to follow when creating Working files include:
 - a. Use the Seed file (CPG_Seed2d.dgn) to create all Working files.
 - b. Include the 'w' designation when naming Working files (Section 4.9, CADD File Naming Convention)
 - c. Working files are for information only and will not be referenced or included in Project deliverables.

6.9.4 Sketch Files – 'k'

- 1) A Sketch file is equivalent to a Sheet file, but is not intended to be included in Project data sets.
- 2) Sketch files include design variations, sketches, information graphics, and supporting or temporary CADD data that are classified as Plot files.
- 3) Some rules to follow when creating Sketch files include:
 - a. Use the Seed file (CPG_Seed2d.dgn) to create all Sketch files.
 - b. Include the 'k' designation when naming Sketch files (Section 4.9, CADD File Naming Convention).
 - c. Sketch files will not be referenced or included in Project deliverables.

6.9.5 Preliminary / Presentation Files – 'p'

- 1) Preliminary / Presentation Files are files not intended to be included in Project data sets.
- 2) Preliminary / Presentation files are used for preliminary design work and presentation purposes.
- 3) Some rules to follow when creating Sketch files include:
 - a. Use the Seed file (CPG_Seed2d.dgn) to create all Preliminary / Presentation files.
 - b. Include the 'p' designation when naming Preliminary / Presentation files (Section 4.9, CADD File Naming Convention).

Library Name	Description
c.dgnlib	Common Library
ea.dgnlib	Architectural
ec.dgnlib	Civil and Geotechnical
ee.dgnlib	Electrical and Power
em.dgnlib	Mechanical
es.dgnlib	Structural
ew.dgnlib	One-time Work Order
levels.dgnlib	Legacy Levels
ocomm.dgnlib	Operations and Communications
ostce.dgnlib	Operations Signals and Train Control
ot.dgnlib	Operations Track and Structure
sg.dgnlib	Operations Signals
CPG_Border.dgnlib	CPG Title Block Levels Only

TABLE A-4 CPG STANDARD DESIGN LIBRARIES FOR BENTLEY MICROSTATION