CAD STANDARDS MANUAL

THE CITY OF NIAGARA FALLS CAD STANDARDS MANUAL

JUNE 2017

REV.1 JANUARY 2020

PREFACE

The goal of the City of Niagara Falls is to consistently produce high quality engineering designs in a timely, cost effective manner. This high standard should be maintained by City staff and the Consultants we retain.

This manual and template will standardize what is required for various drawings within the Municipal Works Department. This will provide consistency to all drawings produced for every project that is undertaken. This consistency is important as drawings are shared among departments and with various outside agencies. This will allow the City to manage our infrastructure data, as per new provincial requirements.

The standards contained in this manual and template will continue to evolve as the software we work with evolves. This will require our staff and consultants to evolve with the software, learning how to utilize the new features to improve productivity.

This manual and template are critical components to achieving this goal.

ACKNOWLEDGEMENTS

This document is the product of the City of Niagara Falls, Municipal Works Department - Engineering CAD Services Group. However, it would not have been possible without the kind support and help of many individuals and organizations. We would like to extend our sincere thanks to all of them.

This project was initiated under the direction of Geoff Holman, former Director of Municipal Works and, Chris Anders, former Project Manager. The directive was to create a CAD Standards Manual that would maintain existing drawing standards, use the newest software, to increase design productivity and to allow easier data retrieval for records. We would like to express our gratitude for their guidance and supervision of this project.

The outline for this template and manual was taken, initially, from the Niagara GIS / CAD Standards Document which was formulated by the Niagara Region, various Municipalities in the Niagara area and the Niagara Chapter of the Consulting Engineers of Ontario. We would like to recognize the efforts of this group and their work which provided a framework for this template and manual.

We also recognize the cooperation and assistance supplied by the following private firms and their employees:

Tyler Pitman *James House* *Brian Kostuk*
Kerry T. Howe – Engineering Limited Upper Canada Consultants

Sincerest thanks and appreciations to all City of Niagara Falls staff for all of their assistance in developing this CAD Manual and Support Files:

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DOCUMENT REVISION HISTORY

CAD Standard Manual

Rev. No.	Updates/Description	Release Date
0	Initial Release	06/01/2015
1	• Minimum software requirement Civil 3D version 2016. • Coordinate system UTM NAD83 (CSRS 2010) Zone 17N. • Removed City internal process documentation. • Removed references to Land XML. • Updated layer naming convention. • Decreased layer list. • Updated points. • Updated point group naming. • Updated pipe networks. • Removed references to pressure networks. • Updated annotation styles. • Updated CTB plot styles. • Added eTransmit preferences. • Updated as-constructed drawing requirements. • Updated sample drawings.	01/30/2020

Civil 3D Template and Support Files

Rev. No.	Updates/Description	Release Date
0	Initial Release	06/01/2015
1	• Updated to reflect Civil3D version 2016 & 2018. • Removed layer state files. • Updated layer naming convention. • Decreased layer list. • Updated point group operation. • Updated pipe networks. • Updated annotation styles. • Updated label styles. • Updated layers. • Updated survey codes. • Removed CAD standard check. • Reduced template file size.	01/30/2020

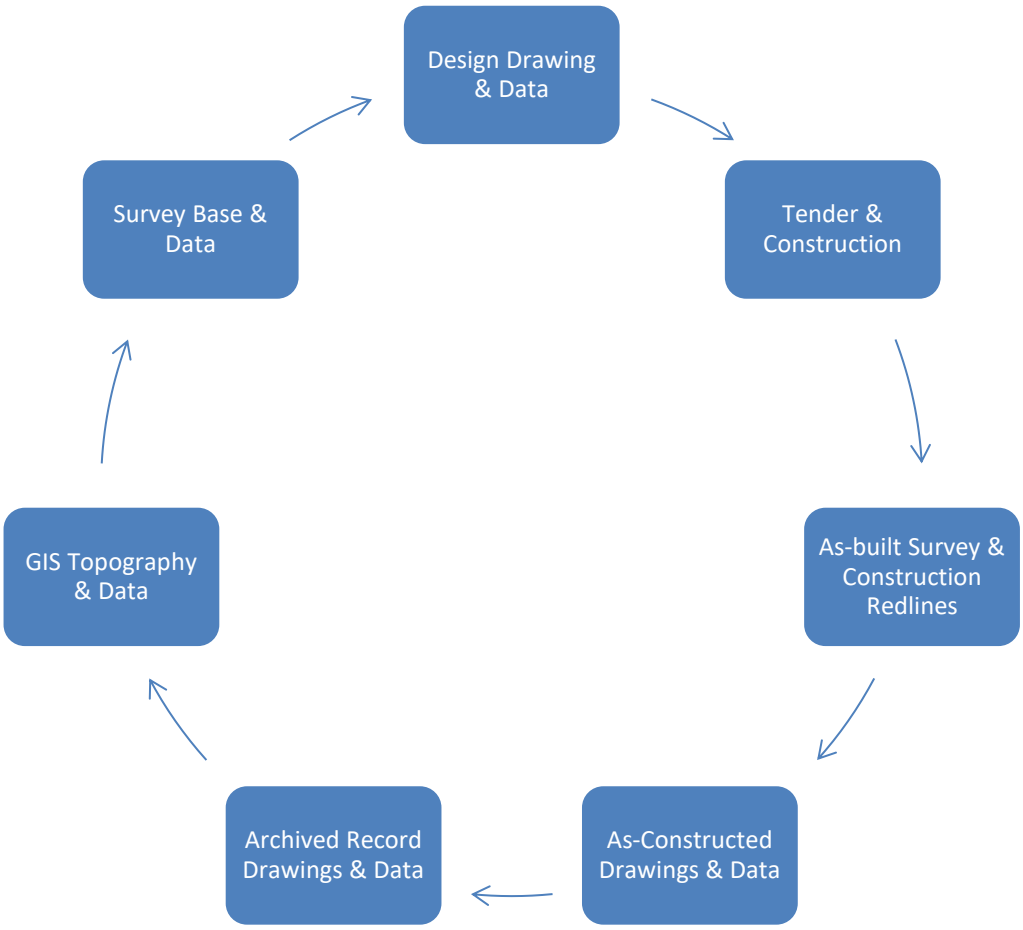
Table of Contents

INTRODUCTION

The City of Niagara Falls CAD Standards Manual was set in place to ensure that all CAD drafting work performed in house or by a city-hired consultant could be readily used by various city departments to satisfy Provincial asset management requirements and be easily translated into the city's GIS network.

Contract plans result from the work of many specialists and engineers. A base plan may be used simultaneously by disciplines such as water design, drainage design, sewer design, roadway design, landscaping design, etc. All the disciplines of a project fit against the base plan, making it possible to compare and complete various design elements in tandem. This ability to work concurrently depends on developing, maintaining and employing CAD standards. The goals of maintaining coherence, minimizing wasted effort in recreating design, and maximizing the effectiveness of a project team are all best served by adhering to the CAD standard.

The Chart Below shows a typical project drawing/data lifecycle.



Additionally the As-built drawing/data is formatted and sent as follows:

PURPOSE

The purpose of this manual is to outline the requirements of the City of Niagara Falls for the various types of drawings used in the Municipal Works Department. It will also explain the set up and features of the design template and what is expected for hardcopy and electronic submissions.

This manual is intended to be used with the most current template revision and other support files. This template will allow the user to focus on design and modeling while eliminating the repetitive presentation drafting, through the use of Civil 3D's dynamic automation.

This manual is intended to be used by internal City staff, as well as our consultants. Everyone involved with design and drawing preparation should review this manual. This manual is to be used in conjunction with the City of Niagara Falls Engineering Design Guidelines Manual.

The existing Niagara Peninsula CAD Standards (NPCS) were used as a guide for the creation of this manual. Wherever possible, the NPCS were utilized, however, there are sections of this manual that were not covered in the NPCS due to advancement in the software since the NPCS were established. When referencing the updated City of Niagara Falls CAD Standards, the abbreviation NFO shall be used.

The City of Niagara Falls is currently working in AutoCAD Civil 3D 2018/2020 and has established version 2016 or higher as the required version for all design work. Newer versions of AutoCAD Civil 3D are compatible with the template provided. **It is up to the consultant to ensure they are using Civil 3D 2016 or higher to prevent backward incompatibility and to satisfy the City of Niagara Falls requirements.**

LEGAL DISCLAIMER

This CAD Manual ("Document") should not be used as a substitute for codes and regulations. The applicant is responsible for compliance with all code and rule requirements, whether or not described in this Document.

This Document contains Autodesk AutoCAD® and Autodesk Civil 3D® usage tips and instructions which are for reference only and are not a replacement for formal training. Contact an Autodesk® Certified Instructor for training opportunities.

SCOPE

This document will focus on three main areas in the development of 3D drawings, listed as follows:

Explain the required set up to achieve and maintain consistency.

Explain setting and styles within the template and support files.

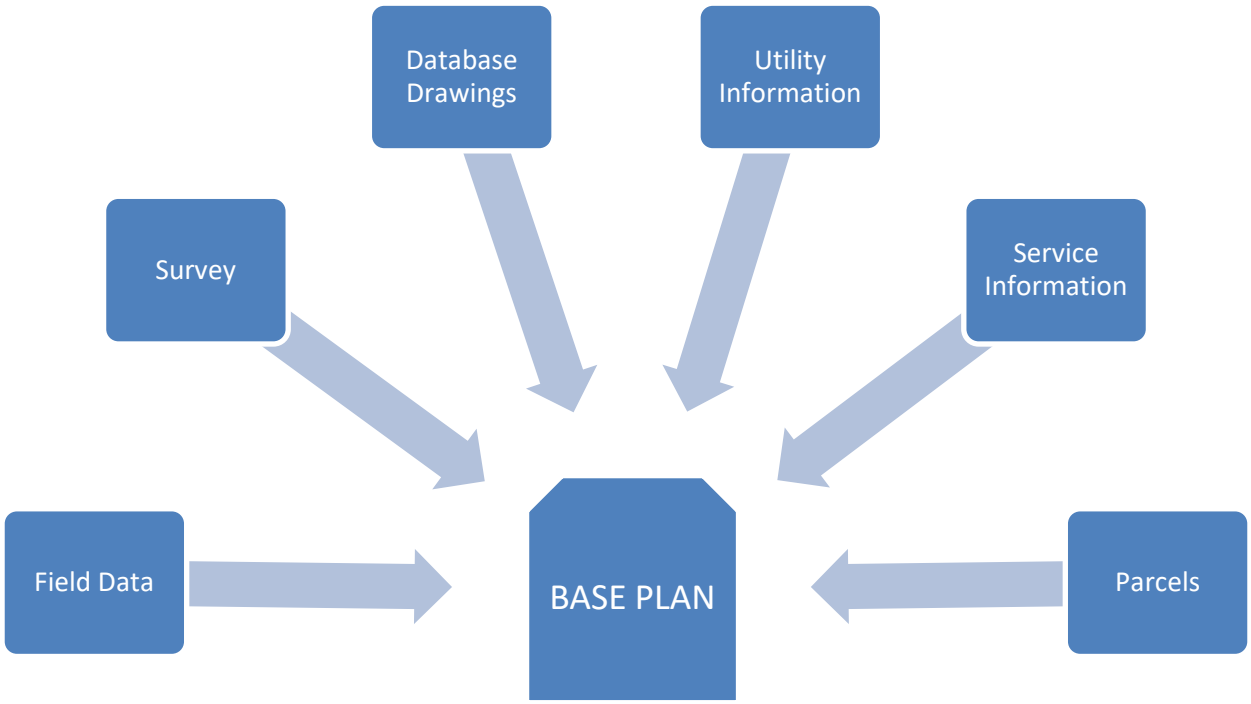
Outline the City of Niagara Falls specific requirements for electronic file submission.

1 WORKFLOW FOR PROJECTS

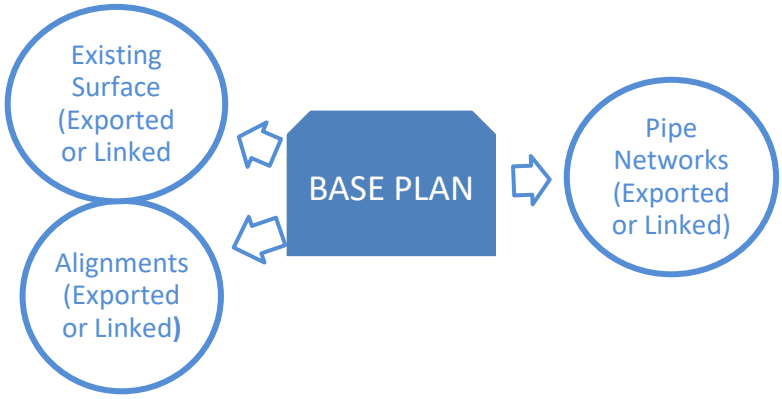
The typical workflow for the City of Niagara Falls projects shall be as follows:

1.1 BASE PLAN CREATION WORKFLOW

All existing information sources shall be used to create the base plan. An existing 3D surface shall be created using surveyed COGO points. All existing storm, sanitary and water services are to be created using pipe networks. All main alignments are to be created in this drawing. An existing conditions profile shall also be created showing the existing surface and all existing storm, sanitary and water services.

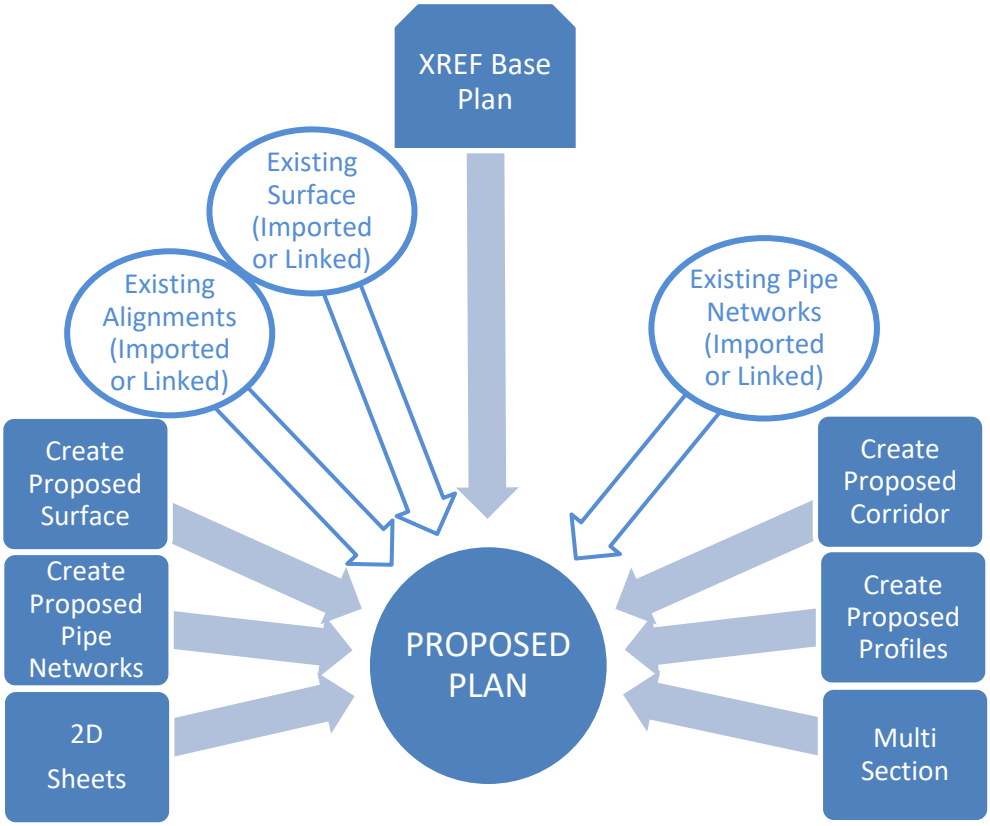


As shown below, the following information is to be exported from the base plan or available through data shortcuts: the existing surface, alignments and pipe networks. This information is to be imported or linked into the proposed drawing for this project.



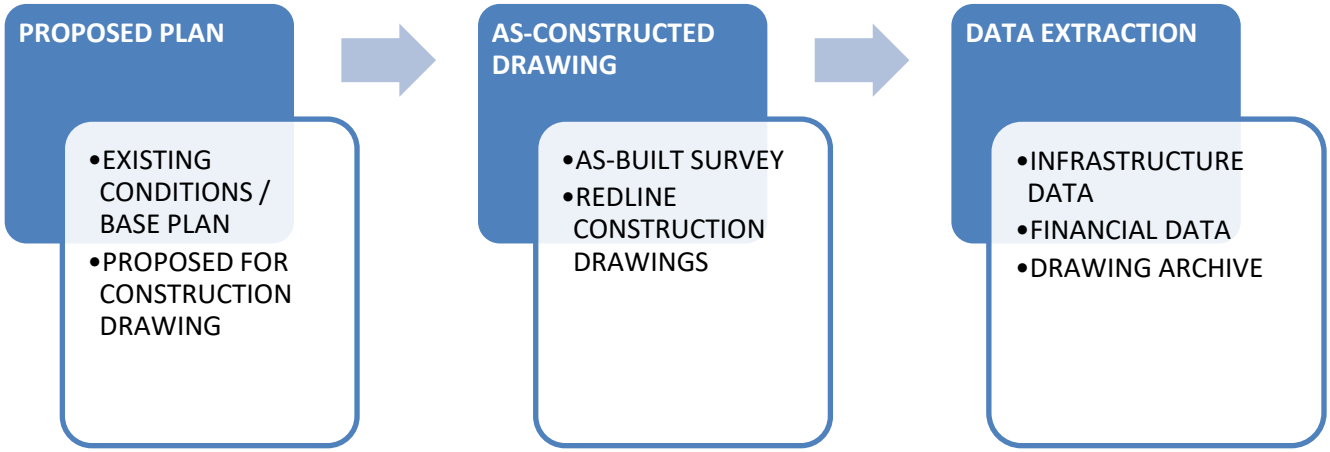
1.2 PROPOSED PLAN CREATION WORKFLOW

Along with the base plan drawing externally referenced into the proposed plan drawing, existing surfaces, existing alignments and existing pipe networks imports or links (dynamic data shortcuts) will be referenced. All proposed design elements will be live in the proposed plan drawing.



1.3 RECORD DRAWING WORKFLOW

The proposed plan drawing, at the final issue for construction (IFC) stage, will be saved as the as-constructed drawing. This as-constructed drawing will include the as-built survey drawing as an external reference, to facilitate modification to the IFC information as noted in the as-built survey drawing and redline construction information. Once the as-built survey drawing and redline construction information is added, various output information files can be provided.



2 SOFTWARE, SUPPORT FILES & SET UP

All projects for the City of Niagara Falls shall be produced using the required software and with the following support files. The proper use and recommended installation of the files is detailed below.

2.1 SOFTWARE

The contractor / consultant / employee are responsible to create Civil 3D 2016 or higher AutoCAD files for submission to the City. The file is to be created as a Civil 3D electronic file, as per project requirements, at 1:1 scale. The electronic AutoCAD file shall be set up, using the provided template, to produce the required drawing sets for the project / contract.

The Consultant/Designer is responsible for the following:

All electronic computer-aided-drafting (CAD) drawing files shall be created using AutoCAD Civil 3D version 2016 or higher.

When requested, all electronic CAD drawing files shall be submitted in AutoCAD Civil 3D 2016 or higher DWG format, AutoCAD DWFx format as well current Adobe PDF files of the drawings/plan set. Civil 3D support files are to be delivered at this time as well.

All electronic CAD drawing files shall conform to the most current City of Niagara Falls CAD Standards which can be found at: https://niagarafalls.ca/city-hall/municipal-works/cad-manual.aspx.

The Prime Consultant is responsible for the coordination, review & compliance of City of Niagara Falls CAD Standards for any/all CAD work performed by a sub-consultant whom they have hired.

All electronic CAD drawing files (DWG, DST, DWF and PDF formats) shall be submitted to the City of Niagara Falls at 30%, 60%, 90% completion for a review of their conformity to our CAD standards & presentation requirements. Contact the City of Niagara Falls Project Manager for submittals and questions.

Reviewed drawings/plan sets that do not conform to current CAD Standards will be returned within seven business days, with comments & requested corrections.

Requested CAD corrections are to be completed prior to the next submittal. Failure to address comments and corrections will result in project delays.

At 100%, issued for tender, production of confirmed drawing set, contract award or notice to proceed - 100% or final drawings will be submitted to the City of Niagara Falls in AutoCAD Civil 3D 2016 or higher (or newer) DWG format (including the Sheet Set Manager DST file) as well as in Autodesk DWF and Adobe PDF formats. Final Civil 3D data source files are to be delivered at this time as well.

The Prime Consultant/Contractor is responsible for the coordination, review & compliance of City of Niagara Falls CAD Standards for all As-Built/Record Drawing work either performed by them or being provided to the City by a sub-consultant whom they have hired. All As-Built/Record Drawings must meet the As-Built and Record Drawing Requirements, which can be found in this document as well as any/all documentation or requirements as noted in the City Standard Plans & Specifications manual.

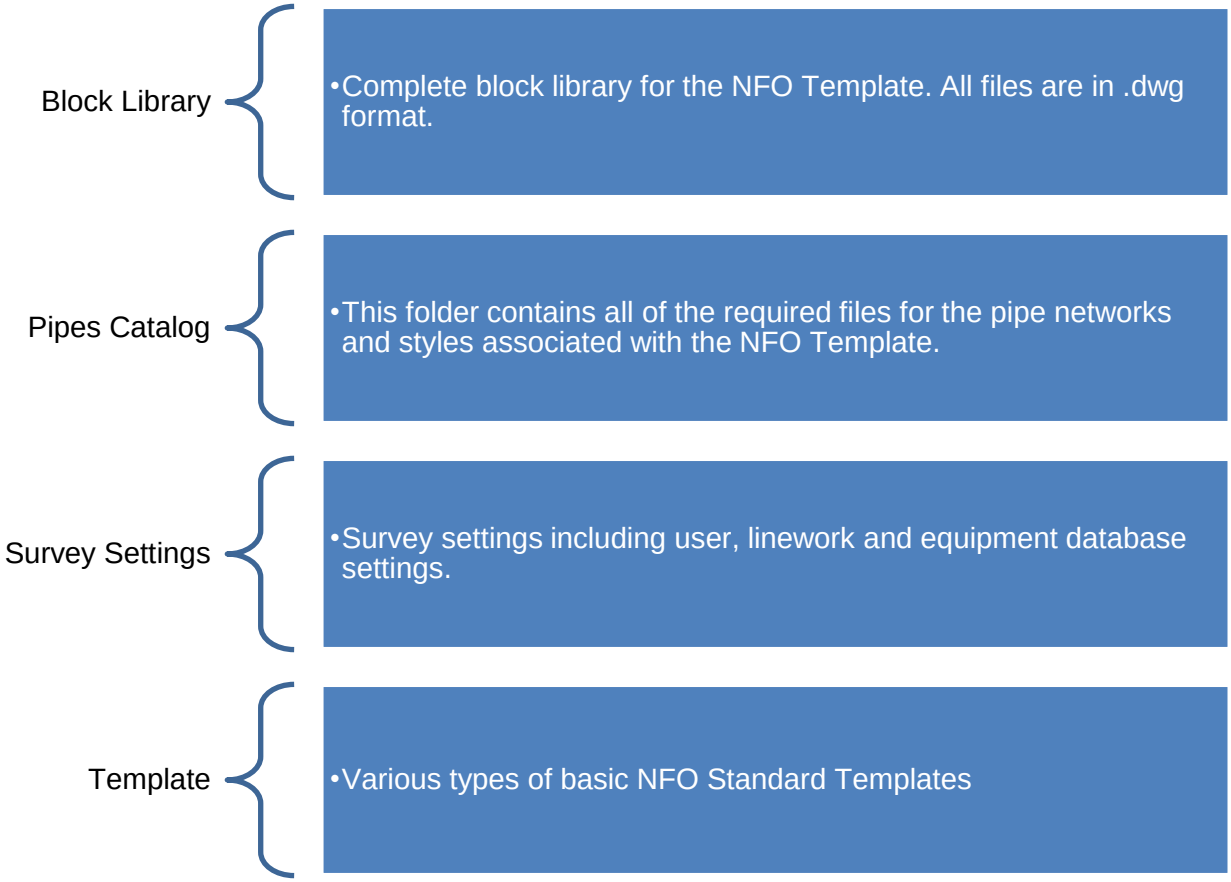
2.2 SUPPORT FOLDERS

To download support files, visit https://niagarafalls.ca/city-hall/municipal-works/cad-manual.aspx.

We periodically update this web page with the latest documentation (CAD Manual, CAD Manual Appendices and Sample Drawings), templates and support files (blocks, fonts, linetypes, and more). Any updates will be posted on the City Web Site.

Program support files are mostly located within the program installed on the hard drive but when working as a CAD team, consistency is best achieved when sharing the standard support files in a common area; network drive.

See below for the Support File Folder structure:



This support file folder structure along with its content shall be maintained by the developers at the City and have restricted access to users to keep consistency within projects. Any additional requirements or updates shall be completed by the developers at the City for the CAD teams use and the consultants. Detailed information for the individual support file folder is found in the following sections.

2.3 SET UP

The following sections cover template set up and customization for standardized use.

2.3.1 Survey Settings

In the Survey Settings folder the following files are available:

SURVEY USER SETTINGS	•NFO Survey user Settings.usr_set
EQUIPMENT DATABASE	•NFO equip databse.edb_xdef
FIGURE PREFIX DATABASE	•NFO fig prefix database.fdb_xdef
LINECODE SET	•NFO line code set.f2f_xdef
SURVEY DATABASE SETTINGS	•NFO Survey Settings.sdb_set

The Survey User Settings are overall settings, like database default locations and graphic settings. Generally, this is set up once and not altered. For use outside of City hall, all support paths will need to be redirected accordingly.

2.3.2 Templates

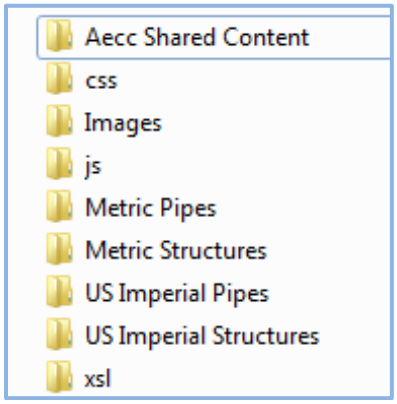
In this folder, the various types of templates available are as follows:

- 2016 NFO C3D template.dwt or 2018 NFO C3D template.dwt; to start any drawing.
- NFO C3D Plan Production.dwt; to layout sheets for plan and/or plan & profile view orientation, See Section 6.

2.3.3 Pipe Catalog

By default, C3D sets up the Pipe Catalog at: C:\ProgramData\Autodesk\C3D 2018\enu\Pipes Catalog. This is configured through the “Set Pipe Network Catalog…” command. To work with the provided template and support files, the Set Pipe Network Catalog needs to be linked to the City of Niagara Falls pipe catalog here and have the metric catalogs selected in the Pipe catalog section and the structure catalog section.

The image below indicates the files in place here:



If a number of users are on the same network, a single pipes catalog can be stored in a central network location. It is important for users to avoid changing the shared catalog, as they could interfere with the work of other users and deviate from the NFO standards. Therefore, one individual shall have access for set up while all other users have restricted access.

2.3.4 Printers

The printers folder contains colour depended plot style table files:

- NFO Colour.ctb, and
- NFO Monochrome.ctb

The available plot style tables are specific to the layer structure of the Civil 3D template described in Section 2.3.2. Any deviation of the current settings within this file will eliminate consistency of the drawing production. See Section 2.3.5 for the colour table settings.

The plotter configuration files for electronic plots listed above are also found in the AutoCAD default printing configuration but these files contain modifications to accommodate the printable area according the needs of the titleblock found in the Plan Production template described in Section 6.1. If the Civil 3D profile support file search paths do not link to these exact files, the layout content will not be positioned correctly as set up in the page setup manager. When creating plotter configuration files for plotters outside of City Hall, see that the paper size and printable area of the ARCH D 914mm x 610mm (36" x 24") paper size are exact dimensions.

When creating the plotter configuration files of any plotter, the associated plotter model parameters files will populate to the specified location.

2.3.5 Colour Table Settings

Colour categories have been assigned as noted in the two tables below.

COLOUR TONE		MAIN		RED	RUST/ORANGE		BROWN	YELLOW	OLIVE	GREEN		
PURPOSE		BNDY, TINN, DR-BR, HOLE, L & T		ROAD	DRAINAGE		DTM & GRND	DIMS/XREF	SURVEY	SANITARY SYSTEM/NF VEG		
COLOUR # RANGE		1-9	250-255	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99
*0	0.70		X									
*1	PR 0.60	X (0.80)		X	X	X			X		X	
*2	PR 0.50	X (0.80)	X	X	X	X	X		X		X	X
*3	PR 0.40	X (0.50)		X	X	X	X			X	X	
*4	PR/EX 0.25	X (0.40)		X			X		X	X		
*5	EX 0.20	X (0.80)	X	X			X					X
*6	EX 0.15	X (0.20)		X	X	X	X	X	X	X	X	X
*7	EX 0.10	X (0.25)		X			X	X	X			
*8	EX 0.10	X (0.25)						X				
*9	0.25	X										

COLOUR TONE			AQUA		CYAN	BLUE				PURPLE		MAGENTA		PINK		
PURPOSE			TRAFFIC		NF WATER	WATERMAIN SYSTEM				LAND USE		TRANSPORTATION		UTILITIES		
COLOUR # RANGE		100-109	110-119	120-129	130-139	140-149	150-159	160-169	170-179	180-198	190-199	200-209	210-219	220-229	230-239	240-249
*0	0.70															
*1	PR 0.60			X			X	X				X				
*2	PR 0.50			X	X		X	X		X		X		X	X	X
*3	PR 0.40		X	X			X	X		X	X	X		X	X	X
*4	PR/EX 0.25		X	X	X		X	X		X	X			X		X
*5	EX 0.20			X							X	X	X			
*6	EX 0.15		X			X	X	X		X	X	X	X	X	X	X
*7	EX 0.10		X											X		X
*8	EX 0.10															
*9	0.25															

View Appendix B for complete Colour Table Settings list.

3 PROJECT DATA SHARING

An organized information storage system is the best approach in any project management system:

Project folders and files should be created and stored so every member of the team can readily find the data files they need, and save all drawings in the right place. It is imperative to establish written procedures for team members who will regularly access project files. Procedures can include the use of templates, naming conventions for files and folders and notices when drawings are being modified. Encourage team members to communicate anything that might affect others.

3.1 PROJECT FILE NAMING CONVENTION

Applying a consistent file naming convention shall assist in maintaining clean records of work. Follow below for the types of electronic files and their appropriate naming requirements:

FOLDER / RECORD TYPE	NAMING CONVENTION	EXAMPLE
CURRENT WORKING FOLDER	“project#” “roadway name”	2017-123-45 Street A.dwg
TENDER RECORD	“project#” “roadway name” rev#	2017-123-45 Street A rev0.dwg
CONSTRUCTION RECORD	“project #” “roadway name” rev#	2017-123-45 Street A rev1.dwg
EXISTING/SURVEY BASE PLAN	“project roadway name” ex plan “surveyed dd-mm-yy”	Street A ex plan 21-09-2019.dwg
UTILITY RECORD	"project #" "project roadway name" ex plan and pr design	2017-123-45 Street A ex plan.dwg

3.2 XREFs

External Referencing, or XREF'ing, has been a standard procedure for concurrent engineering for a long time. The existing conditions drawing should be XREF'd into proposed design drawings as a basis for the design. In large-scale projects every design discipline (plan view) should be a separate XREF drawing.

Sheet drawings (paper-space layouts) should XREF the existing conditions drawing and proposed design drawings into model-space and display all or a portion of the composite plan view with viewports. Overlay the proposed design XREF last so it is on top of all other XREFs.

3.2.1 XREF Naming Convention

Use the XREF Manager to assign names to the XREF'd Drawings. This will allow a shortened layer name for the XREF'd layers in the layer manager while not changing the XREF file name in the storage folder. This allows users to easily filter layers based on individual XREF names (or aliases) using Layer Filters and Layer States. The designer is to consult Section 2.3.5 Colour Table Settings for the viewport override colour for XREFs. The preferred viewport override colour for a XREF is 58.

3.2.2 Creating Civil 3D Data in XREF's

It is important that Civil 3D objects have understandable names and descriptions. Some object types may be "data referenced" into other drawings so it is important to use layer-control to ensure duplicate objects are not visible when XREFs are overlaid in sheet drawings.

All label styles must meet our annotation standards. Styles are set to display differently in the proposed and existing drawings.

Points may be used to display features, modify/define an existing or proposed surface or be used as references.

The finish grade surface is created in the proposed drawing and is to be displayed as labeled contours via external reference on the sheet drawing(s). Grading objects such as Corridors, Feature Lines and Grading Objects are intended to be flexible tools for building surfaces but these objects are not to be printed on the sheets.

Existing alignments should be labeled according to our presentation standards and exported as a data shortcut to be used in the proposed drawing. Proposed alignments will be created in the proposed design drawing they are associated with.

Some Profiles may be created for presentation purposes while some may be created for reference or design purposes but not shown on the sheets.

Pipe Networks should be created in the drawing that they are associated with. All existing pipe networks are to be created in the Existing Conditions drawing and the new proposed networks are to be created in the Proposed Design drawings.

3.2.3 External Reference and Data Shortcuts

Using external reference and data shortcuts aids in reducing design working files size, sharing information, maintaining NFO CAD Standards and the existing information's integrity.

Within the project folder structure there are five locations for storing external references provided by others: Legal Survey, Supplementary External Drawings, Supplementary Xref's, Utilities and Photos folders.

Note that drawings used as an external reference must be inserted via the attach mode to maintain the nested property in the design drawing. When using an external reference drawing that does not conform to the NFO standard, it shall be accepted even if it is flagged as non-compliant as long as the hardcopy presentation is legible. Adjusting the presentation through the viewport overrides is most

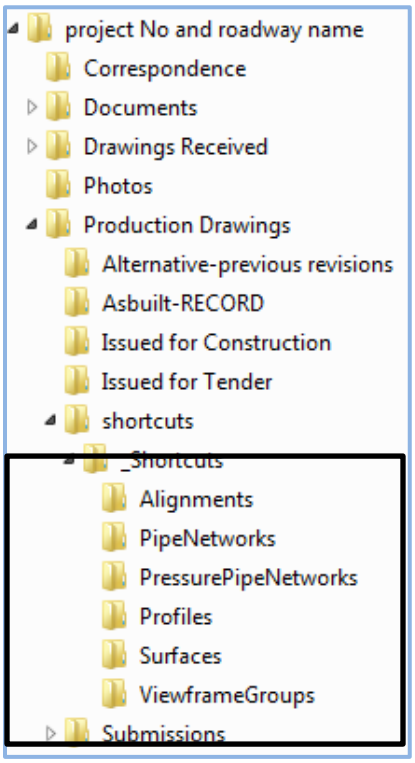
feasible; see Appendix C to select a proper override colour for the external reference non-standard layer structure.

While in the Production Drawings folder, the project's existing information/survey base plan shall be created separately and used as an external reference into the design (consumer) drawing. The external reference located here in the Production Drawings folder would be the entire project area existing base plan which compiles nested external references, survey imported data, the existing ground surface and existing pipe networks (which may be a data transfer file).

Along with the external references set up of the project's existing information/survey base plan to the consumer drawing, the existing information as Civil 3D objects (the existing ground surface and the existing pipe networks) shall be data shortcuts to the consumer drawing. While the alignment of the consumer drawing shall be a data shortcut back to the project's existing information/survey base plan to link the alignment to the existing pipe networks to populate information on various labels.

3.2.3.1 Data Shortcuts

The simplest folder structure to house data shortcut files is the default set up by Autodesk copied within the individual project folder structure. See below.

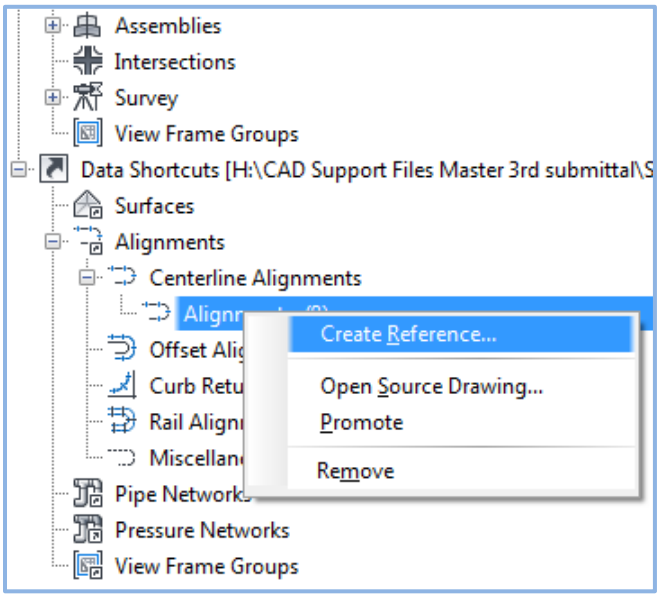


To start using data shortcuts:

1. To set the Working folder:
    a. This should be in the root folder of the project folder structure as shown in the example above.
    b. While in the base plan drawing, on the Toolspace palette>Prospector tab, right click Data Shortcuts and select 'Set Working Folder…'

c. In the ‘Browse for Folder’ dialog window, select within the current project folder structure the ‘Production Drawings’ folder.

2. To set up the data shortcut project folder:
   a. To set up the folder structure as shown above, while in the base plan drawing, right click Data Shortcuts and select ‘New Data Shortcut Project Folder…’.
   b. In the ‘New Data Shortcut Folder’ dialog window, fill in ‘shortcuts’ in the name field and verify that the ‘Project template folder:’ is directed to C:\Civil 3D Project Templates\.
   c. Notice on the Toolspace palette>Prospector tab, at Data Shortcuts; it now list the folder structure location.
   d. When opening a new or existing drawing and maintaining the current data shortcut link; right click Data Shortcuts and select ‘Set Data Shortcuts Project Folder…’
   e. When returning to a project with a data shortcut folder structure in place but not current, in any drawing, right click Data Shortcuts and select ‘Set Working Folder…’
   f. In the ‘Browse for Folder’ dialog window, select the ‘Production Drawings’ folder.
3. To create data shortcuts:
   a. First Save the base plan drawing.
   b. Right click Data Shortcuts and select ‘Create Data Shortcuts…’
   c. The ‘Create Data Shortcuts’ dialog window appears to select which Civil 3D objects are to be made available via data shortcuts.
   d. Save the drawing once again.
4. To link to data shortcuts:
   a. In the proposed plan drawing, whether starting from new or an existing drawing, verify on the Toolspace palette>Prospector tab that the proper project data shortcut folder structure location is listed.
   b. Right click Data Shortcuts and select ‘Set Data Shortcuts Project Folder…’ to set the short cut folder.
   c. Save the proposed plan drawing, and then right click the object to be linked and select ‘Create Reference…’ (See image below).



4 DESIGN

A design team typically spends many hours ensuring that revisions are transferred correctly between surfaces, alignments, profiles, sections, and other design data. Redrafting, relabeling and checking the work can be time-consuming tasks. AutoCAD Civil 3D eliminates the need for most of these tasks by introducing dynamic links between design objects. This system of links and dependencies derives from the object model within the application design.

Survey data creates a set of points that are used to generate an existing ground surface. This surface is referenced by other objects further along in the design process. Parcels, existing ground surfaces, pipe networks, and grading can be created independently or from imported data sources.

The object type with the most complex set of relationships is the corridor, as it requires data from a surface, alignment, profile, and assembly (and typically multiple subassemblies). Design changes to any object will update other objects in the design process.

In the design process, changes in one object can be passed on automatically to associated objects where desired. Civil 3D objects are to be created with the proper links and dependencies that will allow the final design product to have a three-dimensional model with all intelligent data attached.

Various styles and labels are available for each Civil 3D component (from general to building sites) in the template for project specific requirements. Additional styles and labels are acceptable when created and modified through the copy command. Itemized below, are the most commonly used styles and labels. Using Civil 3D objects and applying styles and labels as required in the project, will facilitate presentation, data transfer and an organized electronic file. If a Civil 3D object is not used and instead represented by an AutoCAD object, data transfer and an organized electronic file will be missing. Without all three components, submissions will not be accepted.

4.1 COORDINATE SYSTEM

All drawings and maps shall be produced in UTM NAD 83 (CSRS 2010) Zone 17N. Any datum transformations shall be approved by the project manager prior to execution and shall be reported on the titleblock. All vertical data shall be referenced to CGVD2013. Benchmark data information shall be labeled in the titleblock.

4.2 LAYERS

The current layer structure in the template is also available in .las file (layer state format) in this folder as AEP.las which conforms to the layer hierarchy structure outlined in Appendix B. Additional layers are permitted as long as the naming, colour and linetype assignment conform to the NFO standard, see Section 4.2.1 and Appendix C.

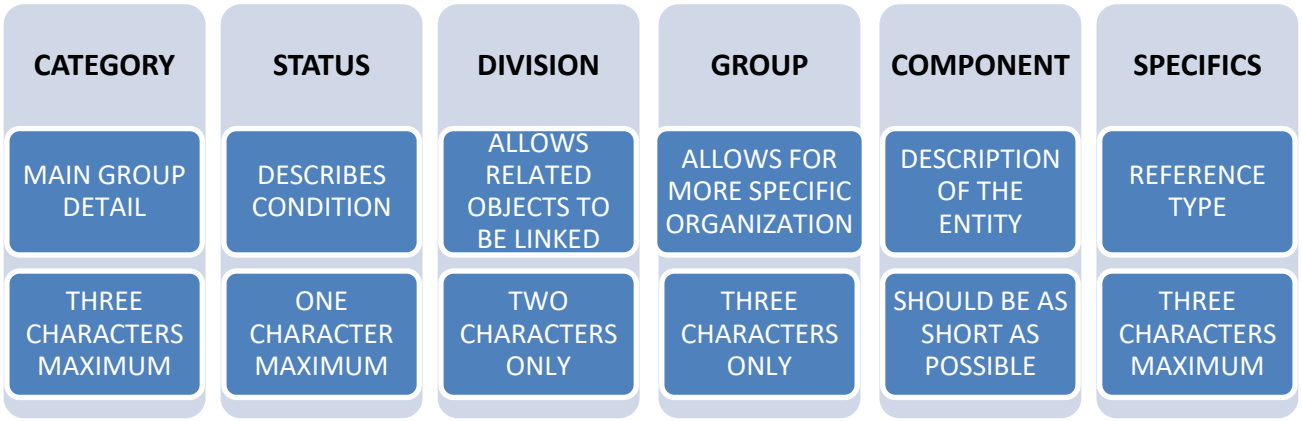
Each 3D object in Civil 3D has a base layer on which the object physically resides, and component layers that control the display of 3D object components. The object layer is defined in the Drawing Settings. The component layers are defined in styles. Object layers are only used if the design omits to select an appropriate object layer in the Create 3D Object command dialogue box.

4.2.1 Layer Fields

The layer name format is organized as a hierarchy. This arrangement allows users to select from a number of options for naming layers according to the level of detailed information desired. Layer names consist of distinct data fields separated from one another by dashes. A detailed list of abbreviations, or field codes, is prescribed to define the content of layers. Most field codes are abbreviations of construction terminology that are easy to remember.

The layer name format, showing the Category, the Status, Division, Group, Component and Specifics fields looks like this:

I	N	_	E	_	R	S	_	R	D	Y	_	C	U	R	B	_	H	



4.2.1.1 Category

The following table shows the abbreviations used in the “Category” field of the NFO Layer hierarchy.

DR	•DRAWING
IN	•INFRASTRUCTURE
LB	•LAND BASE
LU	•LAND USE
TR	•TRANSPORTATION
UT	•UTILITIES

4.2.1.2 Status

The following table shows the abbreviations used in the “Status” field of the NFO Layer hierarchy.

A	•ABANDONED
E	•EXISTING
F	•FUTURE
N	•NEW
P	•PROPOSED
R	•REMOVAL
T	•TEMPORARY

4.2.1.3 Division & Group

The following table shows the abbreviations used in the “Division” and “Group” fields of the NFO Layer hierarchy.

DIVISION		GROUP	
ABBREVIATION	DEFINITION	ABBREVIATION	DEFINITION
BL	BELL	AER GND MCS SER UND	AERIAL GROUND MISCELLANEOUS SERVICE UNDERGROUND
BN	BROADBAND NETWORK	AER GND MCS UND	AERIAL GROUND MISCELLANEOUS UNDERGROUND
BR	BORDER	PRF REF	PROFILE REFERENCE
BS	BULDINGS & STRUCTURES	BLD BRG	BUILDING BRIDGE
CM	CEMETERY	GRV	GRAVE
CO	COMMUNICATION	GND	GROUND
DS	DRAINAGE SYSTEM	BND DDS MSC SER SEW	BOUNDARY DITCH DRAINAGE SYSTEM MISCELLANEOUS SERVICE SEWER
GL	GEOTECHNICAL	MSC TST	MISCELLANEOUS TESTING

DIVISION		GROUP	
ABBREVIATION	DEFINITION	ABBREVIATION	DEFINITION
GS	GAS	AER	AERIAL
		GND	GROUND
		MCS	MISCELLANEOUS
		SER	SERVICE
		UND	UNDERGROUND
HY	HYDRO	AER	AERIAL
		GND	GROUND
		MCS	MISCELLANEOUS
		SER	SERVICE
		UND	UNDERGROUND
IM	IMAGERY	AER	AERIAL
LF	LAND FEATURE	FNC	FENCE
		MSC	MISCELLANEOUS
		WAL	WALL
NF	NATURAL FEATURE	ETH	EARTH FEATURE
		VEG	VEGETATION
		WAT	WATER
OL	OIL	GND	GROUND
		MCS	MISCELLANEOUS
		UND	UNDERGROUND
PK	PARKS	MSC	MISCELLANEOUS
PJ	GLOBAL PROJECT	GRID	PROFILE GRID
		L	LABEL
		H	HATCH
		SYMBOL	SYMBOLS
		TM	TIN
		XREF	X-REFERENCE
RL	RAILWAY	GND	GROUND
		SGN	SIGN
		TRK	TRACK
RS	ROAD SYSTEM	DWY	DRIVEWAY
		FNC	FENCE
		GEO	GEOMETRY
		GND	GROUND
		MSC	MISCELLANEOUS
		PRK	PARKING
		REF	REFERENCE
		RDY	ROADWAY
		STR	STRUCTURE
		SWK	SIDEWALK

DIVISION		GROUP	
ABBREVIATION	DEFINITION	ABBREVIATION	DEFINITION
SV	SURVEY	BND CNT MON REF	BOUNDARY CONTROL MONUMENT REFERENCE
TN	TRANSPORTATION NETWORK	SGN STR	SIGN STRUCTURE
TM	TERRAIN MODEL	CNT FLT GND PNT TM	CONTOUR FAULT LINE / BREAK LINE GROUND POINT TIN
TS	TRAFFIC SYSTEM	AER GND MSC PMK SGN UND	AERIAL GROUND MISCELLANEOUS PAINT MARKING SIGN UNDERGOUND
TV	TELEVISION / CABLE	AER GND MSC SER UND	AERIAL GROUND MISCELLANEOUS SERVICE UNDERGROUND
WS	WATER SYSTEM	BND DST SER TRN	BOUNDARY DISTRIBUTION SERVICE TRANSMISSION
WW	WASTEWATER	BND COM MSC SER SEW	BOUNDARY COMBINED MISCELLANEOUS SERVICE SEWER

4.2.1.4 Specifics

The following table shows the abbreviations used in the “Specific” field of the NFO Layer hierarchy.

DT	•DETAIL
H	•HATCH
L	•LABEL
PF	•PROFILE

4.2.2 NFO Layer Listing

View Appendix C for a complete layer listing.

4.3 IMPORT A SURVEY

TO IMPORT A SURVEY	
1	•Right click survey Databases and select “New local survey database…” and assign a brief description name. Automatically, the survey database folder structure is available.
2	•Right click Import Events and select “Import survey data…”. The Import Survey Data – specify Database dialogue box will appear.
3	•Select the name just created in the Specify Database window and hit Next.
4	•In the Specify Data Source window, browse for the survey file (.fbk, .txt, .csv format) and hit Next.
5	•In the Specify Network window, select the “Create New network…” button and provide a brief description of the survey and hit Next. As for the Import Options window, all setting have been pre-selected with the aid of the Survey User Settings imported earlier, hence simply hit Finish.
6	•Switch over to the Prospector tab and notice under Survey, the newly added Network listed. Note: the NFO C3D template.dwt template file containing point style, figure styles and a description key set (see Section 4.4) to accommodate a field book file set up to work with these styles and settings.
7	•At this point the survey network can be removed after inserting the points and features, right click Networks and select Remove from Drawing.
8	•To continue with this survey data and establish a proper surface see Section 4.5.

4.4 POINTS

Points used for City of Niagara Falls projects are to be created by AutoCAD Civil 3D and are called Coordinate Geometry (COGO) points, which are very different from AutoCAD point nodes. AutoCAD point nodes have only coordinate data (XYZ values) associated with them. However, COGO points, in addition to coordinate data, have a variety of properties associated with them, including point number, point name, raw (field) description, and full (expanded) description. Unlike AutoCAD point nodes, which exist in a single drawing, COGO points can be stored in a project outside a drawing and referenced by multiple users. In AutoCAD Civil 3D, the term point refers to a COGO point, not to an AutoCAD point node.

4.4.1 Point Groups

Point groups are useful for both visibility control and sorting. They're dynamic and can be used to control the visibility of points that already exist in the drawing. Both, point groups and a description key set can be standardized and stored in the template file. A combination of the two methods for preparing points for surface building, exporting and changing the visibility of points already in the drawing, will prove most useful.

In the template file, the following point groups are available:

- TIN-DTM (all points required to build a surface)
- SURVEY MONUMENTS
- STRUCTURES
- STREETSCAPE
- ROAD
- TRAFFIC
- WATER
- STORM
- SANITARY
- UTILITIES
- VEGETATION
- MATERIAL INFORMATION
- DISPLAY ALL
- DISPLAY ALL-SYMBOLS ONLY
- DISPLAY NONE
- SHEET PRODUCTION

Hierarchy of point groups affects the information being displayed when printing. For example, when printing production drawings, sheet production should be listed first followed by display none.

4.4.2 Description Key Set

Description keys are used when inserting existing points and survey figures into a drawing from a point database file (.fbk, .txt, .csv format) to automatically control some drawing point properties, such as the appearance of a point, label, scale and rotation in the drawing.

The available description key set, named NFO_DESCRIPTION_KEYS is located in the 2016 NFO C3D template.dwt or 2018 NFO C3D template.dwt template files.

4.4.3 Block Library

All blocks used in a Civil 3D style are currently loaded into the template. If a block is not found in the template, purged out of the working drawing or needs to be redefined to its original format, it can be loaded via the Insert command and browse to this location within the support folder structure. If this block is not used in a Civil 3D style; set the annotative property to 'yes' via the BEDIT command, after the re-inserted block is redefined. Note: Design Centre provided the user access to these blocks as well but a simple drag-and-drop will not redefine the block.

The blocks which have supplementary settings built-in (description key or dynamic settings) have added description information. View Appendix D for a complete listing of standard NFO Template blocks.

4.5 SURFACES

Surfaces are made up of triangles or grids, which are created when AutoCAD Civil 3D connects the COGO points that make up the surface data. To use a surface in your drawing, you can create an empty surface and then add data to it. You can also import existing files containing surface information, such as TIN, or DEM files.

Points or contours are usually a primary part of the original surface information and are supplemented with breaklines and boundaries. Boundaries define the visible area of a surface. Only the area within the boundary is included in calculations, such as for total area and volume. You can also define masks to hide or show parts of a surface for editing or presentation purposes, while still including that area in calculations.

All surfaces are to have their displays controlled by their Styles and not their object layers.

4.5.1 Surface Styles & Labels

The following Surface Styles have been created and are included in the NFO Template:

EXISTING	PROPOSED	GENERAL
•NFO EX CONTOURS 0.1m AND 0.2m •NFO EXISTING CONTOURS 0.25m AND 1m •NFO EX TIN	•NFO PR CONTOURS 0.1m AND 0.2m •NFO PR CONTOURS 0.25m AND 1M •NFO PR TIN •NFO PR USER CONTOUR	•NFO NO DISPLAY

Labels for Contours, Slope, Spot Elevation and Watershed have also been created for the template.

CONTOUR	SLOPE	SPOT ELEVATION	WATERSHED
•NFO EX MJR •NFO PR MJR	•NFO EX Percent •NFO EX Rise over Run •NFO EX Run over Rise •NFO PR Percent •NFO PR Rise over Run •NFO EX Run over Rise	•NFO EX EL.100.00 •NFO EX EL.100.00 (GRADING PLAN) •NFO PR EL. 100.00 •NFO PR EL. 100.00 (GRADING PLAN)	•NFO EX Watershed STORM •NFO PR Watershed STORM

4.5.2 Survey Data to Existing Tin Surface

The creation of gathered survey information into a database is typically the responsibility of the survey crew; the group involved with this work strives to automate the process as much as possible.

The following elements are required to automate the process:

- Consistent use of field codes that represents specific features, including point style and label assignment (description key set).
- Apply field connectivity codes to automatically generate base plan line work during the import process, including layer and breakline assignment (figure prefix database).

- Point groups for surface modeling are predefined in the template to assist with excluding invalid points (aerial, top of hydrant, catchbasin invert, etc.).
- Representation of survey data as a survey network by applying survey network style.

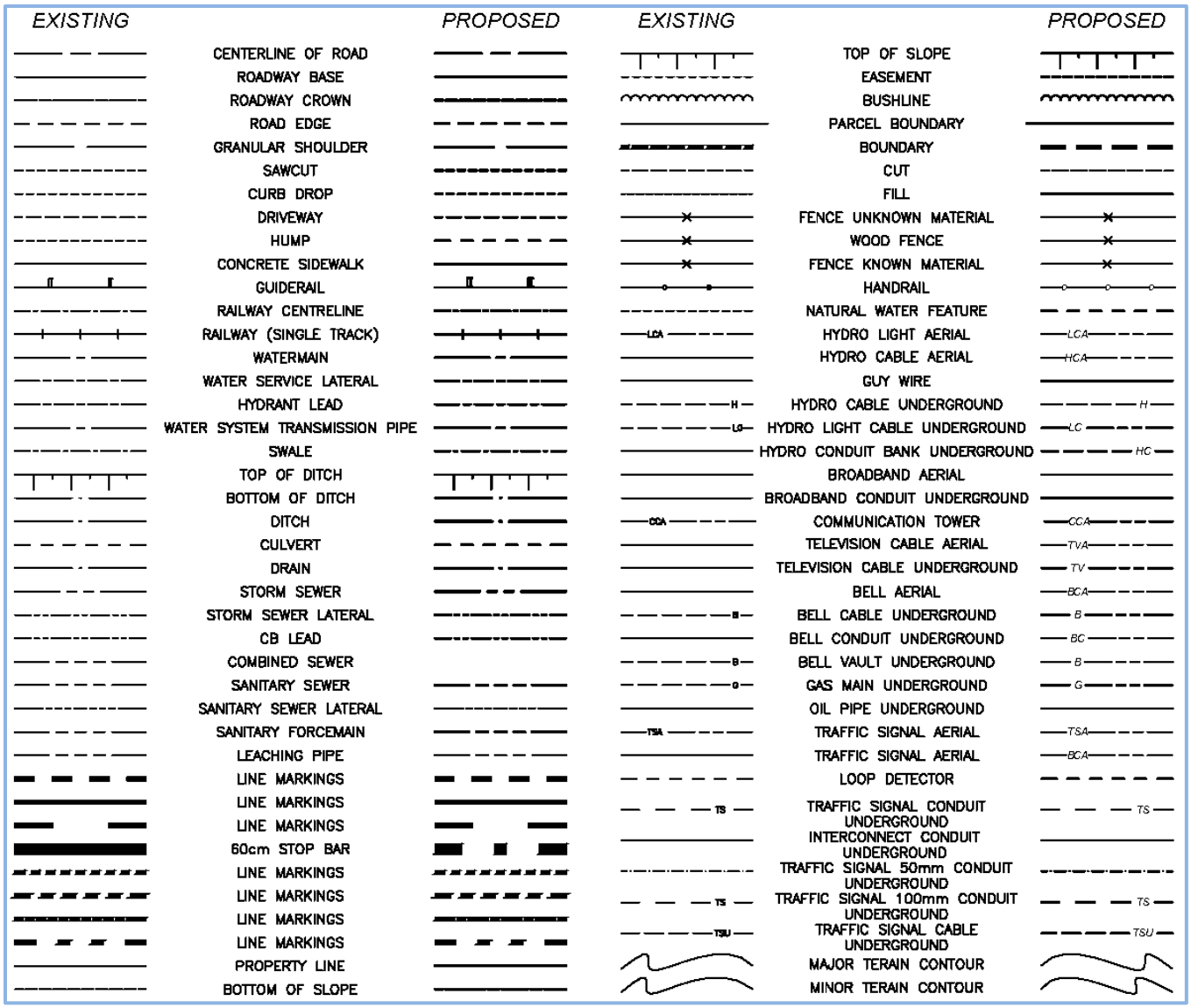
A local Survey Database can have one or more networks. You can import one or more field books or point files into a network when the Survey spans more than one field book or point file. At least one network is necessary when importing files to create line work and points. By default, each import supplements the previous import. When re-importing a file, Survey automatically deletes the information from the original file import and recalculates the observations from the re-import file. Importing multiple files with the correct settings creates a single network whose data is the combination of the imported files. The survey database is intentionally kept separate and independent of the drawing by C3D for both practical and legal reasons; original work by surveyors should not be altered without knowing the consequences.

As mentioned in Section 2.3, the setup of a survey database is to set the working folder to the project's specific folder structure vs. using the default C3D set up of C:\Civil 3D Projects. This keeps the survey database intact and also accessible to anyone working on the project.
REMEMBER: to switch the working folder when you start a new project and when you return to an established project.

To create a surface model from this information:
1) Points and figures need to be imported. In the Survey tab on the Toolspace palette, right click Figures and select Insert into drawing then right click Survey Points and select Points>Insert into drawing.
2) In the Prospector tab, open Surfaces and find EX Ground surface listed with an appropriate style assigned. There's no required order in adding operations in the surface's definition as long as the following sequential order is applied in the Definition tab of the surface Properties:
   - DEM Files
   - Points/point file/point groups
   - Contours
   - Breaklines
   - Drawing Objects
   - Edits
   - Boundaries
3) Right click "Ex Ground" then select "Rebuild".
4) When adding the survey figures as breaklines, switch back to the Survey tab, right click Figures and select Create Breaklines.
5) Select OK to set up the breaklines into the surface parameters. Provide an appropriate description in the Add Breaklines dialogue box, and maintain the Standard Type (3D figures). Note closed polylines, circles and arcs cannot be generated as breaklines; hence review any error message in the panorama palette to adjust these breaklines appropriately.
6) When adding points to the surface; verify the raw description of the point is selected in the Raw Description Matching tab in the TIN_DTM group since this point group is set up to exclude invalid surface points (aerial, top of hydrant, catchbasin invert, etc.).

4.6 LINETYPES

A linetype is a repeating pattern of dashes, dots, and blank spaces displayed in a line or a curve. In this template / survey objects or items have been assigned linetypes either by layer or by specifying the linetype explicitly, independent of layers.



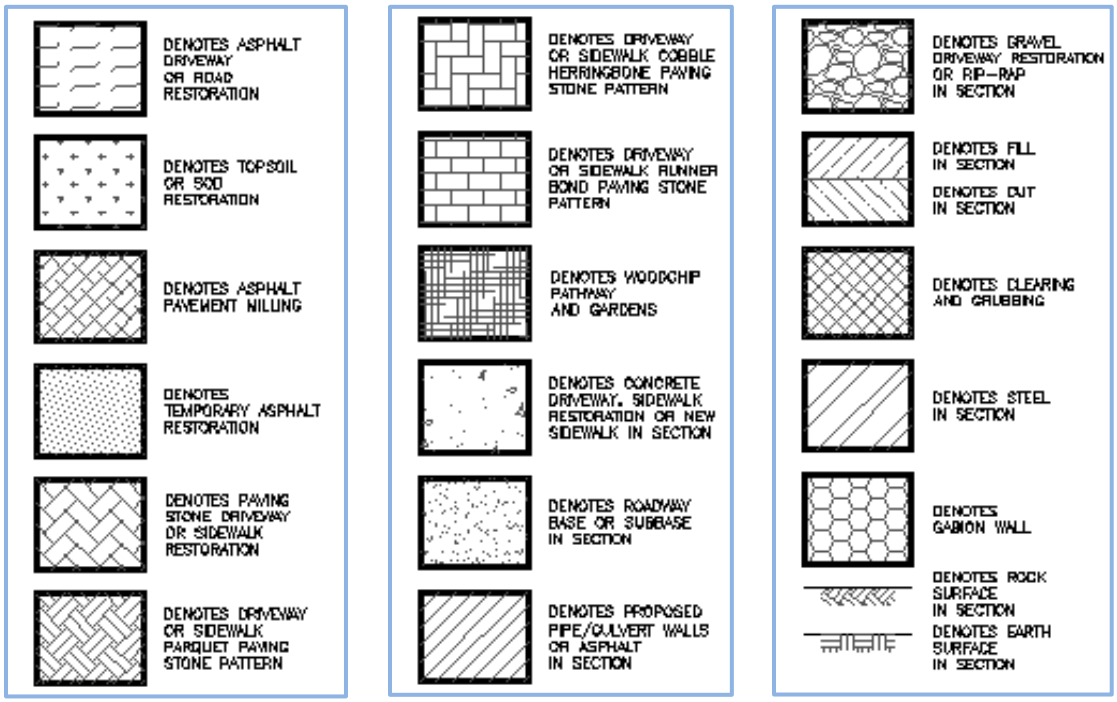
All objects are to be created using the assigned linetype from the template, which is displayed in the Properties palette, Home tab, and the Properties panel of the ribbon when no objects are selected. Some linetype definitions include text and symbols.

4.6.1 Loading Linetypes

The Template support folder contains a “Linetypes” folder that contains two linetype files in .lin format. The acadiso.lin is the Civil 3D default metric linetype styles while the NFO C3D.lin is the City of Niagara Falls required linetype styles. A support search path is required to link the linetypes to the drawing in progress. To maintain proper presentation of these linetypes the LTSCALE, MSLTSCALE and PSLTSCALE variable settings along with the object’s individual linetype scale shall remain at 1. Any deviation will inhibit the annotative properties built into Civil 3D objects.

4.6.2 Hatches - Line Patterns

Below are the NFO standard hatches patterns and what each pattern represents. See section 4.2.1 for hatch layers. Hatches represent restoration information. Hatches are to be displayed in the proposed drawings only.



4.7 PARCELS

A parcel boundary is a closed polygon. It is an intelligent Civil 3D object that contains various property fields and data. Each parcel has an area label, which refers to the parcel as a whole. A parcel can also have segment labels, and associated tables, which display information about the parcel. Labels can contain user-defined property fields. Each parcel maintains information about its segments and nodes, and the area they enclose. Drawing Submissions to the City of Niagara Falls will not be accepted with exploded styles.

4.7.1 Parcel Styles & Labels

The following Parcel Styles have been created and are included in the NFO Template:

EXISTING	PROPOSED
•NFO EX Lots	•NFO PR Lots
•NFO EX Open Space	•NFO PR Open Space
•NFO EX Property	•NFO PR Property
•NFO EX Road	•NFO PR Road

Labels for Area, Line and Curve have also been created for the template.

AREA	LINE	CURVE
•NFO No Display •NFO PR Name Area & Perimeter •NFO PR Name Square Meter & Acres •NFO PR Parcel Number	•NFO PR (Span) Bearing and Distance with Crows Feet •NFO PR Bearing Over Distance •NFO Iron Pipe Node Label •NFO PR Overall Distance and Bearing	•NFO PR Delta Over Length and Radius

4.8 GRADING

You create grading projections by applying grading criteria to a footprint. The grading objects are grouped into named collections to create final surface designs and compute volumes. A grading object normally consists of the footprint, the daylight line, the projection lines, and the face.

Gradings are created in a site. Create individual sites for grading objects if you do not want a grading to interact with other objects. Grading objects in a grading group are consolidated to create one grading group surface so you can compute volumes. Before you create gradings, decide how you want to manage them with regard to surface creation and volume computations.

After you create a grading group, volume tools within AutoCAD Civil 3D show you the amount of cut and fill required for the grading design. Editing can also change the elevation of points along a grading base line, change the grade of a base line, or modify the grading criteria.

4.8.1 Grading Styles

Grading styles are located on the Toolspace Settings tab. The following Grading Styles have been created and are included in the NFO Template:

EXISTING	PROPOSED
•NFO EX Cut Slope Display •NFO EX Fill Slope Display	•NFO PR Cut Slope Display •NFO PR Fill Slope Display

4.8.2 Grading Criteria

Grading criteria are settings that specify the grading method. The settings are consolidated in named criteria to eliminate repetitive prompting when you are creating grading. Project a slope from a feature line to an intersection with a surface, or to a specified distance, elevation, or elevation difference. Use this grading method to calculate proposed feature lines based on some preferred criteria. A major benefit of projection grading is that the resulting grading objects remain true to the original criteria if the base feature line is edited. Additionally, you can edit the criteria, and the grading model reflects the change. This method works best when you need to maintain relationships between feature lines.

The available grading criteria set is set up to reflect the City of Niagara Falls maximum angle of repose, as described in the Engineering Design Standard Manual, are as follows:

NFO BASIC SET	NFO PR LOTS AND DRIVEWAYS	NFO PR PONDS AND SWALES
•NFO PR 3:1 to Distance •NFO PR 3:1 to Elevation •NFO PR 3:1 Relative Elevation •NFO PR 3:1 to Surface	•Driveway 8% Max to Elevation •Driveway 8% Max to Surface •Lot and Driveway 1.5% Min to Elevation •Lot and Driveway 1.5% Min to Surface •Lot Grading 6% Max to Elevation •Lot Grading 6% Max to Surface	•Pond (non residential) and Swale 3:1 to Elevation •Pond (non residential) and Swale 3:1 to Surface •Pond (recreational amenity use) and Swale 4:1 to Elevation •Pond (recreational amenity use) and Swale 4:1 to Surface

These criteria sets are simply a few of the possibilities that may arise during design. The option to modify and add any criteria for the designer's specific needs shall be done within the Basic Set.

Note: These criteria are intended to identify areas of concern. The designer is ultimately responsible for all decisions made during the design process.

4.9 ALIGNMENTS

Creating and defining a horizontal alignment is one of the first steps in roadway, railroad, or site design. Alignments can be stand-alone objects or the parent object of profiles, sections, and corridors. When creating an alignment, assign it a type of centerline, offset, curb return, rail, or miscellaneous. Alignments are listed in either the Alignments collection or a Site collection in the Prospector tab. From these collections, you can change alignment properties and generate reports. If an alignment exists in a site, its geometry interacts with that of other objects in the site, such as parcels and feature lines.

4.9.1 Alignment Styles & Labels

The visual appearance of alignment components is controlled through styles and labels. Creating additional styles is acceptable by copying and modifying specific styles to use in the various phases of a project. When creating an alignment, specify a style for the alignment object and label. In the Alignment Labels dialog box when modifying label sets, all changes shall be saved as a new label set for future use.

The following Alignment Styles have been created and are included in the NFO Template:

EXISTING	PROPOSED	GENERAL
•NFO EX DITCH •NFO EX ROAD •NFO EX SWALE	•NFO PR DITCH •NFO PR ROAD •NFO PR SWALE	•NFO GENERAL LAYOUT •NFO NO DISPLAY

Labels for Label Sets, Major Station and Minor Station have also been created for the template.

LABEL SETS	MAJOR STATION	MINOR STATION
•NFO No Labels •NFO PR All Labels •NFO PR Major and Minor Only •NFO PR Major and Minor Geometry Points •NFO PR Standard Major-Minor Geo Point	•NFO EX Perpendicular with Tick •NFO PR Parallel with Tick •NFO PR Perpendicular with Line •NFO PR Perpendicular with Tick	•NFO EX Tick •NFO PR Tick

Additional label styles have been created for: Station Offset, Lines, Curves, Spiral, Tangent Intersection and Point Intersection. The designer is directed to review these styles in the template.

4.10 PROFILES

The main purpose of a profile is to show surface elevations along a horizontal alignment and to visualize the terrain along a route of interest or across a particular region. There are several types of profiles: surface profiles, layout profiles, superimposed profiles, quick profiles, and corridor profiles. All profiles are to be created as a dynamic profile.

Profiles are displayed as graphed lines in a grid known as a profile view. A profile object is derived from a horizontal alignment. The horizontal alignment must exist to define the route of a profile across the terrain. If you edit a horizontal alignment after creating dynamic surface profiles along its length, the profiles automatically change.

A profile view object is also dependent on a horizontal alignment. The length of the alignment can control the horizontal extents of the profile view grid, and the alignment stationing controls the annotation of horizontal axes. The vertical extents of the profile view have an optional relationship with one of the profiles in the profile view. You can set the vertical extents to a fixed value, but normally they are dynamically linked to one of the profiles.

4.10.1 Profile & Label Styles

When you create a layout profile, you can automatically label it using label styles you specify in the Create Profile - Draw New dialog box. Profile label styles can be configured to mark any of the following standard points along the profile:

- Major and minor stations of the parent horizontal alignment
- Horizontal geometry points
- Grade breaks
- Lines
- Sag curves
- Crest curves

The following Profile Styles have been created and are included in the NFO Template:

EXISTING	PROPOSED	GENERAL
•NFO EG •NFO EX DITCH •NFO EX ROAD •NFO EX SWALE	•NFO PR DITCH •NFO PR PRK LOT SURFACE •NFO PR ROAD •NFO PR SURFACE •NFO PR SWALE	•NFO GENERAL LAYOUT •NFO NO DISPLAY

Labels for Label Sets, Major Station and Minor Station have also been created for the template.

LABEL SETS	MAJOR STATION	MINOR STATION
•NFO No Labels •NFO PR All Labels •NFO PR Curves •NFO PR Major and Minor Only •NFO PR Major Minor and Geometry Points •NFO EXISTING •NFO PROPOSED	•NFO PR Perpendicular with Tick	•NFO PR Perpendicular with Tick

Addition labels have been created for grade breaks, lines, curves and horizontal geometry points. The designer is directed to review these styles in the template.

4.11 CORRIDORS

A corridor model builds on and uses various AutoCAD Civil 3D objects and data, including subassemblies, assemblies, alignments, surfaces, and profiles. The corridor manages the data, tying various assemblies (applied for different ranges of stations) to the baselines and their finished grade profiles.

Corridors are created from and based on existing AutoCAD Civil 3D objects, which include:

ALIGNMENTS	•Used by a corridor as its baseline.
PROFILES	•Used to define surface elevations along a horizontal alignment.
SURFACES	•Used to derive alignments and profiles, and for corridor grading.
SUBASSEMBLIES	•Subassemblies define the geometry of a corridor section (assembly).
ASSEMBLIES	•Represent a typical section of a corridor. Assemblies comprise one or more subassemblies connected together.
DATA EXTRACTION	•Includes surfaces, feature lines (as polylines, alignments, profiles, and grading feature lines), and volume (quantity takeoff) data.

Corridors and Assemblies have their own display style and also inherit styles from their components.

CORRIDORS	ASSEMBLIES
•NFO PR BASIC •NFO PR ROAD	•NFO PR BASIC •NFO PR ROAD

4.12 SECTIONS

In AutoCAD Civil 3D, section data is defined and displayed using sample lines, sections, and section views, all of which are managed through a collection called a sample line group. An alignment can have more than one sample line group associated with it, each having a unique set of sample lines and sections. Use sections (also referred to as cross sections) to provide a view of the terrain cut at an angle across a linear feature, such as a proposed road.

Typically, sections are cut across horizontal (plan) alignments at a specified station interval using specified swath widths. These sections are then plotted, individually for a station, or as a group for a range of stations. Before creating sections, a surface and one or more horizontal alignments must exist.

4.12.1 Sections & Label Styles

The following Section Styles have been created and are included in the NFO Template:

EXISTING	PROPOSED
•NFO EX Ground SURFACE	•NFO PR Ground SURFACE •NFO PR PRK LOT SURFACE

Labels for Label Sets, Major Offset and Minor Offset have also been created for the template.

LABEL SETS	MAJOR OFFSET	MINOR OFFSET
•NFO FG Section Labels •NFO No Labels •NFO PR Major and Minor Offsets •NFO EG Section Labels	•NFO PR Distance from CL •NFO PR Offset and Elevation	•NFO PR Distance from CL •NFO PR Offset and Elevation

4.13 PIPE NETWORKS

A pipe network object manages a collection of pipe objects and structure objects that are associated with each other to represent a pipe system. Typically, the pipes and structures are connected to each other, forming a single pipe run or pipe network. The pipe and structure objects in a pipe network can be associated with a referenced alignment and or a surface, which provide them with station offset and elevation data. Each part in a pipe network can reference any given surface or alignment in the drawing.

AutoCAD Civil 3D has interference checking features which quickly identify areas where pipes or structures physically collide, or are too close to one another. AutoCAD Civil 3D also includes extension applications that enable the designer to perform a variety of hydraulics and hydrology tasks on pipe network data.

All pipe network objects such as manholes, pipes, fittings and bends shall be drawn as Civil3D pipe and part objects utilizing the appropriate pipe network. It is acceptable to draft laterals/services as polylines; however, catchbasin leads shall be drafted as pipe objects. If the designer chooses to draft services and/or laterals as pipes, then do not connect to the mainline sewer as this will break the pipe.

4.13.1 Parts Catalog

A part catalog provides access to pipe network items, such as circular, elliptical, or rectangular pipes, manholes, catch basins, headwalls, and more. The following parts catalogs are included as part of the NFO Template:

EXISTING & PROPOSED
•COMBINED - Combined System •SANITARY - Sanitary System •STORM - Storm System •WATERMAIN - Water System

4.13.2 Pipe Networks

The base set of pipe networks shall be broken down as follows:

EXISTING & PROPOSED
•COMBINED - Combined System •SANITARY - Sanitary System •STORM - Storm System •WATERMAIN - Water System

It is to the designer's discretion on how to use the available labels for each pipe network. The plan view labels are assigned through the Create Pipe Network dialogue box by specifying label styles for pipes and structures or all views label styles can be assigned via the Pipe Network Properties dialogue box. In the Create Pipe Network dialogue box, the option to set the label style to <none>, enables working space by minimize clutter during design. After completing the design, the option to add labels via the Add Labels Dialogue box allows the designer to set the entire network, single part, and spanning labels. **Note: It is essential to assign names to all structures (ex. MH 12345) not only to facilitate an organized design but to use the available label styles.**

5 ANNOTATION

Annotation objects include dimensions, notes, and other types of explanatory symbols or objects commonly used to add information to your drawing.

Annotation objects provide information about a feature, such as its length, diameter, or a specific detail or required information. Typically, annotation objects are scaled differently than the views of the drawing, and depend on the scale of how they should appear when plotted.

You can control the method that an annotation object is scaled by defining the object either as non-annotative or annotative.

Annotation in the titleblock is assigned to Arial or romans font via the ARIAL and TEXT_ text styles. Text sizes vary throughout the titleblock which depends on the type of information provided. See block 'sheet frame explode upon insert.dwg' or the layouts set up in the NFO C3D PLAN PRODUCTION.dwt template file (see section 2.3.2.).

All proposed text is assigned to oblique Arial black font at 2mm plotted height. There are three text styles available; ANNO PROPOSED, PROPOSED, and TEXT_B. ANNO PROPOSED is applying the annotative property and to be used for manual labels of proposed features, PROPOSED is the same as ANNO PROPOSED but non-annotative, while TEXT_B is non-annotative and is reserved for linetypes & object style labels.

All existing text is assigned to romans font at 1.5mm plotted height. There are three text styles available; ANNO EXISTING, EXISTING, and TEXT_. ANNO EXISTING is applying the annotative property and to be used for manual labels of existing features, EXISTING is the same as ANNO EXISTING but non-annotative, while TEXT_ is non-annotative and is reserved for linetypes & object style labels.

5.1 ANNOTATIVE OBJECTS

Annotative scales are applied to the following objects: Text, Dimensions, Hatches, Blocks, Attributes and Linetypes:

- Objects can be created as annotative but can also be changed to annotative after creation through the objects edit command and properties:
- Adjusting the quantity and options of scales to suit the working drawing through the Scale List Edit Dialog Box.
  - Modify pull-down menu>Annotative Objects>Scale List Edit
  - Command prompt: scalelistedit
  - The scale icon button at the lower right corner of the AutoCAD interface (drawing status bar)>Custom…
- When copying objects to the working drawing ALWAYS set scale back to 1:1 then delete copied scales through the Scale List Edit.
- When creating annotative objects or changing an object to annotative, ALWAYS set scale to 1:1.
- Text and blocks used in dimension and multileaders cannot be annotative if dimension or multileader is annotative.
- Text and attributes in blocks cannot be annotative if block is annotative.

- The scale to be used is assigned to the object through the Modify pull-down menu>Annotative Objects Scale>Add Current Scale.
- Multiple scales can be used on one object. The appropriate location of the object from one scale to another doesn't always match. The location of the object can be moved using the grip commands.
- The visibility of the annotative object can be turned off/on in the viewport so that the objects with the same scale as the viewport are the only visible annotative objects.

Annotative text, dimension and multileader for proposed and existing styles are available along with proposed and existing non-annotative styles.

5.2 STYLES AND LABELS

On the Settings tab in the Toolspace palette, the drawing settings, object settings and the command settings have been configured to the NFO requirements. This includes object style controls to the display and design characteristics of drawing objects and label styles controls to manage the display of labels and expressions for a class of objects. Applying these styles will efficiently and consistently manage object appearance; which includes applying the required visibility options.

All labels shall use the correct Civil 3D styles and shall not be exploded. Labels shall be applied using the "Add Labels" dialogue box.

5.2.1 Label Styles

Labelling objects, such as Pipes in plan & profile, should be applied through the "Add Labels" dialog box in order to take advantage of the ability to apply labels to the entire network or to label individual components.

When labelling pipe system objects, each part has their own label, such as manholes, water valves, tees, bends, etc. in both plan and profile. Watermain parts have additional styles in profile to allow for an offset when parts are close together and have grips that can adjust the vertical label line as necessary.

5.2.2 Pipe Year

Each pipe label must specify the year of the pipe for existing and as-constructed infrastructure. Civil3D versions using the 2016 template will have to perform a text edit of the label and manually insert the pipe year in the specified field.

Civil3D versions using the Civil3D 2018 template can take advantage of Property Sets in order to automate this process. Once the Property Set has been applied to the pipe, the user can enter the pipe year in the Extended Data tab of the object's properties. This process supports selecting multiple pipes at once and entering the same pipe year.

5.3 TABLE STYLE

Each row in a table contains information about a single object component, such as a line. Tables are supported for points, parcels, alignments, surfaces, pipes, and structures where:

- The first column of data in a table is reserved for the identifier.
- Additional columns display the object data.

Hence, the importance of having an organized design, since any object property can be listed in a table. Here are the available table styles in the template:

1) Pipe tables, where the pipe name, size, length, slope and material information is listed.

2) Storm systems, where the pipe name, size, length, slope and connected catchbasin information is listed.

3) Structure table, where the structure name, size, pipe in/out name, size, material and invert information is listed.

4) Storm and sanitary systems, where the catchbasin/maintenance hole name, station, rim elevation and connected pipe invert information is listed. Note: one additional column intentionally left blank is included on the right side of the table for future use to record as-built information.

5) Quantity takeoff table, where the volume table lists the sample line station, fill volume, cut volume and cumulative volumes and the material table lists the sample line station, material area (cross-sectional area), material volume (cross-sectional area x distance between sample lines), and cumulative volume.

6) Point table, where the point ID, northing, easting, elevation, and description of each point are listed or where the point ID, elevation, latitude, longitude and description are listed. Both of these styles are available for existing and proposed points.

7) Surface table, where existing and proposed table styles for direction, elevation, slope, contour, watershed and user-defined contours are available listing its range.

6 DRAWING GUIDELINES

Plan production is a template drawing containing Paperspace 2D entities to facilitate converting the 3D design into conventional engineering documents,.

All sheets are set up to ARCH D size which is 914mm x 610mm (36in x 24in) in landscape orientation.

The design alignment will govern viewport and north arrow orientation along with the view frame command. In conjunction with the view frame command, the sheet creation command will set up profiles views accordingly, see Section 6. Similarly, multi section views are governed by selecting the NFO PR ARCH D sheet style and the section layout in the plan production template.

6.1 MULTI TAB SET UP

The plan production template drawing contains multiple layout set ups for the various options that the designer may require for proper presentation of the design. Below are itemized entities that have been set up to allow a smooth transition of 3D to 2D:

Layouts (divided by scale and type)	•Title Sheet •1:200 for plan •1:50 for profile •For cross sections, 1:200 horizontal and 1: 100 vertical
Titleblock	•SV_LNRTH1 block is located at the top right. •City of Niagara Falls Logo is located within the appropriate limits in the titleblock, along with the consultant's logo outlined (on defpoint layer). •Titleblock and drawing data located at insert point 0,0 via block insert. Standard general notes are located within the appropriate limits in the titleblock. •Benchmark information is located within the appropriate limits in the titleblock. •Keyplan outlined.

Sheet tabs will reside in the design drawing file unless the project drawing set is greater than seven layouts, the sheets will need to be separated into multiple drawing files. All layout tabs shall be named according to the drawing number.

6.2 PLOT AND DRAWING ORIENTATION

When working in model space, the proper coordinate system must stay in-tact, all elements are to be drawn at 1:1 and clear distinction shall group and label plan views, profile views, sections, details separately. It is poor drafting practice to retain irrelevant design in a submittal drawing file; hence, if it's not showing in a viewport, it is not part of the design.

The DVIEW>TWIST command enables the designer to rotate the plan and maintain the coordinate system. For submission this rotation shall be reverted back to maintain the North direction up by applying the PLAN>CURRENT command.

The UCS>E command is an alternative option. If the designer chooses to work with the UCS command, it is imperative to maintain the view by Named Views. This will facilitate quick access to the original coordinate system and maintain the North direction up for submission.

Alternatively, maintaining the North direction up at all times in modelspace can be facilitated with the MVSETUP>A>R command in the paperspace viewport. If the designer chooses to work in paperspace inside the viewport, the CHSPACE command will assist with rotational alignment and drawing readability.

When using the Plan Production command, the manual application of the MVSETUP command is automated as long as an alignment is current in modelspace.

6.3 CHECKLISTS

View Appendix E for a complete listing of all template checklists.

7 OUTPUT

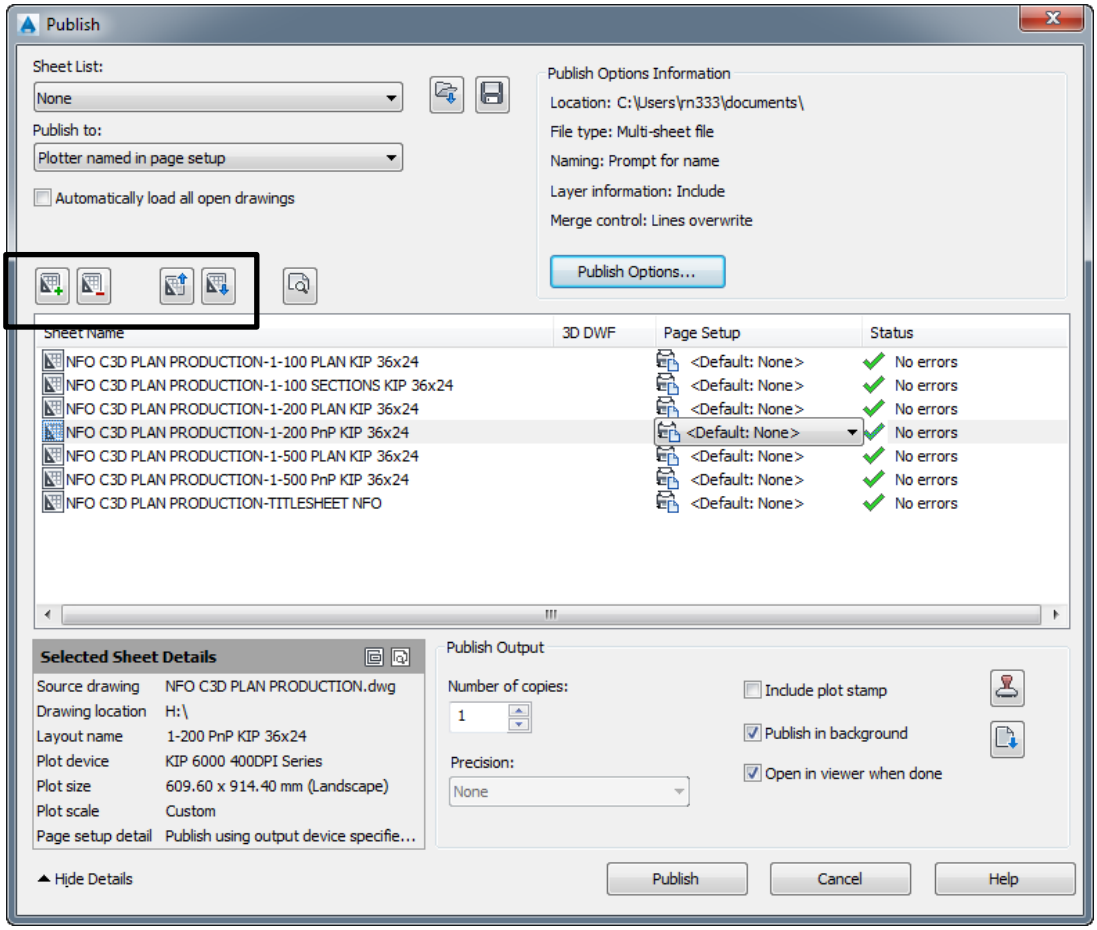
Output is the method of converting electronic files into a required new format. This includes plan production, plotting and producing various required versions of electronic files, etc.

It is essential to use the layouts in the NFO C3D PLAN PRODUCTION.dwt template file (see section 2.3.2), to easily use the plan production command and the page setups. The available page setups are the governing element in applying the publish command for multi sheet printing and a sheet set configurations.

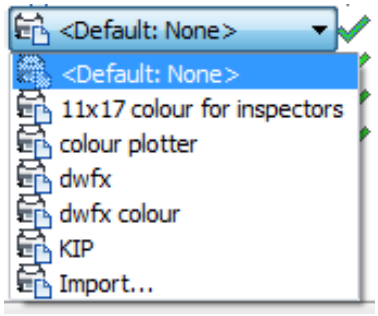
7.1 PLOTTING/PRINTING USING THE PUBLISH COMMAND AND SHEET SET FOR PLOTTING

Using the Publish Command for Plotting

To use the publish command, select the File pull-down menu and select 'Publish…' In the Publish dialog window (see image below), adjust which sheet and in which printing order with the "add/remove" and "up/down buttons".

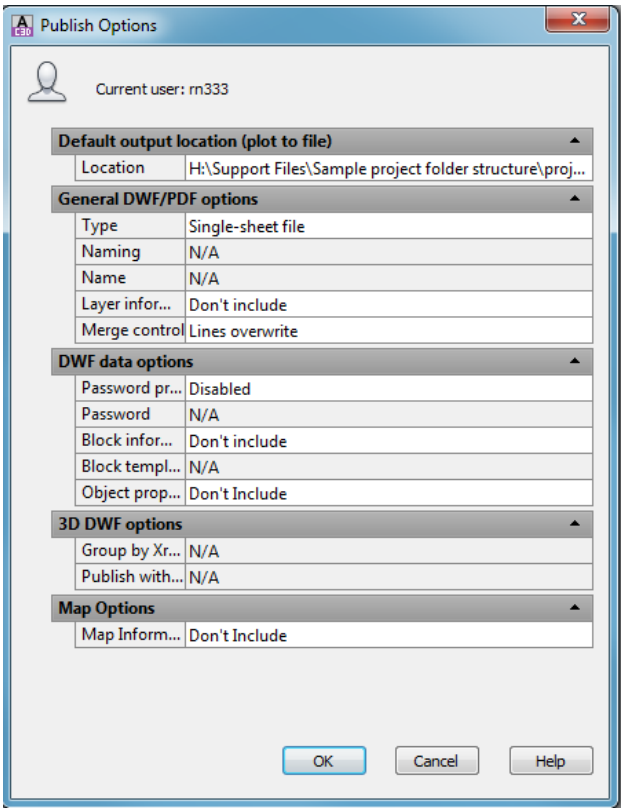


In the Page Setup column, select the drawing preset printing set up, as shown below:



Knowing that the page setups available are properly configured to the exact plotting needs for the selected printer, the designer is guaranteed to get multi-sheet plotting completed quickly.

In the image below, find the ‘Publish Options’ dialog window to change electronic plot file settings.

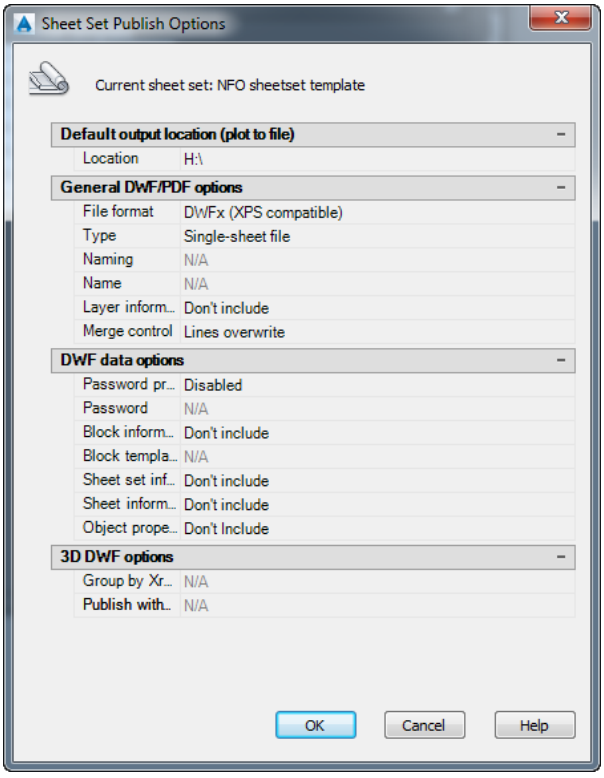


1) Change the ‘Default output location’ to the proper folder within the project folder structure.
2) Set the ‘Type’ to single-sheet file. This is according to the City’s one drawing/file filing policy. The City’s drawing/file policy is ‘one drawing per file’.
3) Always have the ‘Merge control’ set to ‘Lines overwrite’ to maintain small files.

Using the Sheet Set for Plotting and Sheet Numbering

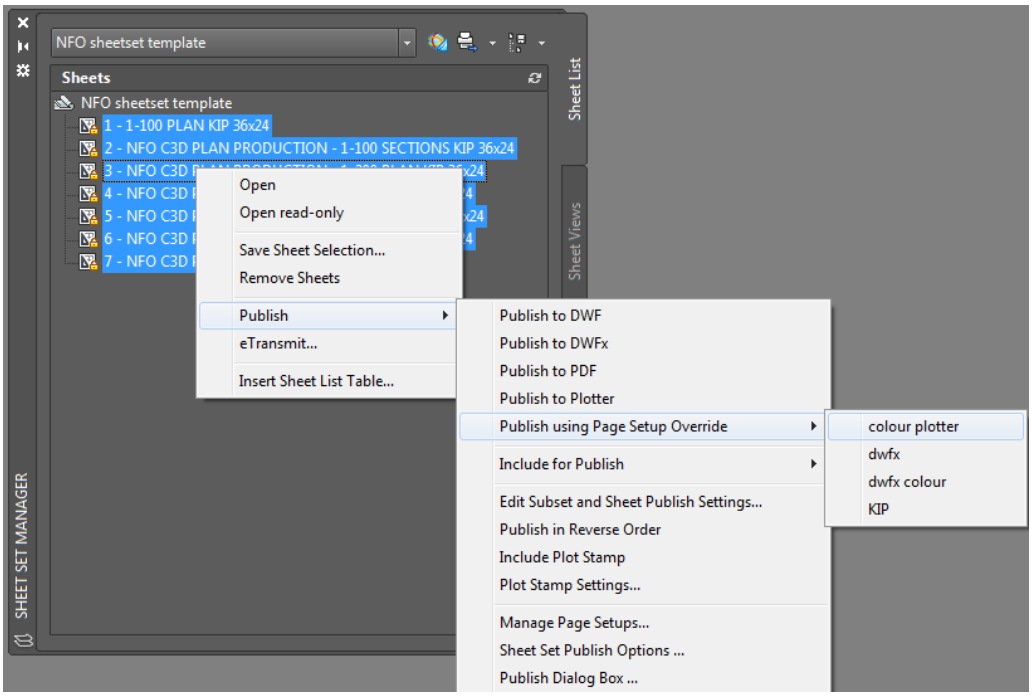
To use a Sheet Set for plotting and sheet numbering, make a copy of the NFO C3D SS.dst file and place it within the current project folder structure. While in the current project design drawing, open the Sheet Set Manager palette, select the pull-down menu and select 'Open…' Browse to the location and select the newly copied .dst file.

a. Right click the 'NFO sheetset template' in the palette and select 'Properties…' Verify the 'Page setup overrides file' link is set to the NFO C3D PLAN PRODUCTION.dwt template file.
b. Right click the 'NFO sheetset template' in the palette and select 'Import Layout as Sheet…' The 'Import Layouts as Sheets' dialog window appears and select 'Browse for Drawings…' button. After selecting the drawing file(s), check the layouts to be included in the sheet set, de-select 'Prefix sheet titles with file name' and import.
c. Right click the first sheet listed and select 'Rename & Renumber…' The 'Rename & Renumber Sheet' dialog window appears which lets you assign the sheet number. This value will populate the 'Sheet No.' field located in the lower right corner of the titleblock on all layouts numbered. The 'updatefield' command may need to be complete to regenerate the values on all layouts. The 'XX' value of the 'Sheet No.' annotation will need to be updated manually on all layouts. Various project specific automations can be applied here with the 'copy to layout' command.
d. To change electronic plot file settings: For the 'Sheet Set Publish Options' dialog window to appear, in the Sheet Set palette, select all sheets and right click Publish>Sheet Set Publish Options (see image below).



1. Change the ‘Default output location’ to the proper folder within the project folder structure.
2. Set the ‘Type’ to single-sheet file. This is according to the City’s one drawing/file filing policy.
3. Always have the ‘Merge control’ set to ‘Lines overwrite’ to maintain small files.

e. In the Sheet Set palette, select all sheets and right click to select the publish command (see the image below). Note the page setup options from the NFO C3D PLAN PRODUCTION.dwt template are listed.



7.1.1 Page Setups

Common plot settings:

Paper size: 914mm x 610mm (36"x24")

Plot area: Layout (do not put linework or annotation outside of title block limits)

Drawing orientation: Landscape

7.1.1.1 Plot Style Tables (pen assignments)

CTB files; NFO Colour and NFO Monochrome have been created for the template. They are to assign as required for all drawings sent to and/or produced by the City of Niagara Falls.

Modifications to the .CTB files and using colors that are not defined in our plot style tables are strictly prohibited.

7.2 PAPERLESS PLOTTING

Creating DWFs and PDFs is an important part of our work process. Not only does it save paper, but it also allows us to electronically share drawings with people who do not have Civil 3D.

7.2.1 DWF Format

The DWF format is especially powerful because it can be marked-up electronically and DWF sheets can be overlaid for comparison using Autodesk Design Review.

Recommended DWF "Paper Size" for Drawing Submittals: 914mm x 610mm (36"x24").

7.2.2 PDF Format

The PDF format can be opened with Adobe Reader.

Recommended PDF "Paper Size" for Full-Size Sheets: 914mm x 610mm (36"x24")

7.3 ELECTRONIC TRANSMITTALS

Here is an electronic transmittal checklist:

- Utilize **eTransmit** to package the file in .ZIP format, specifying the options to keep the files in their existing format and not exploded.
- Files shall be named in accordance with the City of Niagara Falls' file naming convention.
- Use organized folder structure (proper file naming and relative XREF paths ensure smooth translation).
- Include files from data links (i.e. Excel files).
- Include sheet set data and files (including .DST file, plot files, and XREFs).
- Include data shortcut source files (you may need to manually include these).
- Include DWF and PDF of the plan set.

APPENDIX A
SUBMITTALS

This Appendix of the manual will outline what is required for the various types of drawings used in the Municipal Works Department. If any requirements in this manual are not applied, the submitted drawing will not be accepted.

A.1 SUBMISSION OF DRAWINGS

The City of Niagara Falls requires the electronic drawings for the 'Issue for Information', 'Issue for Tender' and the 'Issue for Construction' submissions to be in the two (2) following file types along with a hardcopy of the complete drawing set:

- AutoCAD Drawing Format (.dwg) in the proper coordinate system, see Section 5.1.
- AutoCAD Drawing Web Format (.dwf).

Using the template provided, the proper coordinate system will always be in position. See Section 3.2 for the proper naming convention of each type of electronic submittal.

All electronic submissions shall be a compressed file (i.e. zip file) assembled through the e-Transmit command in AutoCAD Civil 3D to ensure all external references and images retain their link.

A.1.1 Revision Numbering System

Every submission made to the City of Niagara Falls for review or approval shall be indicated with a revision number along with a description located in lower left corner of the titleblock on all drawings in the drawing set. The revision number shall follow the sequence below:

- Issued for information shall be an alpha-numeric designation,
- Issued for tender shall be zero (0),
- Issued for construction and record shall be a numeric designation (1, 2, etc.).

A.1.2 Issue As-built

The City of Niagara Falls requires all contractors to submit as-built drawings of the work completed in real world coordinates. These are required in all cases, even if the project was constructed as per the issued for construction drawings. The final survey shall be completed to the City of Niagara Falls Standards.

The following information shall be provided in the survey:

- Watermain:
  - All water valve ground elevations
  - All water valve top of operating nut
  - Top of nut hydrant elevations
  - All curb box ground elevations
  - All blow off elevations
- Sanitary Sewer:
  - All maintenance hole inverts and lid elevations
  - All sanitary cleanout lid elevations and tee elevation
  - Elevations of any stub ends
- Storm Sewer:
  - All maintenance hole inverts and lid elevations
  - All catchbasin inverts and rim elevations
  - Elevation of any stub ends
- Roadway:

- Cross section shots shall be taken every 20m. This will include shots on the property line, back of sidewalk, front of sidewalk, top of back of curb, edge of pavement and centre line of road. This shall be completed for both sides of the road.
- Any changes that were made during construction must be picked up in the survey.

The Contractor shall submit a set of redline markup drawings showing all underground details (bends, tees, pipe lengths etc.) that were not captured on the as-built drawing.

A.1.3 Issue As-constructed / Record Drawings

All drawing file formats shall have all external references bound, contain the final as-constructed layer state and indicate the revision number and description. All files shall be named using the file naming convention described in Section 3.1.

As-constructed drawings must be updated to incorporate all as-constructed survey data and the information from both the Contractor's and the Inspector's red line markups.

A.1.3.1 General As-constructed Requirements:

- As-constructed drawings shall leave all proposed design elements on the applicable proposed layer and their linetypes shall remain bold. The proposed labels shall have their "PR" designations removed and the year of pipe installation added. See the as-constructed example drawings for reference.
- As-constructed drawings are required to be set up as presented in the 'Issue for Construction' submission, and shall bear the name, address, and telephone number of the firm preparing the drawings.
- Civil 3D version 2018 or higher (dwg file format) shall be used to generate all engineering drawings and shall be supplied to the City in accordance with the NFO requirements, including the assigned spatial characteristics outlined in Section 5.1.
- "AS-CONSTRUCTED" shall be clearly labeled on each sheet.
- The "consultant" (the developer's/contractor's engineer) will have sixty (60) days to submit As-constructed drawings. Release of hold back will not occur.
- Once all construction is accepted by the development inspection staff, building permits may be issued.
- The "consultant" (the developer's/contractor's engineer) will be required to update the As-constructed plans for services, that are not underground, or roadwork, i.e. sidewalks, trees, fences etc. and submit a revised CD within thirty (30) days of construction, otherwise pending security reductions or permit issuance will be halted.
- Street names shall be on all streets. All easements and right-of-ways shall be shown and clearly labeled.
- If the utility system is to be private (not to be dedicated to City), it shall be identified on the sheet.
- The location and elevation of the benchmark referenced will be shown on the drawing. If the referenced benchmark is not within the project, then a complete description of its location will be provided to assist in future locating.
- The locations and description of any utility lines and other installations of any kind or other description known to exist within the construction area. The location includes dimensions to permanent features.
- The locations and dimensions of any changes to buildings and structures.
- Correct grade or alignment of roads.

- Correct elevations to changes made on site grading.
- Changes in details of design or additional information such as approved placement details, pipe sizes, material changes, etc.
- Where drawings and/or specifications allow options, only the option constructed shall be shown on the as-constructed drawings.

A.1.3.2 Electrical/Cable/Street Lighting/Fibre Optic System

Electrical/Cable/Street Lighting/Fibre Optic System – Cable Utility As-constructed Requirements:

- Locate and clearly label all conduit runs, fittings, splice vaults, pull boxes, meter pedestals, light asset, transformer or switch gear pads, poles and other appurtenances.
- Show all sizes and material types of pipes and conduits.
- Show location and elevations on pipes and fittings where changes or deflections in direction occur.
- Typical service installation details with deviations from original plans or standard details shall be noted on as-constructed drawings.

A.1.3.3 Water System As-constructed Requirements:

- Locate valves, fittings, services, bends, tees and fire hydrants
- Show all sizes and types of valves and pipes.
- Special detail drawings may be required where installations are not shown on approved construction drawings for whatever reason or where required for clarity.
- Show location and elevations on pipes and fittings where changes in direction occur.
- Typical water service installation details with deviations from original plans shall be noted on as-constructed drawings.
- Special detail drawings will be required where installations were not as shown on the drawings due to field conditions or where required for clarity.

A.1.3.4 Sanitary Sewer System As-constructed Requirements:

- All piping, wyes, tees, valves, cleanouts, maintenance holes and special cases shall be located
- Identify runs of gravity mains and label year of construction (i.e., 90.0m – 300mm Ø PVC SAN @ 0.44% (2012)).
- Elevations shall be given for the top of all maintenance holes covers and for all inverts.
- Service laterals are to be identified with location of end service or plug (station and offset measured upstream).
- Maintenance holes shall be identified by diameter.
- Special detail drawings will be required where installations were not as shown on the drawings due to field conditions or where required for clarity.

A.1.3.5 Forcemain As-constructed Requirements:

- Locate all valves, fittings, etc. in two directions as above.
- Locations of pipe shall be shown at all changes in direction.
- Show all sizes and types of valves, fittings, pipe, etc.
- Special detail drawings will be required where installations were not as shown on the drawings due to field conditions or where required for clarity.
- Identify runs of forcemains and label year of construction (i.e., 90.0m – 300mm Ø PVC FM @ 0.44% (2012)).

A.1.3.6 Drainage System As-constructed Requirements:

- All piping, wyes, tees, valves, cleanouts, manholes and special cases shall be located.
- Provide elevations for all drainage structures, top, invert, bottom, etc.
- Identify size, material and slope of all piping.
- Provide spot elevations and cross-sectional information, as well as slope, on all ditches, canals, etc.
- Provide as-constructed storage volume of detention, retention basins or structures.
- Show all drainage easements and encroachments to those easements on the as-constructed drawings.
- Spot elevation on top of banks to confirm minimum design bank elevations.
- Elevation of water stage at date of as-constructed.
- Elevation of top of control structure, throat, faces, or under drain.
- Location of top of bank and existing water edges at time and date of taking elevations.
- Identify runs of gravity mains and label year of construction (i.e., 90.0m – 300mm Ø PVC STM @ 0.44% (2012)).

A.1.3.7 Roadway, Sidewalks and Trails System As-constructed Requirements:

- Show all right-of-way or easement lines, clearly labeled.
- Provide typical offset dimensions from property, right-of-way or easement lines.
- Typical ramp or curb opening installation details that deviate from original plans shall be noted on as-constructed drawings.
- Special detail drawings will be required where installations were not as shown on original drawings due to field conditions or where required for clarity.
- Locate and describe all installed regulatory or warning signage and pavement markings within the project.
- Location and species information on installed street trees.
- Locate irrigation lines, controllers, sprinkler heads, backflow devices, pressure reducing valves, meters, supply sources and tap location. Location, type, material and reinforcement, height, drainage systems and foundation information of all retaining walls.
- Note any changes to the alignment, either vertically or horizontally, of curb & gutter, sidewalk, pavers or any other surface improvement.
- Provide crown line spot elevations approximately on 20m stations, or as field condition warrants.

A.2 SUBDIVISION DRAWING SET

The following sections outline what is required in a typical subdivision drawing set. Additions or deletions from this typical set may be required; this will be determined on a project by project basis by our Development Technologists or Manager of Development.

Any questions regarding the drawing set should be directed to the Development Staff in the Municipal Works Department.

A.2.1 Title Sheet

The Title Sheet shall include the following:

- Registered name of the Plan of Subdivision
- Name of the Developer
- Name of the Consulting Engineering Firm
- Name of the Mayor and Director of Municipal Works

- Key plan of the development and adjacent lands at 1:10,000 scale
- An index of all drawings included in the complete set.

A.2.2 Draft Reference Plans (or Registered Plans if Available)

The complete set of drawings shall include a copy of any Reference Plans showing all dedications, easements, widening or other conveyances to be referred to in the Subdivision Agreement.

A.2.3 Draft Plan of Subdivision

The complete set of drawings shall include a copy of the approved Draft Plan of Subdivision drawn to an acceptable scale.

A.2.4 General Plan of Services

The General Plan of Services shall include the following:

- roadways, property lines, easements, new lot numbers and existing municipal addresses
- sanitary and storm sewers showing manholes, pipe materials, diameters, lengths, direction of flow, lateral locations and related appurtenances or facilities
- water mains, service connections, hydrants valves or other appurtenances
- culverts, watercourse, woodlots, marshes and other significant topographic features
- existing streets and services surrounding the development that will be integrated into the new project
- location and description of geodetic benchmarks used for the topographic survey
- street lighting
- locations of existing trees, including size, condition, species name, etc., to be completed by a certified arborist (as required)
- approved development limits (natural heritage & tree preservation)

A.2.5 Subdivision Grade Control Plan

The Subdivision Grade Control Plan shall include the following:

- all existing and proposed topographic features required on the General Plan of Services
- existing and proposed elevations at all lot corners, mid lot grade changes and the direction of overland flow
- existing grade contours at 0.5m intervals sufficient to determine the general direction of surface drainage patterns
- proposed centerline of road elevations at 20m intervals, changes in grade, intersections and at catch basins
- gutter grade on all curb radii
- top of grate and invert elevations of all catch basins and storm sewer manholes
- maximum building envelope permitted by the zoning bylaw for each proposed building lot
- minimum basement floor and first floor elevations for all buildings that require Building Permits and identification of those buildings requiring the installation of sump pumps for the discharge of weeping tile drainage
- proposed apron elevations at the front, rear and sides of all proposed buildings
- proposed drainage swales including invert elevations, top of slope elevations, grade and direction of flow
- required drainage easements for all pipes, inlets or other drainage related appurtenances
- rear lot catch basins, inlets, leads, tile drains or connections including sizes, materials and lengths

- typical cross-sections for all swales, channels or sewers conveying surface drainage
- location and design details for any retaining wall required
- erosion protection, flow control devices, stormwater management facilities or other feature of the development that would require special consideration for final grading of adjacent land
- street lighting

A.2.5.1 Master Grade Control Plan

Master Grade Control Plans shall be prepared in conformance with this part and with regard to the Design Guidelines set out in Section 2.5 above. The Master Grade Control Plan shall be prepared at a minimum scale of 1:500, on 610mm x 914mm (24" x 36") size sheet, and clearly illustrate the following:

- legend, north direction, name of subdivision, City of Niagara Falls Geodetic Benchmark(s), date of preparation and any subsequent revisions
- property boundaries, lots/block numbers/designations
- existing/proposed contours/elevations
- existing elevations and drainage from lands adjacent to the proposed subdivision and if drainage from these lands is towards the proposed subdivision, the existing information shall be obtained to the high point of the drainage area or at least to the adjacent street
- location of sewer manholes, hydrants, sidewalks, catchbasins, and rear yard catchbains
- proposed elevations at the centreline of the finished road and relative data showing distances and slopes between these elevations
- existing and proposed ground elevations at the corner of each lot or block with suitable intermediate elevations as required
- existing and proposed ground elevations at the house/building envelope
- location, elevation, and longitudinal slopes at the invert of swales together with rear yard catchbasin elevations and drainage arrows showing the direction of swale drainage
- the lot grading type of each lot or block with arrows to indicate the direction of surface drainage (see Plates that follow this section)
- Any drainage obstruction such as berms, retaining walls, sound barriers, silt traps, vegetation, etc.
- artificial or natural impoundments
- existing trees and vegetation as they affect proposed drainage and catch basin schemes which are to be saved/preserved
- any lots or blocks not suitable for the construction of any type of buildings or features due to the grading and drainage patterns, should be clearly indicated on the plan

A.2.5.2 Lot Grading Plans

Lot Grading Plans for individual lots shall be prepared in conformance with this part, and with regard to the design guidelines set out in Section 2. 5 above.

- The plan shall be at a scale of no more than 1:200
- The plan shall be on a legal-size sheet or an 11x17 sheet, if so needed
- The plan shall include at least the identification and certification information shown on Plate 2 following this section
- The plan shall clearly illustrate the following:
- General Information
- Shape and dimension of the lot
- House location and shape (type)
- Abutting street names

- Existing or proposed curbs, catchbasins, sidewalks utility plant, hydrants, driveway location(s) within the Municipal road allowance
- Proposed walkways, patios, decks, porches, chimneys, environmental control units (a/c units, heat pumps, etc.) swimming pools, etc.
- Existing trees to be saved
- Location of proposed entrances, outside stairwells and window-wells
- Location of easements for rear yard catchbasins and leads or other utilities
- Drainage and Grading Information
- Specific lot grading with drainage arrows to indicate direction of surface drainage flow
- Location and direction of flow of swales
- Existing or proposed geodetic ground elevations at each corner of the lot, at high and low points, at changes in slope of ground, where a change in the direction of flow occurs, at the corners of the house, and at entrances to outside stairwells
- Existing or proposed elevations of the centreline of the road, side walk or top of ditch abutting the subject lands
- Elevations of top of footing, top of the foundation wall, and ground (finished) floor
- Elevations for finished garage floor and entrance elevations if different from the floor elevations
- Elevation of rim of any rear yard or on-site catchbasins to which flow from the lot is directed
- Ground elevations on adjacent lands if drainage is to cross these lands to a catch basin or other outlet on these lands
- Location of downspouts and direction of discharge (NOTE: No downspouts shall be directed so as to adversely affect adjacent properties)
- Location of terraces and retaining walls
- Any slope which exceeds three horizontal to one vertical (3H:1V), including side slopes of swales
- Elevation of top of step of outside stairwells (to be a minimum of 150mm (6”) above the adjacent ground

A.2.6 Sanitary Drainage Area Plan

The Sanitary Drainage Plan shall include the following:

- all existing and proposed topographic features shown on the General Plan of Services
- all proposed sanitary sewers, manholes, pumping stations, forcemains or related appurtenances required in the servicing of the subject property
- information regarding the size, length, pipe material, grade and direction of flow for the conveyance system
- The sanitary drainage areas for each pipe section including information about service population (per 1,000) and catchment area (in hectares)
- any design assumptions made to accommodate the sanitary flows generated from adjacent developed or undeveloped property

A.2.7 Storm Drainage Area Plan

The Storm Drainage Area Plan shall include the following:

- all existing and proposed topographic features shown on the General Plan of Services
- all proposed storm sewers, manholes, catch basins, ditches, inlets, control devices, Storm water management facilities or related appurtenances required in the servicing of the subject property
- information regarding the size, length, pipe material, grade and direction of flow for the conveyance system
- the storm drainage areas for each pipe section including information about the runoff coefficient and catchment area (in hectares)

- any design assumptions made to accommodate storm drainage flows generated from adjacent developed or undeveloped property
- major flow routes, flood lines and contours that are proposed as a result of the development of the subject property
- contours at 1.0m intervals maximum with contour elevations

A.2.8 Plan and Profile Drawings (New Developments)

Plan and profile drawings must be drawn for all new streets and service corridors within and external to the subdivision or site plan. All chainages shall be calculated along the centreline of the road or service corridor. At least two ties per sheet must be provided showing the relationship of the centreline to existing property bars. All Plan and Profile drawings shall include:

- Plan View
  - all existing and proposed topographic features shown on the General Plan of Services drawn at a scale of 1:500
  - streetlighting.
- Profile View
  - chainages for the centreline of the road or service corridor
  - existing and proposed sanitary sewers, storm sewers, watermains including any related appurtenances labeled to match the corresponding location in the Plan View, drawn at a scale of 1:50 vertical, 1:500 horizontal
  - location and description of the nearest benchmark
  - borehole log information including the elevation of any soil characteristics that may affect the construction of the Works such as the water table or bedrock
  - the proposed centreline of the road and the existing ground elevation along the same alignment
  - invert, top of frame, vertical curve data
  - the location and elevation of any conflicting utility, service, sewer or water main
  - high & low points
  - centreline of intersections

A.2.9 Construction Details

The Construction Details sheet shall include:

- any cross-sections, cut-away views, schematic diagrams or schedules deemed necessary to provide the contractor and Municipal staff with a better understanding of the components of a particular portion of the Works
- generally, the Construction Details sheet does not include standard details that are presently available in other formats *(i.e. manuals, OPSS, OPSD etc.)* rather it should be used to show unique or non-standard information about an important element of the design
- all details shall be properly titled with cross references provided to direct the reader to the appropriate Plan and Profile drawing.

A.3 CAPITAL PROJECTS AND MAINTENANCE CONTRACTS DRAWING SET

These guidelines shall be used for all Capital Projects which include the following:

- Complete road reconstructions
- Replacement or repair of underground infrastructure (watermain, sanitary and storm sewer, forcemains, tanks, etc.)
- Replacement or repair of above ground infrastructure (road, curbs, sidewalk, line painting, sign placement etc.)

A.3.1 Title Sheets

The Title Sheet shall include the following:

- Name of the Project
- Project number and title
- “The Corporation of the City of Niagara Falls Municipal Works Department”
- City of Niagara Falls Logo
- Name of the Consulting Engineering Firm (if applicable)
- Name of the Mayor and Director of Municipal Works
- Key plan showing the project area and adjacent lands
- An index of all drawings included in the complete set.

A.3.2 Plan and Profile Drawings (Reconstruction Projects)

Plan and profile drawings must be drawn for all new streets and service corridors within and external to the project location. All chainages shall be calculated along the centreline of the road or service corridor. At least two ties per sheet must be provided showing the relationship of the centreline to existing property bars. All Plan and Profile drawings shall include:

- Plan View
  - all existing and proposed topographic features shown on the General Plan of Services (see Section 2.4) drawn at a scale of 1:200
  - streetlighting, front of buildings, driveway material, sidewalks, private walkways and fences.
- Profile View
  - chainages for the centreline of the road or service corridor
  - existing and proposed sanitary sewers, storm sewers, watermains including any related appurtenances labeled to match the corresponding location in the Plan View, drawn at a scale of 1:50 vertical, 1:200 horizontal
  - location and description of the nearest benchmark
  - borehole log information including the elevation of any soil characteristics that may affect the construction of the Works such as the water table or bedrock
  - the proposed centreline of the road and the existing ground elevation along the same alignment
  - invert, top of frame, vertical curve data
  - Existing and proposed centerline grades
  - Slope of the road along the centerline
  - Edge of road grades
  - Location and elevation of any conflicting utility, service, sewer or water main
  - High & low points
  - Centreline of intersections

A.3.3 Construction Details

The Construction Details sheet shall include:

- any cross-sections, cut-away views, schematic diagrams or schedules deemed necessary to provide the contractor and Municipal staff with a better understanding of the components of a particular portion of the Works
- generally, the Construction Details sheet does not include standard details that are presently available in other formats *(i.e. manuals, OPSS, OPSD etc.)* rather it should be used to show unique or non-standard information about an important element of the design
- all details shall be properly titled with cross references provided to direct the reader to the appropriate Plan and Profile drawing.

A.4 ADDITIONAL DRAWING TYPES

A.4.1 Street Lighting Plan

The City of Niagara Falls is currently revising our streetlighting standards. All streetlighting design should be completed by a lighting consultant, to ensure all codes and standards are satisfied. Typically, the plan and profile drawings used for the construction can be utilized for the streetlighting drawings.

Streetlighting drawings shall include the following:

- location of any existing or proposed conduit for wiring, junction boxes, control panels, power pedestals, light poles etc.,
- location of existing utilities and potential conflicts
- all necessary cross sections for trench details, road crossings, lighting layout, pole and base details etc.
- all necessary wiring diagrams and details, demolition/removal notes and all necessary standards

A.4.2 Landscaping/Streetscaping/Park Plans (Including Details)

There are a variety of drawings that may be required for landscaping and parks. These include park and sports fields, splash pads, equipment drawings, planting drawings, underground servicing drawings etc.

Any questions regarding the drawing set required for a landscape or park project should be directed to The City of Niagara Falls Landscape Architects.

The Landscaping/Streetscaping Plan shall include the following:

- all existing and proposed topographic features shown on the General Plan of Services (see Section 2.4)
- all proposed plants complete with a schedule showing the species, number of plants, location and planting details
- any existing or proposed fences, structures or equipment to be constructed as part of the proposed development
- any proposed walkways, pathways or pedestrian links including the size, material and interconnection with existing linkages
- a description of the type of finished surfaces (i.e. sod, seed, asphalt, concrete, etc.)
- the location of any community mailboxes, fire hydrants, transformers, streetlights or other utility pedestals
- streetlighting
- existing trees
- proposed entrance features and details
- proposed park block dedications

A.4.3 Standard Notes

The City of Niagara Falls puts all of the standard notes for the drawing set on drawing CC-5300. This includes information such as hatching patterns, typical cross sections for various infrastructure installations in varying soil types, clearance and cover tables and general notes for underground infrastructure.

Any additional general notes and details for the drawing set shall be added as a sub-sequential “General Information Plan” since multiple pages can be produced if necessary.

A.4.4 Survey Base Plan

All survey field data collected shall be tied to benchmark horizontal and vertical control. It is the responsibility of persons carrying out field survey to locate and tie-in adequate control. All benchmark control used shall be identified on survey plans in accordance with Ontario Land Surveyor requirements. Additionally, when undertaking a survey for a plan to be registered or deposited in the registry system or land titles system, Ontario Regulations 216/10 (Performance Standards for the Practice of Professional Land Surveying), made under the Survey Act, must be adhered to. Horizontal control monument locations and field sketches will be provided for projects upon request, by the City of Niagara Falls or the Region of Niagara. This information is also available through the internet at: http://pw.regional.niagara.on.ca/control.

For appropriate use of survey codes see Appendix F – Survey Point Codes Table.

The following standards shall be adhered to when completing any engineering topographic surveys on behalf of the City of Niagara Falls:

- Survey work is to be conducted using total station survey equipment and data collector.
- Survey grade GPS for data collection may be used subject to the approval of the project manager when the vertical component is not as critical for the project.
- Property lines must be identified on base plans with found property bars clearly identified.
- Vertical and horizontal control shall be identified including description. A minimum of two horizontal and vertical monuments must be tied in.
- All points must have complete description according the Appendix F – Survey Point Codes Table.

The following surface and underground features must be collected:

- Property bars
- Limits and types of traveled road surfaces and shoulders. NOTE: road shots at maximum 20 metres intervals and at grade changes. Cross-sections shall extend at least 3 metres beyond the limit of the right-of-way. A maximum interval of 10 metres in sections of horizontal and vertical curves is required.
- Limits and types of all entrances
- Elevations of existing sidewalks, curbs/gutters, doorsills of immediately adjacent buildings, break points, catchbasins, manholes and building types shall be surveyed as required.
- Pavement line markings
- Limits of ditches and natural watercourses including the type and size of all cross and entrance culverts and headwalls.
- Identification and location of all above-ground utilities and their appurtenances
- Locations, diameter (in millimetres), drip-line and type (deciduous or coniferous) of all trees and shrubs.
- All available locates and locate markings

- As required, the size type and elevation of water and sewer services (ex. Inverts of manholes and catchbasins, valve stems, etc.)

All survey work is subject to any additional requirements as requested by the project manager.

The following deliverables are required at the completion of survey works:

- Plan drawing in accordance to the City of Niagara Falls Civil 3D template.
- Original survey data in PNEZD (point number, northing, easting, elevation, description) point file in .txt or .csv format or preferably as a field book file (.fbk) format. NOTE: numeric values representing point coordinates must be stored.
- Surveyor's quality management documentation.

APPENDIX B
COLOUR TABLE SETTINGS

B.1 PEN PLOT TABLE – FULL SIZE MONOCHROME (NFO Monochrome.ctb)

Display Colour		Plot Colour		Line Wth
C	#	C	#	mm
	1		1	0.80
	2		2	0.80
	3		3	0.50
	4		4	0.40
	5		5	0.80
	6		6	0.30
	7		7	0.25
	8		8	025
	9		9	0.25
	10		10	0.70
	11		11	0.60
	12		12	0.50
	13		13	0.40
	14		14	0.25
	15		15	0.20
	16		16	0.15
	17		17	0.10
	18		18	0.10
	19		19	0.25
	20		20	0.70
	21		21	0.60
	22		22	0.50
	23		23	0.40
	24		24	0.25
	25		25	0.20
	26		26	0.15
	27		27	0.10
	28		28	0.10
	29		29	0.25
	30		30	0.70
	31		31	0.60
	32		32	0.50
	33		33	0.40
	34		34	0.25
	35		35	0.20
	36		36	0.15
	37		37	0.10
	38		38	0.10
	39		39	0.25
	40		40	0.70
	41		41	0.60
	42		42	0.50
	43		43	0.40
	44		44	0.25
	45		45	0.20
	46		46	0.15
	47		47	0.10
	48		48	0.10
	49		49	0.25
	50		50	0.70
	51		51	0.60
	52		52	0.50
	53		53	0.40
	54		54	0.25
	55		55	0.20
	56		56	0.15
	57		57	0.10
	58		58	0.10
	59		59	0.25
	60		60	0.70
	61		61	0.60
	62		62	0.50
	63		63	0.40
	64		64	0.25
	65		65	0.20

Display Colour		Plot Colour		Line Wth
C.	#	C.	#	mm
	66		66	0.15
	67		67	0.10
	68		68	0.10
	69		69	0.25
	70		70	0.70
	71		71	0.60
	72		72	0.50
	73		73	0.40
	74		74	0.25
	75		75	0.20
	76		76	0.15
	77		77	0.10
	78		78	0.10
	79		79	0.25
	80		80	0.70
	81		81	0.60
	82		82	0.50
	83		83	0.40
	84		84	0.25
	85		85	0.20
	86		86	0.15
	87		87	0.10
	88		88	0.10
	89		89	0.25
	90		90	0.70
	91		91	0.60
	92		92	0.50
	93		93	0.40
	94		94	0.25
	95		95	0.20
	96		96	0.15
	97		97	0.10
	98		98	0.10
	99		99	0.25
	100		100	0.70
	101		101	0.60
	102		102	0.50
	103		103	0.40
	104		104	0.25
	105		105	0.20
	106		106	0.15
	107		107	0.10
	108		108	0.10
	109		109	0.25
	110		110	0.70
	111		111	0.60
	112		112	0.50
	113		113	0.40
	114		114	0.25
	115		115	0.20
	116		116	0.15
	117		117	0.10
	118		118	0.10
	119		119	0.25
	120		120	0.70
	121		121	0.60
	122		122	0.50
	123		123	0.40
	124		124	0.25
	125		125	0.20
	126		126	0.15
	127		127	0.10
	128		128	0.10
	129		129	0.25
	130		130	0.70

Display Color		Plot Color		Line Wth
C.	#	C.	#	mm
	131		131	0.60
	132		132	0.50
	133		133	0.40
	134		134	0.25
	135		135	0.20
	136		136	0.15
	137		137	0.10
	138		138	0.10
	139		139	0.25
	140		140	0.70
	141		141	0.60
	142		142	0.50
	143		143	0.40
	144		144	0.25
	145		145	0.20
	146		146	0.15
	147		147	0.10
	148		148	0.10
	149		149	0.25
	150		150	0.70
	151		151	0.60
	152		152	0.50
	153		153	0.40
	154		154	0.25
	155		155	0.20
	156		156	0.15
	157		157	0.10
	158		158	0.10
	159		159	0.25
	160		160	0.70
	161		161	0.60
	162		162	0.50
	163		163	0.40
	164		164	0.25
	165		165	0.20
	166		166	0.15
	167		167	0.10
	168		168	0.10
	169		169	0.25
	170		170	0.70
	171		171	0.60
	172		172	0.50
	173		173	0.40
	174		174	0.25
	175		175	0.20
	176		176	0.15
	177		177	0.10
	178		178	0.10
	179		179	0.25
	180		180	0.70
	181		181	0.60
	182		182	0.50
	183		183	0.40
	184		184	0.25
	185		185	0.20
	186		186	0.15
	187		187	0.10
	188		188	0.10
	189		189	0.25
	190		190	0.70
	191		191	0.60
	192		192	0.50
	193		193	0.40
	194		194	0.25
	195		195	0.20

Display Color		Plot Color		Line Wth
C.	#	C.	#	mm
	196		196	0.15
	197		197	0.10
	198		198	0.10
	199		199	0.25
	200		200	0.70
	201		201	0.60
	202		202	0.50
	203		203	0.40
	204		204	0.25
	205		205	0.20
	206		206	0.15
	207		207	0.10
	208		208	0.10
	209		209	0.25
	210		210	0.70
	211		211	0.60
	212		212	0.50
	213		213	0.40
	214		214	0.25
	215		215	0.20
	216		216	0.15
	217		217	0.10
	218		218	0.10
	219		219	0.25
	220		220	0.70
	221		221	0.60
	222		222	0.50
	223		223	0.40
	224		224	0.25
	225		225	0.20
	226		226	0.15
	227		227	0.10
	228		228	0.10
	229		229	0.25
	230		230	0.70
	231		231	0.60
	232		232	0.50
	233		233	0.40
	234		234	0.25
	235		235	0.20
	236		236	0.15
	237		237	0.10
	238		238	0.10
	239		239	0.25
	240		240	0.70
	241		241	0.60
	242		242	0.50
	243		243	0.40
	244		244	0.25
	245		245	0.20
	246		246	0.15
	247		247	0.10
	248		248	0.10
	249		249	0.25
	250		250	0.25
	251		251	0.25
	252		252	0.25
	253		253	0.25
	254		254	0.25
	255		255	0.25

B.2 PEN PLOT TABLE – FULL SIZE COLOUR

(NFO Colour.ctb)

Display Colour		Plot Colour		Line Wth
C	#	C	#	mm
	1		1	0.80
	2		2	0.80
	3		3	0.50
	4		4	0.40
	5		5	0.80
	6		6	0.30
	7		7	0.25
	8		8	0.25
	9		9	0.25
	10		10	0.70
	11		11	0.60
	12		12	0.50
	13		13	0.40
	14		14	0.25
	15		15	0.20
	16		16	0.15
	17		17	0.10
	18		18	0.10
	19		19	0.25
	20		20	0.70
	21		21	0.60
	22		22	0.50
	23		23	0.40
	24		24	0.25
	25		25	0.20
	26		26	0.15
	27		27	0.10
	28		28	0.10
	29		29	0.25
	30		30	0.70
	31		31	0.60
	32		32	0.50
	33		33	0.40
	34		34	0.25
	35		35	0.20
	36		36	0.15
	37		37	0.10
	38		38	0.10
	39		39	0.25
	40		40	0.70
	41		41	0.60
	42		42	0.50
	43		43	0.40
	44		44	0.25
	45		45	0.20
	46		46	0.15
	47		47	0.10
	48		48	0.10
	49		49	0.25
	50		50	0.70
	51		51	0.60
	52		52	0.50
	53		53	0.40
	54		54	0.25
	55		55	0.20
	56		56	0.15
	57		57	0.10
	58		58	0.10
	59		59	0.25
	60		60	0.70
	61		61	0.60
	62		62	0.50
	63		63	0.40
	64		64	0.25
	65		65	0.20

Display Colour		Plot Colour		Line Wth
C.	#	C.	#	mm
	66		66	0.15
	67		67	0.10
	68		68	0.10
	69		69	0.25
	70		70	0.70
	71		71	0.60
	72		72	0.50
	73		73	0.40
	74		74	0.25
	75		75	0.20
	76		76	0.15
	77		77	0.10
	78		78	0.10
	79		79	0.25
	80		80	0.70
	81		81	0.60
	82		82	0.50
	83		83	0.40
	84		84	0.25
	85		85	0.20
	86		86	0.15
	87		87	0.10
	88		88	0.10
	89		89	0.25
	90		90	0.70
	91		91	0.60
	92		92	0.50
	93		93	0.40
	94		94	0.25
	95		95	0.20
	96		96	0.15
	97		97	0.10
	98		98	0.10
	99		99	0.25
	100		100	0.70
	101		101	0.60
	102		102	0.50
	103		103	0.40
	104		104	0.25
	105		105	0.20
	106		106	0.15
	107		107	0.10
	108		108	0.10
	109		109	0.25
	110		110	0.70
	111		111	0.60
	112		112	0.50
	113		113	0.40
	114		114	0.25
	115		115	0.20
	116		116	0.15
	117		117	0.10
	118		118	0.10
	119		119	0.25
	120		120	0.70
	121		121	0.60
	122		122	0.50
	123		123	0.40
	124		124	0.25
	125		125	0.20
	126		126	0.15
	127		127	0.10
	128		128	0.10
	129		129	0.25
	130		130	0.70

Display Color		Plot Color		Line Wth
C.	#	C.	#	mm
	131		131	0.60
	132		132	0.50
	133		133	0.40
	134		134	0.25
	135		135	0.20
	136		136	0.15
	137		137	0.10
	138		138	0.10
	139		139	0.25
	140		140	0.70
	141		141	0.60
	142		142	0.50
	143		143	0.40
	144		144	0.25
	145		145	0.20
	146		146	0.15
	147		147	0.10
	148		148	0.10
	149		149	0.25
	150		150	0.70
	151		151	0.60
	152		152	0.50
	153		153	0.40
	154		154	0.25
	155		155	0.20
	156		156	0.15
	157		157	0.10
	158		158	0.10
	159		159	0.25
	160		160	0.70
	161		161	0.60
	162		162	0.50
	163		163	0.40
	164		164	0.25
	165		165	0.20
	166		166	0.15
	167		167	0.10
	168		168	0.10
	169		169	0.25
	170		170	0.70
	171		171	0.60
	172		172	0.50
	173		173	0.40
	174		174	0.25
	175		175	0.20
	176		176	0.15
	177		177	0.10
	178		178	0.10
	179		179	0.25
	180		180	0.70
	181		181	0.60
	182		182	0.50
	183		183	0.40
	184		184	0.25
	185		185	0.20
	186		186	0.15
	187		187	0.10
	188		188	0.10
	189		189	0.25
	190		190	0.70
	191		191	0.60
	192		192	0.50
	193		193	0.40
	194		194	0.25
	195		195	0.20

Display Color		Plot Color		Line Wth
C.	#	C.	#	mm
	196		196	0.15
	197		197	0.10
	198		198	0.10
	199		199	0.25
	200		200	0.70
	201		201	0.60
	202		202	0.50
	203		203	0.40
	204		204	0.25
	205		205	0.20
	206		206	0.15
	207		207	0.10
	208		208	0.10
	209		209	0.25
	210		210	0.70
	211		211	0.60
	212		212	0.50
	213		213	0.40
	214		214	0.25
	215		215	0.20
	216		216	0.15
	217		217	0.10
	218		218	0.10
	219		219	0.25
	220		220	0.70
	221		221	0.60
	222		222	0.50
	223		223	0.40
	224		224	0.25
	225		225	0.20
	226		226	0.15
	227		227	0.10
	228		228	0.10
	229		229	0.25
	230		230	0.70
	231		231	0.60
	232		232	0.50
	233		233	0.40
	234		234	0.25
	235		235	0.20
	236		236	0.15
	237		237	0.10
	238		238	0.10
	239		239	0.25
	240		240	0.70
	241		241	0.60
	242		242	0.50
	243		243	0.40
	244		244	0.25
	245		245	0.20
	246		246	0.15
	247		247	0.10
	248		248	0.10
	249		249	0.25
	250		250	0.25
	251		251	0.25
	252		252	0.25
	253		253	0.25
	254		254	0.25
	255		255	0.25

APPENDIX C
NFO LAYER LISTING

C.1 DRAWING

Name	Color	Linetype	Description
0	white	Continuous	0 - reserved for CAD
Defpoints	white	Continuous	Defpoints - reserved for CAD
DR_BR_ANNOTATION	white	Continuous	titleblock annotation
DR_BR_COV_COLOR1	255,0,0	Continuous	NFO logo
DR_BR_COV_COLOR116	12,100,54	Continuous	NFO logo
DR_BR_COV_COLOR143	6,168,249	Continuous	NFO logo
DR_BR_COV_COLOR156	0,85,150	Continuous	NFO logo
DR_BR_FRAME	green	Continuous	titleblock frame
DR_BR_PRF_FRAME	white	Continuous	profile frame
DR_BR_PRF_L	white	Continuous	profile frame label
DR_BR_REF_KEYPLAN	cyan	Continuous	keyplan linework
DR_BR_REF_KEYPLAN_L	white	Continuous	keyplan label
DR_BR_REF_MATCHLINE	red	Continuous	planview matchline
DR_BR_REF_MATCHLINE_H	255	Continuous	planview matchline hatch
DR_BR_REF_MATCHLINE_L	white	Continuous	planview matchline label
DR_BR_REF_NORTHARROW	cyan	Continuous	planview north arrow block
DR_BR_REF_VIEWBOX	cyan	Continuous	viewport no plot
DR_BR_REF_VIEWBOX_L	white	Continuous	viewport labels no plot
DR_E_PJ_H	252	Continuous	existing general hatch
DR_P_PJ_H	250	Continuous	proposed general hatch
DR_PJ_GRID_MJR	8	Continuous	major grid
DR_PJ_GRID_MNR	9	Continuous	minor grid
DR_PJ_L	white	Continuous	miscellaneous labels
DR_PJ_L_D	white	Continuous	miscellaneous dimensions
DR_PJ_SYMBOL	white	Continuous	miscellaneous labels
DR_PJ_XREF	cyan	Continuous	xrefs

C.2 INFRASTRUCTURE

C.2.1 Abandoned

Name	Color	Linetype	Description
IN_A_DS_H	252	Continuous	abandoned STM hatch
IN_A_DS_L	white	Continuous	abandoned STM label
IN_A_DS_SEW_CB	26	Continuous	abandoned STM catchbasin
IN_A_DS_SEW_MH	26	Continuous	abandoned STM maintenance hole
IN_A_DS_SEW_PIPE	26	UND_STM	abandoned STM pipe
IN_A_DS_SEW_PLUG	26	Continuous	abandoned STM plug
IN_A_DS_SEW_STRC	26	Continuous	abandoned STM structure
IN_A_WS_DST_BEND	166	Continuous	abandoned water system bends
IN_A_WS_DST_CAP	166	Continuous	abandoned water system cap

Name	Color	Linetype	Description
IN_A_WS_DST_CROSS	166	Continuous	abandoned water system cross
IN_A_WS_DST_PIPE	166	UND_WM	abandoned water system pipe
IN_A_WS_DST_REDUCER	166	Continuous	abandoned water system reducer
IN_A_WS_DST_STRC	166	Continuous	abandoned water system structure
IN_A_WS_DST_TEE	166	Continuous	abandoned water system tee
IN_A_WS_DST_VALVE	166	Continuous	abandoned water system valve
IN_A_WS_DST_VALVECHAMBER	166	Continuous	abandoned water system valve chamber
IN_A_WS_H	252	Continuous	abandoned water system hatch
IN_A_WS_L	white	Continuous	abandoned water system label
IN_A_WS_SER_CURBSTOP	156	Continuous	abandoned water system service curb stop
IN_A_WS_SER_LATERAL	156	UND_WM_LAT	abandoned water system service lateral
IN_A_WS_TRN_PIPE	146	UND_WM	abandoned water system transmission pipe
IN_A_WS_TRN_VALVE	146	Continuous	abandoned water system transmission valve
IN_A_WW_COM_MH	76	Continuous	abandoned waste water system combined maintenance hole
IN_A_WW_COM_PIPE	76	UND_SAN	abandoned waste water system combined pipe
IN_A_WW_COM_PLUG	76	Continuous	abandoned waste water system combined plug
IN_A_WW_H	252	Continuous	abandoned SAN hatch
IN_A_WW_L	white	Continuous	abandoned SAN label
IN_A_WW_MSC_MH	96	Continuous	abandoned waste water system miscellaneous maintenance hole
IN_A_WW_SER_CLEANOUT	96	Continuous	abandoned waste water system service cleanout
IN_A_WW_SER_LATERAL	96	UND_SAN_LAT	abandoned waste water system service lateral
IN_A_WW_SER_LEACHATEPIPE	96	UND_SAN	abandoned waste water system service leachate pipe
IN_A_WW_SEW_CAP	96	Continuous	abandoned SAN cap
IN_A_WW_SEW_FORCEMAIN	96	UND_SAN	abandoned SAN forcemain
IN_A_WW_SEW_FORCEMAINVC	96	Continuous	abandoned SAN forcemain valve chamber
IN_A_WW_SEW_MH	96	Continuous	abandoned SAN maintenance hole
IN_A_WW_SEW_PIPE	96	UND_SAN	abandoned SAN pipe
IN_A_WW_SEW_PLUG	96	Continuous	abandoned SAN plug
IN_A_WW_SEW_STRC	96	Continuous	abandoned SAN structure
IN_A_WW_SEW_VALVE	96	Continuous	abandoned SAN valve
IN_A_WW_SEW_VALVECHAMBER	96	Continuous	abandoned SAN valve chamber

C.2.2 Existing

Name	Color	Linetype	Description
IN_E_DS_BND_DRAINAGEAREA	blue	DASH1	existing drainage system drainage area boundary
IN_E_DS_BND_L	white	Continuous	existing drainage system drainage area boundary label
IN_E_DS_DDS_CHANNEL	37	CL3	existing drainage system channel
IN_E_DS_DDS_CULVERT	37	UND_CULVERT	existing drainage system culvert
IN_E_DS_DDS_CULVERTCLAY	37	UND_CULVERT	existing drainage system clay culvert
IN_E_DS_DDS_CULVERTCONC	37	UND_CULVERT	existing drainage system concrete culvert
IN_E_DS_DDS_CULVERTCSP	37	UND_CULVERT	existing drainage system CSP culvert
IN_E_DS_DDS_CULVERTPE	37	UND_CULVERT	existing drainage system PE culvert
IN_E_DS_DDS_CULVERTPVC	37	UND_CULVERT	existing drainage system PVC culvert
IN_E_DS_DDS_DAM	37	CL3	existing drainage system dam
IN_E_DS_DDS_DITCH	37	DITCH	existing drainage system ditch
IN_E_DS_DDS_DITCHBOT	37	DITCH	existing drainage system ditch bottom
IN_E_DS_DDS_DITCHTOP	37	CUT	existing drainage system ditch top
IN_E_DS_DDS_DRAIN	37	DRAIN	existing drainage system drain
IN_E_DS_DDS_HEADWALL	37	Continuous	existing drainage system headwall
IN_E_DS_DDS_PIPE	37	UND_STM	existing drainage system pipe
IN_E_DS_DDS_POND	37	Continuous	existing drainage system pond
IN_E_DS_DDS_RIPRAP	37	Continuous	existing drainage system riprap
IN_E_DS_DDS_STMDEVICE	37	Continuous	existing drainage system storm device
IN_E_DS_DDS_SWALE	37	CL3	existing drainage system swale
IN_E_DS_H	252	Continuous	existing drainage system hatch
IN_E_DS_L	35	Continuous	existing drainage system label
IN_E_DS_MSC_MH	37	Continuous	existing drainage system miscellaneous maintenance hole
IN_E_DS_SER_CLEANOUT	37	Continuous	existing STM service cleanout
IN_E_DS_SER_LATERAL	37	UND_STM_LAT	existing STM service lateral
IN_E_DS_SEW_CB	37	Continuous	existing STM catchbasin
IN_E_DS_SEW_CBLEAD	37	UND_STM_LAT	existing STM catchbasin lead
IN_E_DS_SEW_CURBSTOP	37	Continuous	existing STM curbstop
IN_E_DS_SEW_DCB	37	Continuous	existing STM double catchbasin
IN_E_DS_SEW_DICB	37	Continuous	existing STM double inlet catchbasin
IN_E_DS_SEW_MH	37	Continuous	existing STM maintenance hole
IN_E_DS_SEW_PIPE	37	UND_STM	existing STM pipe
IN_E_DS_SEW_PIPE_SD	37	UND_STM	existing STM Subdrain pipe

Name	Color	Linetype	Description
IN_E_DS_SEW_PLUG	37	Continuous	existing STM plug
IN_E_DS_SEW_STRC	37	Continuous	existing STM structure
IN_E_RS_DWY_ASPH	17	GR-DRIVE	existing road system asphalt driveway
IN_E_RS_DWY_CONC	17	GR-DRIVE	existing road system concrete driveway
IN_E_RS_DWY_CONCRETESTAMPED	17	GR-DRIVE	existing road system concrete stamped driveway
IN_E_RS_DWY_DRIVEWAY	17	GR-DRIVE	existing road system driveway
IN_E_RS_DWY_FLAGSTONE	17	GR-DRIVE	existing road system flag stone driveway
IN_E_RS_DWY_GRAV	17	GR-DRIVE	existing road system gravel driveway
IN_E_RS_DWY_INTERLOCKINGBRICK	17	GR-DRIVE	existing road system interlocking brick
IN_E_RS_DWY_PAVER	17	GR-DRIVE	existing road system driveway paver
IN_E_RS_FNC_GATE	17	Continuous	existing road system fence gate
IN_E_RS_FNC_HANDRAIL	17	HANDRAIL	existing road system handrail fence
IN_E_RS_GEO_ALIGN	16	ROAD_CL	existing road system alignment
IN_E_RS_GEO_ALIGN_L	white	Continuous	existing road system alignment label
IN_E_RS_GEO_LINE-EXTN	17	TYPDASH	existing road system PVI extension lines
IN_E_RS_GND_ASPH	17	Continuous	existing road system ground asphalt
IN_E_RS_GND_BRICK	17	Continuous	existing road system ground brick
IN_E_RS_GND_CLAY	17	Continuous	existing road system ground clay
IN_E_RS_GND_CONC	17	Continuous	existing road system ground concrete
IN_E_RS_GND_GRAN	17	Continuous	existing road system ground granular
IN_E_RS_GND_GRASS	17	Continuous	existing road system ground grass
IN_E_RS_GND_GRAVEL	17	Continuous	existing road system ground gravel
IN_E_RS_GND_PAVER	17	Continuous	existing road system ground paver
IN_E_RS_GND_REFLECTOR	17	Continuous	existing road system road reflector
IN_E_RS_GND_RETWALLWOOD	17	Continuous	existing road system wood retaining wall
IN_E_RS_GND_RIPRAP	17	Continuous	existing road system ground riprap
IN_E_RS_GND_STONE	17	Continuous	existing road system ground stone
IN_E_RS_GND_WOODCHIPS	17	Continuous	existing road system ground woodchips
IN_E_RS_H	252	Continuous	existing road system hatch
IN_E_RS_L	white	Continuous	existing road system label
IN_E_RS_MSC_CONCRETE	17	Continuous	existing road system miscellaneous concrete
IN_E_RS_MSC_CONCRETEPAD	17	Continuous	existing road system miscellaneous concrete pad

Name	Color	Linetype	Description
IN_E_RS_MSC_RAMP	17	Continuous	existing road system miscellaneous ramp
IN_E_RS_PRK_PARKINGLOT	17	Continuous	existing road system parking lot
IN_E_RS_RDY_CENTRELINE	17	ROAD_CL	existing road system centerline
IN_E_RS_RDY_CROWN	17	TYPDASH	existing road system crown
IN_E_RS_RDY_CURB	17	Continuous	existing road system curb
IN_E_RS_RDY_CURBDROP	17	Continuous	existing road system curbdrop
IN_E_RS_RDY_GUTTERASPH	17	Continuous	existing road system asphalt gutter
IN_E_RS_RDY_GUTTERCONC	17	Continuous	existing road system concrete gutter
IN_E_RS_RDY_HUMP	17	DASH2	existing road system speed hump
IN_E_RS_RDY_MEDIAN	17	Continuous	existing road system median
IN_E_RS_RDY_ROADEDGEASPH	17	GR-ROAD	existing road system paved road edge
IN_E_RS_RDY_ROADEDGECONC	17	GR-ROAD	existing road system concrete road edge
IN_E_RS_RDY_ROADEDGEGRAN	17	GR-ROAD	existing road system granular road edge
IN_E_RS_RDY_SAWCUT	17	DASH2	existing road system sawcut
IN_E_RS_RDY_SHDASPH	17	GR_SHLDR	existing road system asphalt shoulder
IN_E_RS_RDY_SHDCONC	17	GR_SHLDR	existing road system concrete shoulder
IN_E_RS_RDY_SHDGRAN	17	GR_SHLDR	existing road system granular shoulder
IN_E_RS_RDY_SHOULDER	17	GR_SHLDR	existing road system shoulder
IN_E_RS_RDY_TWS	17	Continuous	existing tactile walking surface
IN_E_RS_STR_BRIDGE	17	Continuous	existing road system bridge
IN_E_RS_STR_GUIDERAIL	17	GUIDERAIL	existing road system guiderail
IN_E_RS_STR_GUIDERAILSTEEL	17	GUIDERAIL	existing road system steel guiderail
IN_E_RS_STR_GUIDERAILWIRE	17	GUIDERAIL	existing road system wire guiderail
IN_E_RS_STR_JERSBARRIER	17	GUIDERAIL	existing road system jersey barrier
IN_E_RS_SWK_SIDEWALK	17	SIDEWALK	existing road system sidewalk
IN_E_RS_SWK_STEELGRATE	17	Continuous	existing road system steel grate sidewalk
IN_E_TS_AER_ARMS	117	AERIAL_TRAF	existing traffic system aerial arm
IN_E_TS_AER_HEAD	117	AERIAL_TRAF	existing traffic system aerial head
IN_E_TS_AER_POWER	117	AERIAL_TRAF	existing traffic system aerial power
IN_E_TS_AER_WIRE	117	AERIAL_BELL	existing traffic system aerial wire
IN_E_TS_GND_CONTROLLER	125	Continuous	existing traffic system ground controller
IN_E_TS_GND_GUYWIRE	125	Continuous	existing traffic system ground guy wire
IN_E_TS_GND_JUNCTIONBOX	125	Continuous	existing traffic system ground junction box

Name	Color	Linetype	Description
IN_E_TS_GND_LOOPS	125	Continuous	existing traffic system ground loops
IN_E_TS_GND_MH	125	Continuous	existing traffic system ground maintenance hole
IN_E_TS_GND_MSC	125	Continuous	existing traffic system ground miscellaneous
IN_E_TS_GND_POLE	125	Continuous	existing traffic system ground pole
IN_E_TS_L	white	Continuous	existing traffic system label
IN_E_TS_MSC_PARKINGMACHINE	125	Continuous	existing traffic system parking machine
IN_E_TS_MSC_PARKINGMETRE	125	Continuous	existing traffic system parking meter
IN_E_TS_PMK_PMARKS	124	Continuous	existing traffic system pavement marking
IN_E_TS_PMK_SYMBOLS	124	Continuous	existing traffic system pavement marking
IN_E_TS_SGN_INFORMATION	125	Continuous	existing traffic system information sign
IN_E_TS_SGN_REGULATORY	125	Continuous	existing traffic system regulatory sign
IN_E_TS_SGN_SIGN	125	Continuous	existing traffic system signs
IN_E_TS_SGN_SIGNUNIDENTIFIED	125	Continuous	existing traffic system unidentified sign
IN_E_TS_SGN_WARNING	125	Continuous	existing traffic system warning sign
IN_E_TS_UND_CABLE	116	UND_TRAF	existing traffic system underground cable
IN_E_TS_UND_CONDUIT	116	UND_TS_CONDUIT100	existing traffic system underground conduit
IN_E_WS_BND_HYDCOVERAGE	167	DASH1	existing water system hydrant coverage boundary
IN_E_WS_BND_SUPPLYAREA	167	Continuous	existing water system supply area boundary
IN_E_WS_DST_BEND	167	Continuous	existing water system bend
IN_E_WS_DST_CAP	167	Continuous	existing water system cap
IN_E_WS_DST_CROSS	167	Continuous	existing water system cross
IN_E_WS_DST_CURBSTOP	167	Continuous	existing water system curbstop
IN_E_WS_DST_HEAD	167	Continuous	existing water system head
IN_E_WS_DST_HYDRANT	167	Continuous	existing water system hydrant
IN_E_WS_DST_HYDRANTVALVE	167	Continuous	existing water system hydrant valve
IN_E_WS_DST_INSULATION	167	Continuous	existing water system insulation
IN_E_WS_DST_METRE	167	Continuous	existing water system meter
IN_E_WS_DST_METRECHAMBER	167	Continuous	existing water system meter chamber
IN_E_WS_DST_PIPE	167	UND_WM	existing water system pipe
IN_E_WS_DST_REDUCER	167	Continuous	existing water system reducer
IN_E_WS_DST_SPRINKLER	167	Continuous	existing water system sprinkler
IN_E_WS_DST_STRC	167	Continuous	existing water system structure
IN_E_WS_DST_TEE	167	Continuous	existing water system tee

Name	Color	Linetype	Description
IN_E_WS_DST_TOWER	167	Continuous	existing water system tower
IN_E_WS_DST_VALVE	167	Continuous	existing water system valve
IN_E_WS_DST_VALVEBOX	167	Continuous	existing water system valve box
IN_E_WS_DST_VALVECHAMBER	167	Continuous	existing water system valve chamber
IN_E_WS_DST_WELL	167	Continuous	existing water system well
IN_E_WS_H	252	Continuous	existing water system hatch
IN_E_WS_L	165	Continuous	existing water system label
IN_E_WS_SER_CURBSTOP	157	Continuous	existing water system service curbstop
IN_E_WS_SER_HYDRANTLEAD	157	UND_WM_LAT	existing water system service hydrantlead
IN_E_WS_SER_LATERAL	157	UND_WM_LAT	existing water system service lateral
IN_E_WS_TRN_PIPE	147	UND_WM	existing water system transmission pipe
IN_E_WS_TRN_VALVE	147	Continuous	existing water system transmission valve
IN_E_WW_BND_DRAINAGEAREA	95	Continuous	existing waste water system drainage area boundary
IN_E_WW_BND_L	white	Continuous	existing waste water system boundary label
IN_E_WW_BND_SEPTICFIELD	95	DASH1	existing waste water system septic field boundary
IN_E_WW_COM_MH	77	Continuous	existing waste water system combined maintenance hole
IN_E_WW_COM_PIPE	77	UND_SAN	existing waste water system combined pipe
IN_E_WW_COM_PLUG	77	Continuous	existing waste water system combined plug
IN_E_WW_COM_STRC	77	Continuous	existing waste water system combined structure
IN_E_WW_H	252	Continuous	existing waste water system hatch
IN_E_WW_L	95	Continuous	existing waste water system label
IN_E_WW_MSC_MH	97	Continuous	existing waste water system miscellaneous maintenance hole
IN_E_WW_SER_CLEANOUT	97	Continuous	existing waste water system service cleanout
IN_E_WW_SER_LATERAL	97	UND_SAN_LAT	existing waste water system service lateral
IN_E_WW_SEW_CAP	97	Continuous	existing SAN cap
IN_E_WW_SEW_FORCEMAIN	97	UND_SAN	existing SAN forcemain
IN_E_WW_SEW_FORCEMAINVC	97	Continuous	existing SAN forcemain valve chamber
IN_E_WW_SEW_MH	97	Continuous	existing SAN maintenance hole
IN_E_WW_SEW_PIPE	97	UND_SAN	existing SAN pipe
IN_E_WW_SEW_PLUG	97	Continuous	existing SAN plug
IN_E_WW_SEW_STRC	97	Continuous	existing SAN structure
IN_E_WW_SEW_VALVE	97	Continuous	existing SAN valve

C.2.3 Proposed

Name	Color	Linetype	Description
IN_P_DS_BND_DRAINAGEAREA	blue	DASH1	proposed drainage system drainage area boundary
IN_P_DS_BND_L	white	Continuous	proposed drainage area boundary label
IN_P_DS_DDS_CHANNEL	23	CL3	proposed drainage system channel
IN_P_DS_DDS_CULVERT	22	UND_CULVERT	proposed drainage system culvert
IN_P_DS_DDS_CULVERTCLAY	22	UND_CULVERT	proposed drainage system clay culvert
IN_P_DS_DDS_CULVERTCONC	22	UND_CULVERT	proposed drainage system concrete culvert
IN_P_DS_DDS_CULVERTCSP	22	UND_CULVERT	proposed drainage system CSP culvert
IN_P_DS_DDS_CULVERTPVC	22	UND_CULVERT	proposed drainage system PVC culvert
IN_P_DS_DDS_DAM	23	CL3	proposed drainage system dam
IN_P_DS_DDS_DITCH	21	DITCH	proposed drainage system ditch
IN_P_DS_DDS_DITCHBOT	23	DITCH	proposed drainage system ditch bottom
IN_P_DS_DDS_DITCHTOP	23	Continuous	proposed drainage system ditch top
IN_P_DS_DDS_DRAIN	21	DRAIN	proposed drainage system drain
IN_P_DS_DDS_HEADWALL	23	Continuous	proposed drainage system headwall
IN_P_DS_DDS_PIPE	21	UND_STM_PR	proposed drainage system pipe
IN_P_DS_DDS_POND	23	Continuous	proposed drainage system pond
IN_P_DS_DDS_RIPRAP	23	Continuous	proposed drainage system riprap
IN_P_DS_DDS_STMDEVICE	23	Continuous	proposed drainage system STM device
IN_P_DS_DDS_SWALE	23	CL3	proposed drainage system swale
IN_P_DS_H	250	Continuous	proposed drainage system hatch
IN_P_DS_L	white	Continuous	proposed drainage system label
IN_P_DS_MSC_MH	23	Continuous	proposed drainage system miscellaneous maintenance hole
IN_P_DS_MSC_OVRLND_ARROW	white	Continuous	proposed overland flow arrow
IN_P_DS_SER_CLEANOUT	33	Continuous	proposed STM service cleanout
IN_P_DS_SER_LATERAL	32	UND_STM_LAT	proposed STM service lateral
IN_P_DS_SEW_CB	33	Continuous	proposed STM catchbasin
IN_P_DS_SEW_CBLEAD	32	UND_STM_LAT	proposed STM catchbasin lead
IN_P_DS_SEW_CURBSTOP	33	Continuous	proposed STM curbstop
IN_P_DS_SEW_L	white	Continuous	proposed STM label
IN_P_DS_SEW_MH	33	Continuous	proposed STM maintenance hole
IN_P_DS_SEW_PIPE	31	UND_STM_PR	proposed STM pipe
IN_P_DS_SEW_PLUG	33	Continuous	proposed STM plug

Name	Color	Linetype	Description
IN_P_DS_SEW_STRC	33	Continuous	proposed STM structure
IN_P_RS_DWY_DRIVEWAYASPH	12	Continuous	proposed road system asphalt driveway
IN_P_RS_DWY_DRIVEWAYCONC	12	Continuous	proposed road system concrete driveway
IN_P_RS_DWY_DRIVEWAYGRAN	12	Continuous	proposed road system granular driveway
IN_P_RS_FNC_GATE	12	Continuous	proposed road system fence gate
IN_P_RS_FNC_HANDRAIL	12	HANDRAIL_PR	proposed road system handrail fence
IN_P_RS_GEO_ALIGN	14	ROAD_CL	proposed road system alignment
IN_P_RS_GEO_ALIGN_L	white	Continuous	proposed road system alignment label
IN_P_RS_GEO_CORR	13	Continuous	proposed road system corridor geometry
IN_P_RS_GEO_CORR_BNDY	yellow	Continuous	proposed road system corridor boundary no plot
IN_P_RS_GEO_LINE-EXTN	15	TYPDASH	proposed road system curve tangents
IN_P_RS_GEO_SAMPLINE	white	Continuous	proposed road system sample line
IN_P_RS_GND_ASPH	13	Continuous	proposed road system ground asphalt
IN_P_RS_GND_BRICK	13	Continuous	proposed road system ground brick
IN_P_RS_GND_CLAY	13	Continuous	proposed road system ground clay
IN_P_RS_GND_CONC	13	Continuous	proposed road system ground concrete
IN_P_RS_GND_GRAN	13	Continuous	proposed road system ground granular
IN_P_RS_GND_GRASS	13	Continuous	proposed road system ground grass
IN_P_RS_GND_GRAVEL	13	Continuous	proposed road system ground gravel
IN_P_RS_GND_PAVER	13	Continuous	proposed road system ground paver
IN_P_RS_GND_REFLECTOR	13	Continuous	proposed road system ground road reflector
IN_P_RS_GND_RETWALLWOOD	13	Continuous	proposed road system ground wood retaining wall
IN_P_RS_GND_RIPRAP	13	Continuous	proposed road system ground riprap
IN_P_RS_GND_STONE	13	Continuous	proposed road system ground stone
IN_P_RS_GND_WOODCHIPS	13	Continuous	proposed road system ground woodchips
IN_P_RS_H	250	Continuous	proposed road system hatch
IN_P_RS_L	white	Continuous	proposed road system label
IN_P_RS_MSC_CONCRETE	12	Continuous	proposed road system miscellaneous concrete
IN_P_RS_MSC_CONCRETEPAD	12	Continuous	proposed road system miscellaneous concrete pad

Name	Color	Linetype	Description
IN_P_RS_MSC_RAMP	13	Continuous	proposed road system miscellaneous ramp
IN_P_RS_PRK_PARKINGLOT	12	Continuous	proposed road system parking lot
IN_P_RS_RDY_ASPHALT	12	Continuous	proposed road system asphalt
IN_P_RS_RDY_CENTRELINE	14	ROAD_CL	proposed road system centreline
IN_P_RS_RDY_CORR_ASPHALT	12	Continuous	proposed road system asphalt (corridor links)
IN_P_RS_RDY_CORR_ASSM	13	Continuous	proposed road system C3D assembly
IN_P_RS_RDY_CORR_BASE	13	Continuous	proposed road system base (corridor links)
IN_P_RS_RDY_CORR_CROWN	11	TYPDASH	proposed road system crown
IN_P_RS_RDY_CORR_GRAN	11	GR_SHLDR	proposed road system granular (corridor links)
IN_P_RS_RDY_CROWN	11	TYPDASH	proposed road system crown
IN_P_RS_RDY_CURB	12	Continuous	proposed road system curb
IN_P_RS_RDY_CURBDROP	17	Continuous	proposed road system curb drop
IN_P_RS_RDY_GUTTER	16	Continuous	proposed road system gutter
IN_P_RS_RDY_HUMP	12	DASHED_PR	proposed road system speed hump
IN_P_RS_RDY_MEDIAN	13	Continuous	proposed road system median
IN_P_RS_RDY_MILL	12	Continuous	proposed road system milling
IN_P_RS_RDY_RESURF	12	Continuous	proposed road system resurface
IN_P_RS_RDY_ROADEDGE	11	GR-ROAD	proposed road system road edge
IN_P_RS_RDY_SAWCUT	11	DASH2	proposed road system sawcut
IN_P_RS_RDY_SHOULDERGRAN	11	GR_SHLDR	proposed road system granular shoulder
IN_P_RS_RDY_SHOULDERPAVE	11	GR_SHLDR	proposed road system paved shoulder
IN_P_RS_RDY_TWS	13	Continuous	proposed tactile walking surface
IN_P_RS_REF_CONSTLIMIT	10	Continuous	proposed road system construction limits reference
IN_P_RS_REF_LIMITCLEARGRUB	10	Continuous	proposed road system grub clearance limit reference
IN_P_RS_STR_BRIDGE	12	Continuous	proposed road system bridge
IN_P_RS_STR_GUIDERAIL	12	GUIDERAIL_PR	proposed road system guiderail
IN_P_RS_STR_JERSBARRIER	12	GUIDERAIL_PR	proposed road system jersey barrier
IN_P_RS_SWK_SIDEWALK	11	SIDEWALK_PR	proposed road system sidewalk
IN_P_TS_L	white	Continuous	proposed traffic system label
IN_P_TS_MSC	114	Continuous	proposed traffic system miscellaneous
IN_P_TS_PMK_MARKINGS	121	PMK3	proposed traffic system pavement markings/symbols/lines
IN_P_TS_SIGN	122	Continuous	proposed traffic system information sign

Name	Color	Linetype	Description
IN_P_TS_UND	113	UND_TRAF_PR	proposed traffic system undergrounds
IN_P_WS_BND_HYDCOVERAGE	163	DASH1	proposed water system hydrant coverage area boundary
IN_P_WS_BND_SUPPLYAREA	163	Continuous	proposed water system supply area boundary
IN_P_WS_DST_BEND	163	Continuous	proposed water system bend
IN_P_WS_DST_BLOWOFF	163	Continuous	proposed water system blowoff
IN_P_WS_DST_CAP	163	Continuous	proposed water system cap
IN_P_WS_DST_CROSS	163	Continuous	proposed water system cross
IN_P_WS_DST_CURBSTOP	163	Continuous	proposed water system curbstop
IN_P_WS_DST_HYDRANT	163	Continuous	proposed water system hydrant
IN_P_WS_DST_HYDRANTVALVE	163	Continuous	proposed water system hydrant valve
IN_P_WS_DST_INSULATION	163	Continuous	proposed water system insulation
IN_P_WS_DST_METRE	163	Continuous	proposed water system meter
IN_P_WS_DST_METRECHAMBER	163	Continuous	proposed water system meter chamber
IN_P_WS_DST_PIPE	161	UND_WM_PR	proposed water system pipe
IN_P_WS_DST_REDUCER	163	Continuous	proposed water system reducer
IN_P_WS_DST_STRC	163	Continuous	proposed water system structure
IN_P_WS_DST_TEE	163	Continuous	proposed water system tee
IN_P_WS_DST_VALVE	163	Continuous	proposed water system valve
IN_P_WS_DST_VALVEBOX	163	Continuous	proposed water system valve box
IN_P_WS_DST_VALVECHAMBER	163	Continuous	proposed water system valve chamber
IN_P_WS_DST_WATERDEVICE	163	Continuous	proposed water system device
IN_P_WS_DST_WELL	163	Continuous	proposed water system well
IN_P_WS_H	250	Continuous	proposed water system hatch
IN_P_WS_L	white	Continuous	proposed water system label
IN_P_WS_SER_CURBSTOP	153	Continuous	proposed water system service curbstop
IN_P_WS_SER_HYDRANTLEAD	152	UND_WM_LAT	proposed water system service hydrant lead
IN_P_WS_SER_LATERAL	152	UND_WM_LAT	proposed water system service lateral
IN_P_WS_TRN_PIPE	151	UND_WM_PR	proposed water system transmission pipe
IN_P_WS_TRN_VALVE	153	Continuous	proposed water system transmission valve
IN_P_WW_BND_DRAINAGEAREA	red	DASH1	proposed waste water system drainage area boundary
IN_P_WW_BND_L	white	Continuous	proposed waste water system boundary label
IN_P_WW_BND_SEPTICFIELD	red	DASH1	proposed waste water system septic field boundary

Name	Color	Linetype	Description
IN_P_WW_H	250	Continuous	proposed waste water system hatch
IN_P_WW_L	white	Continuous	proposed waste water system label
IN_P_WW_MSC_MH	83	Continuous	proposed waste water system miscellaneous maintenance hole
IN_P_WW_SER_CLEANOUT	83	Continuous	proposed waste water system service cleanout
IN_P_WW_SER_LATERAL	82	UND_SAN_LAT	proposed waste water system service lateral
IN_P_WW_SER_LEACHATEPIPE	83	UND_SAN_PR	proposed waste water system service leachate pipe
IN_P_WW_SEW_CAP	83	Continuous	proposed SAN cap
IN_P_WW_SEW_FORCEMAIN	81	UND_SAN_PR	proposed SAN forcemain
IN_P_WW_SEW_FORCEMAINVC	83	Continuous	proposed SAN forcemain valve chamber
IN_P_WW_SEW_MH	83	Continuous	proposed SAN maintenance hole
IN_P_WW_SEW_PIPE	81	UND_SAN_PR	proposed SAN pipe
IN_P_WW_SEW_PLUG	83	Continuous	proposed SAN plug
IN_P_WW_SEW_STRC	83	Continuous	proposed SAN structure
IN_P_WW_SEW_VALVE	83	Continuous	proposed SAN valve

C.3 LAND BASE

C.3.1 Existing

Name	Color	Linetype	Description
LB_E_GL_MSC_BOREHOLE	magenta	Continuous	existing geotechnical borehole
LB_E_GL_MSC_OBSERVWELL	magenta	Continuous	existing geotechnical observation well
LB_E_GL_TST_TESTHOLE	magenta	Continuous	existing geotechnical test hole
LB_E_IM_AER_PHOTO	white	Continuous	existing aerial image
LB_E_NF_ETH_BOULDER	45	Continuous	existing boulder
LB_E_NF_H	252	Continuous	existing land base natural feature hatch
LB_E_NF_L	white	Continuous	existing land base natural feature label
LB_E_NF_VEG_BUSHLINE	76	TREELINE	existing bushline
LB_E_NF_VEG_DRIPLINE	76	Continuous	existing tree dripline
LB_E_NF_VEG_SHRUBCONIF	76	Continuous	existing coniferous shrub
LB_E_NF_VEG_SHRUBDECID	76	Continuous	existing deciduous shrub
LB_E_NF_VEG_SOD	76	Continuous	existing sod
LB_E_NF_VEG_STUMP	76	Continuous	existing tree stump
LB_E_NF_VEG_TREE	76	Continuous	existing tree
LB_E_NF_VEG_TREECONIF	76	Continuous	existing coniferous tree

Name	Color	Linetype	Description
LB_E_NF_VEG_TREEDECID	76	Continuous	existing deciduous tree
LB_E_NF_WAT_CREEK	134	Continuous	existing creek
LB_E_NF_WAT_FALLS	134	Continuous	existing falls
LB_E_NF_WAT_LAGOON	134	Continuous	existing lagoon
LB_E_NF_WAT_LAKE	134	Continuous	existing lake
LB_E_NF_WAT_MARSH	134	Continuous	existing marsh
LB_E_NF_WAT_POND	134	Continuous	existing pond
LB_E_NF_WAT_RIVER	134	Continuous	existing river
LB_E_NF_WAT_SPRING	134	Continuous	existing spring
LB_E_NF_WAT_STREAM	134	Continuous	existing stream
LB_E_NF_WAT_SWAMP	134	DASH2	existing swamp
LB_E_SV_BND_BLDSITE	64	Continuous	existing surveyed building side boundary
LB_E_SV_BND_CTCHMT	64	Continuous	existing surveyed catchment boundary
LB_E_SV_BND_EASEMENT	64	EASEMENT	existing surveyed easements boundary
LB_E_SV_BND_GEOTOWNSHIP	64	Continuous	existing surveyed geotownship boundary
LB_E_SV_BND_LOTS	64	Continuous	existing surveyed lot boundary
LB_E_SV_BND_OPENSPACE	64	Continuous	existing surveyed open space boundary
LB_E_SV_BND_PARCEL	64	Continuous	existing surveyed parcel boundary
LB_E_SV_BND_PROPERTY	64	Continuous	existing surveyed property boundary
LB_E_SV_BND_SUBDIVISION	64	HIDDEN	existing surveyed subdivision boundary
LB_E_SV_CNT_CONTROLPNT	66	Continuous	existing surveyed control point
LB_E_SV_CNT_CUTCROSS	66	Continuous	existing surveyed cut cross
LB_E_SV_CNT_HORIZONTAL	66	Continuous	existing surveyed horizontal control
LB_E_SV_CNT_HORZVERT	66	Continuous	existing surveyed horizontal and vertical control
LB_E_SV_CNT_MONUMENT	66	Continuous	existing surveyed control monument
LB_E_SV_CNT_NAIL	66	Continuous	existing surveyed nail
LB_E_SV_CNT_PI	66	Continuous	existing surveyed point of intersection
LB_E_SV_CNT_STAKE	66	Continuous	existing surveyed stake
LB_E_SV_CNT_VERTICAL	66	Continuous	existing surveyed vertical control
LB_E_SV_MON_BAR	66	Continuous	existing surveyed monument bar
LB_E_SV_MON_MONUMENT	white	Continuous	existing surveyed monument
LB_E_SV_REF_PNT	67	Continuous	existing surveyed reference point
LB_E_SV_REF_PNT_CONTROL	67	Continuous	existing surveyed reference control point
LB_E_SV_REF_PNT_CONTROL-	67	Continuous	existing Survey Control points:

Name	Color	Linetype	Description
LINE-DIRC			traverse lines
LB_E_SV_REF_PNT_CONTROL-LINE-NETW	67	Continuous	existing Survey Control points: traverse network
LB_E_SV_REF_PNT_CONTROL-LINE-SHOT	67	Continuous	existing Survey Control points: traverse sideshot
LB_E_SV_REF_PNT_CONTROL-TRAV-ERRO	67	Continuous	existing Survey Control points: traverse errors
LB_E_SV_REF_PNT_DTM	67	Continuous	existing surveyed reference TINN point
LB_E_TM_CNT_MAJR	46	Continuous	existing TIN major contours
LB_E_TM_CNT_MINR	47	Continuous	existing TIN minor contours
LB_E_TM_CNT_USER	43	Continuous	existing TIN user contours
LB_E_TM_FLT_BREAKLINE	47	Continuous	existing TIN breakline
LB_E_TM_GND_ELEV	46	GR-TYPOG	existing TIN ground elevation
LB_E_TM_GND_ELEV_GTAG	white	Continuous	existing TIN grade tag
LB_E_TM_GND_GRAD-CUT	16	GR-ROCK	existing cut
LB_E_TM_GND_GRAD-FILL	95	GR-EARTH	existing fill
LB_E_TM_GND_SLOPEBOTTOM	46	TYPDASH	existing TIN slope bottom
LB_E_TM_GND_SLOPETOP	46	CUT	existing TIN slope top
LB_E_TM_GND_TIN	45	GR-TYPOG	existing TIN
LB_E_TM_GND_TIN-BNDY	yellow	Continuous	existing TIN boundary no plot
LB_E_TM_GND_TIN_GRID	45	Continuous	existing TIN grid
LB_E_TM_GND_WSHD	45	Continuous	existing TIN watershed
LB_E_TM_PNT_TIN	45	Continuous	existing TIN point

C.3.2 Proposed

Name	Color	Linetype	Description
LB_P_GL_TST_TESTHOLE	magenta	Continuous	proposed geotechnical test hole
LB_P_NF_ETH_BOULDER	42	Continuous	proposed boulder
LB_P_NF_H	250	Continuous	proposed land base hatch
LB_P_NF_L	white	Continuous	proposed land base label
LB_P_NF_VEG_GRUBCLEAR	73	Continuous	proposed grub clearance
LB_P_NF_VEG_SHRUBCONIF	73	Continuous	proposed coniferous shrub
LB_P_NF_VEG_SHRUBDECID	73	Continuous	proposed deciduous shrub
LB_P_NF_VEG_SOD	73	Continuous	proposed sod
LB_P_NF_VEG_TREECONIF	73	Continuous	proposed coniferous tree
LB_P_NF_VEG_TREEDECID	73	Continuous	proposed deciduous tree
LB_P_NF_WAT_CREEK	132	Continuous	proposed creek
LB_P_NF_WAT_POND	132	Continuous	proposed pond
LB_P_SV_BND_LOTS	61	PROPERTY	proposed lot boundary survey

Name	Color	Linetype	Description
LB_P_SV_BND_OPENSPACE	red	Continuous	proposed open space boundary survey
LB_P_SV_BND_PARCEL	61	Continuous	proposed parcel boundary survey
LB_P_SV_BND_PROPERTY	61	Continuous	proposed property boundary survey
LB_P_SV_BND_SUBDIVISION	61	HIDDEN	proposed subdivision boundary survey
LB_P_TM_CNT_MAJR	45	Continuous	proposed TIN major contours
LB_P_TM_CNT_MINR	46	Continuous	proposed TIN minor contours
LB_P_TM_CNT_USER	43	Continuous	proposed TIN user contours
LB_P_TM_FLT_BREAKLINE	42	Continuous	proposed TIN breaklines
LB_P_TM_GND_ELEV	42	GR-TYPOG	proposed TIN ground elevation
LB_P_TM_GND_ELEV_GTAG	white	Continuous	proposed TIN grade tag
LB_P_TM_GND_GRAD-CUT	12	GR-ROCK	proposed cut
LB_P_TM_GND_GRAD-FILL	92	GR-EARTH	proposed fill
LB_P_TM_GND_SLOPEBOTTOM	42	TYPDASH	proposed TIN slope bottom
LB_P_TM_GND_SLOPETOP	42	Continuous	proposed TIN slope top
LB_P_TM_GND_TIN	42	GR-TYPOG	proposed TIN
LB_P_TM_GND_TIN-BNDY	yellow	Continuous	proposed TIN boundary no plot
LB_P_TM_GND_TIN_GRID	42	Continuous	proposed TIN model grid
LB_P_TM_GND_WSHD	42	Continuous	proposed TIN watershed
LB_P_TM_PNT_TIN	42	Continuous	proposed TIN point

C.4 LAND USE

C.4.1 Existing

Name	Color	Linetype	Description
LU_E_BS_BLD_ADDRESS_L	250	Continuous	existing building address label (annotative label template)
LU_E_BS_BLD_BUILDING	196	Continuous	existing building
LU_E_BS_BLD_COLUMN	196	Continuous	existing building column
LU_E_BS_BLD_PILLAR	196	Continuous	existing building pillar
LU_E_BS_BLD_PORCH	196	Continuous	existing porch
LU_E_BS_BLD_STAIRS	196	Continuous	existing stairs
LU_E_BS_BRG_BRIDGE	196	Continuous	existing bridge
LU_E_BS_BRG_BRIDGEABUT	196	Continuous	existing bridge abutment
LU_E_CM_GRV_BOUNDARY	196	Continuous	existing cemetery grave boundary
LU_E_CM_GRV_HEADSTONE	196	Continuous	existing cemetery grave headstone
LU_E_H	252	Continuous	existing land use hatch
LU_E_L	white	Continuous	existing land use label

Name	Color	Linetype	Description
LU_E_LF_FNC_FENCE	196	FENCE	existing fence
LU_E_LF_FNC_FENCECHAINLINK	196	FENCE	existing chainlink fence
LU_E_LF_FNC_FENCEMETAL	196	FENCE	existing metal fence
LU_E_LF_FNC_FENCEPOST	196	FENCE	existing fence post
LU_E_LF_FNC_FENCESTONE	196	FENCE	existing stone fence
LU_E_LF_FNC_FENCEWIRE	196	FENCE	existing wire fence
LU_E_LF_FNC_FENCEWOOD	196	FENCE	existing wood fence
LU_E_LF_FNC_GATE	196	Continuous	existing fence gate
LU_E_LF_MSC_AIRCOND	186	Continuous	existing air conditioner
LU_E_LF_MSC_ANTENNA	186	Continuous	existing antenna
LU_E_LF_MSC_BENCH	186	Continuous	existing bench
LU_E_LF_MSC_BOARDWARLK	186	Continuous	existing boardwalk
LU_E_LF_MSC_COLUMN	186	Continuous	existing column
LU_E_LF_MSC_DAM	186	Continuous	existing man-made dam
LU_E_LF_MSC_DOCK	186	Continuous	existing dock
LU_E_LF_MSC_FLAGPOLE	186	Continuous	existing flag pole
LU_E_LF_MSC_GARDEN	186	Continuous	existing garden
LU_E_LF_MSC_LAWN	186	Continuous	existing lawn
LU_E_LF_MSC_MAILBOX	186	Continuous	existing mailbox
LU_E_LF_MSC_ORCHARD	186	Continuous	existing orchard
LU_E_LF_MSC_PATH	186	Continuous	existing trail
LU_E_LF_MSC_PIERS	186	Continuous	existing piers
LU_E_LF_MSC_PILLAR	186	Continuous	existing pillar
LU_E_LF_MSC_PLANTER	186	Continuous	existing planter
LU_E_LF_MSC_PLAQUE	186	Continuous	existing plaque
LU_E_LF_MSC_POLE	186	Continuous	existing pole
LU_E_LF_MSC_POLEUNIDENTIFIED	186	Continuous	existing unidentified pole
LU_E_LF_MSC_POST	186	Continuous	existing post
LU_E_LF_MSC_PROPANETANK	186	Continuous	existing propane tank
LU_E_LF_MSC_RESERVOIR	186	Continuous	existing reservoir
LU_E_LF_MSC_SIGN	186	Continuous	existing sign
LU_E_LF_MSC_STATUE	186	Continuous	existing statue
LU_E_LF_MSC_STOCKPILE	186	Continuous	existing stock pile
LU_E_LF_MSC_TREEGRATE	186	Continuous	existing tree grate
LU_E_LF_MSC_TREEGUARD	186	Continuous	existing tree guard
LU_E_LF_MSC_VINEYARD	186	Continuous	existing vineyard
LU_E_LF_MSC_WASTERECEPTACLE	186	Continuous	existing waste receptacle
LU_E_LF_MSC_WELL	186	Continuous	existing well

Name	Color	Linetype	Description
LU_E_LF_MSC_WINDMILL	186	Continuous	existing windmill
LU_E_LF_WAL_GABIONWALL	196	Continuous	existing gabion wall
LU_E_LF_WAL_RETWALLBRICK	196	Continuous	existing brick retaining wall
LU_E_LF_WAL_RETWALLCONC	196	Continuous	existing concrete retaining wall
LU_E_LF_WAL_RETWALLWOOD	196	Continuous	existing wood retaining wall
LU_E_PK_MSC_BENCH	186	Continuous	existing park bench
LU_E_PK_MSC_BIKERACK	186	Continuous	existing park bike rack
LU_E_PK_MSC_PLAYEQUIP	186	Continuous	existing park play equipment
LU_E_PK_MSC_POOL	186	Continuous	existing park pool

C.4.2 Proposed

Name	Color	Linetype	Description
LU_P_BS_BLD_BUILDING	183	Continuous	proposed building
LU_P_BS_BRG_BRIDGE	182	Continuous	proposed bridge
LU_P_BS_BRG_BRIDGEABUT	182	Continuous	proposed bridge abutment
LU_P_CM_GRV_BOUNDARY	red	Continuous	proposed cemetery grave boundary
LU_P_CM_GRV_HEADSTONE	183	Continuous	proposed cemetery grave headstone
LU_P_H	250	Continuous	proposed land use hatch
LU_P_L	white	Continuous	proposed land use label
LU_P_LF_FNC_FENCE	184	FENCE	proposed fence
LU_P_LF_FNC_GATE	184	Continuous	proposed fence gate
LU_P_LF_MSC_BENCH	194	Continuous	proposed bench
LU_P_LF_MSC_COLUMN	194	Continuous	proposed column
LU_P_LF_MSC_DAM	194	Continuous	proposed man-made dam
LU_P_LF_MSC_DOCK	194	Continuous	proposed dock
LU_P_LF_MSC_FLAGPOLE	194	Continuous	proposed flag pole
LU_P_LF_MSC_GARDEN	194	Continuous	proposed garden
LU_P_LF_MSC_MAILBOX	194	Continuous	proposed mailbox
LU_P_LF_MSC_PATH	194	Continuous	proposed trail
LU_P_LF_MSC_PIER	194	Continuous	proposed pier
LU_P_LF_MSC_PLANTER	194	Continuous	proposed planter
LU_P_LF_MSC_PLAQUE	194	Continuous	proposed plaque
LU_P_LF_MSC_POLE	194	Continuous	proposed pole
LU_P_LF_MSC_SIGN	194	Continuous	proposed sign
LU_P_LF_MSC_STATUE	194	Continuous	proposed statue
LU_P_LF_MSC_TREEGRATE	194	Continuous	proposed tree grate
LU_P_LF_MSC_WELL	194	Continuous	proposed well

Name	Color	Linetype	Description
LU_P_LF_WAL_GABIONWALL	182	Continuous	proposed gabion wall
LU_P_LF_WAL_RETWALLBRICK	182	Continuous	proposed brick retaining wall
LU_P_LF_WAL_RETWALLCONC	182	Continuous	proposed concrete retaining wall
LU_P_LF_WAL_RETWALLWOOD	182	Continuous	proposed wood retaining wall
LU_P_PK_MSC_BENCH	194	Continuous	proposed park bench
LU_P_PK_MSC_BIKERACK	194	Continuous	proposed park bike rack
LU_P_PK_MSC_PLAYEQUIP	194	Continuous	proposed park play equipment
LU_P_PK_MSC_POOL	194	Continuous	proposed park pool

C.5 TRANSPORTATION

C.5.1 Existing

Name	Color	Linetype	Description
TR_E_RL_GND_SIGNALCONTROLBOX	216	Continuous	existing railway signal control box
TR_E_RL_GND_SWITCHBOX	216	Continuous	existing railway switch box
TR_E_RL_GND_WIGWAG	216	Continuous	existing railway wigwag
TR_E_RL_L	white	CL3	existing railway label
TR_E_RL_SGN_CROSSING	216	Continuous	existing railway crossing sign
TR_E_RL_SGN_FLASHGATE	216	Continuous	existing railway flashgate sign
TR_E_RL_SGN_FLASHLIGHT	216	Continuous	existing railway flashlight sign
TR_E_RL_TRK_CL	215	CL3	existing railway track centreline
TR_E_RL_TRK_RAIL	216	RAILROAD	existing railway track rail
TR_E_TN_SGN_BUSSTOPSIGN	206	Continuous	existing bus stop sign
TR_E_TN_STR_BUSSHELTER	206	Continuous	existing bus shelter

C.5.2 Proposed

Name	Color	Linetype	Description
TR_P_RL_FEATURE	203	Continuous	proposed railway feature
TR_P_RL_L	white	Continuous	proposed railway label
TR_P_TN_STR_BUSSHELTER	203	Continuous	proposed bus shelter
TR_P_RL_FEATURE	203	Continuous	proposed railway feature
TR_P_RL_L	white	Continuous	proposed railway label
TR_P_TN_STR_BUSSHELTER	203	Continuous	proposed bus shelter

C.6 UTILITIES

C.6.1 Abandoned

Name	Color	Linetype	Description
UT_A_BL_AER_WIRE	227	AERIAL_BELL	abandoned bell aerial wire
UT_A_BL_MSC	226	Continuous	abandoned bell miscellaneous
UT_A_BL_UND_CABLE	226	UND_BELL_CABLE	abandoned bell underground cable
UT_A_BL_UND_CONDUIT	226	UND_BELL_CONDUIT	abandoned bell underground conduit
UT_A_BN_AER_WIRE	227	AERIAL_BROADBAND	abandoned broadband aerial wire
UT_A_BN_MSC	227	Continuous	abandoned broadband miscellaneous
UT_A_CO_GND_TOWER	226	AERIAL_COMM	abandoned communication ground tower
UT_A_GS_MSC	236	Continuous	abandoned gas underground pipe
UT_A_GS_UND_PIPE	236	UND_GAS	abandoned gas underground pipe
UT_A_HY_AER_WIRE	247	AERIAL_HYDRO	abandoned hydro aerial wire
UT_A_HY_GND_JUNCTIONBOX	246	Continuous	abandoned hydro ground junction box
UT_A_HY_GND_MH	246	Continuous	abandoned hydro ground maintenance hole
UT_A_HY_GND_POLE	246	Continuous	abandoned hydro ground pole
UT_A_HY_GND_TRANSFORMER	246	Continuous	abandoned hydro ground transformer
UT_A_HY_GND_VAULT	246	Continuous	abandoned hydro ground vault
UT_A_HY_SER_CABLE	246	UND_HYDRO	abandoned hydro service cable
UT_A_HY_UND_CABLE	246	UND_HYDRO	abandoned hydro underground cable
UT_A_HY_UND_CONDUIT	246	UND_HYDRO_CONDUIT	abandoned hydro underground conduit
UT_A_HY_UND_VAULT	246	UND_HYDRO	abandoned hydro underground vault
UT_A_L	white	Continuous	abandoned utility label
UT_A_OL_MSC	236	Continuous	abandoned oil miscellaneous
UT_A_OL_UND_PIPE	236	UND_OIL	abandoned oil underground pipe
UT_A_TV_AER_WIRE	227	AERIAL_CATV	abandoned TV aerial wire
UT_A_TV_MSC	227	Continuous	abandoned TV miscellaneous
UT_A_TV_UND_CABLE	226	UND_CATV	abandoned TV underground cable
UT_A_TV_UND_CONDUIT	226	UND_CATV	abandoned TV underground conduit

C.6.2 Existing

Name	Color	Linetype	Description
UT_E_BL_AER_WIRE	227	AERIAL_BELL	existing bell aerial wire
UT_E_BL_GND_CABINET	227	Continuous	existing bell ground cabinet
UT_E_BL_GND_CONTROLBOX	227	Continuous	existing bell ground control box
UT_E_BL_GND_GUYPOLE	227	Continuous	existing bell ground guypole
UT_E_BL_GND_GUYWIRE	227	Continuous	existing bell ground guywire
UT_E_BL_GND_INSPECTPOST	227	Continuous	existing bell ground inspect post
UT_E_BL_GND_JUNCTIONBOX	227	Continuous	existing bell ground junction box
UT_E_BL_GND_MH	227	Continuous	existing bell ground maintenance hole
UT_E_BL_GND_PEDESTAL	227	Continuous	existing bell ground pedestal
UT_E_BL_GND_PNT	227	Continuous	existing bell ground marker
UT_E_BL_GND_POLE	227	Continuous	existing bell ground pole
UT_E_BL_GND_SWITCHBOX	227	Continuous	existing bell ground switch box
UT_E_BL_GND_TELEBOOTH	227	Continuous	existing bell ground telephone booth
UT_E_BL_SER_CABLE	227	UND_BELL	existing bell service cable
UT_E_BL_UND_CABLE	227	UND_BELL_CABLE	existing bell underground cable
UT_E_BL_UND_CONDUIT	227	UND_BELL_CONDUIT	existing bell underground conduit
UT_E_BL_UND_CONDUIT_BANK	227	UND_BELL_CONDUIT	existing bell underground conduit bank
UT_E_BL_UND_VAULT	227	UND_BELL_CABLE	existing bell underground vault
UT_E_BN_AER_WIRE	227	AERIAL_BROADBAND	existing broadband aerial wire
UT_E_BN_GND_CONNECTIOBOX	227	Continuous	existing broadband ground connection box
UT_E_BN_GND_JUNCTIONBOX	227	Continuous	existing broadband ground junction box
UT_E_BN_GND_MSC	227	Continuous	existing broadband ground miscellaneous
UT_E_BN_GND_POLE	227	Continuous	existing broadband ground pole
UT_E_BN_UND_CABLE	227	UND_BBND	existing broadband underground cable
UT_E_BN_UND_CONDUIT	227	UND_BBND	existing broadband underground conduit
UT_E_CO_GND_TOWER	227	AERIAL_COMM	existing communication ground tower
UT_E_GS_GND_GASVENT	237	Continuous	existing gas ground gas vent
UT_E_GS_GND_INSPECTPOST	237	Continuous	existing gas ground inspect post
UT_E_GS_GND_METRE	237	Continuous	existing gas ground meter
UT_E_GS_GND_MH	237	Continuous	existing gas ground maintenance hole
UT_E_GS_GND_PIPE	237	UND_GAS	existing gas ground pipe

Name	Color	Linetype	Description
UT_E_GS_GND_VALVE	237	Continuous	existing gas ground valve
UT_E_GS_SER_PIPE	237	UND_GAS	existing gas service pipe
UT_E_GS_UND_PIPE	237	UND_GAS	existing gas underground pipe
UT_E_HY_AER_WIRE	247	AERIAL_HYDRO	existing hydro aerial wire
UT_E_HY_GND_ANCHOR	247	Continuous	existing hydro ground anchor
UT_E_HY_GND_CONTROLLER	247	Continuous	existing hydro ground controller
UT_E_HY_GND_GROUNDROD	247	Continuous	existing hydro ground groundrod
UT_E_HY_GND_GUYPOLE	247	Continuous	existing hydro ground guy pole
UT_E_HY_GND_GUYWIRE	247	Continuous	existing hydro ground guywire
UT_E_HY_GND_INSPECTPOST	247	Continuous	existing hydro ground inspect post
UT_E_HY_GND_JUNCTIONBOX	247	Continuous	existing hydro ground junction box
UT_E_HY_GND_LIGHTSTANDARD	247	Continuous	existing hydro ground light standard
UT_E_HY_GND_MH	247	Continuous	existing hydro ground maintenance hole
UT_E_HY_GND_MSC	247	Continuous	existing hydro ground miscellaneous
UT_E_HY_GND_POLE	247	Continuous	existing hydro ground pole
UT_E_HY_GND_TOWER	247	Continuous	existing hydro ground tower
UT_E_HY_GND_TRANSFORMER	247	Continuous	existing hydro ground transformer
UT_E_HY_GND_VAULT	247	Continuous	existing hydro ground vault
UT_E_HY_SER_CABLE	247	UND_HYDRO	existing hydro service cable
UT_E_HY_UND_CABLE	247	UND_HYDRO	existing hydro underground cable
UT_E_HY_UND_CONDUIT	247	UND_HYDRO_CONDUIT	existing hydro underground conduit
UT_E_HY_UND_CONDUIT_BANK	247	UND_HYDRO_CONDUIT	existing hydro underground conduit bank
UT_E_HY_UND_LIGHTCABLE	247	UND_LIGHT	existing hydro underground light cable
UT_E_HY_UND_TRANSFORMER	247	UND_HYDRO	existing hydro underground transformer
UT_E_HY_UND_VAULT	247	UND_HYDRO	existing hydro underground vault
UT_E_L	white	Continuous	existing utility label
UT_E_OL_GND_FUELPUMP	237	Continuous	existing oil ground fuel pump
UT_E_OL_GND_FUELTANK	237	Continuous	existing oil ground fuel tank
UT_E_OL_GND_FUELVENT	237	Continuous	existing oil ground fuel vent
UT_E_OL_GND_OILTANK	237	Continuous	existing oil ground oil tank
UT_E_OL_GND_PROPANETANK	237	Continuous	existing oil ground propane tank
UT_E_OL_GND_TANKS	237	Continuous	existing oil ground tanks
UT_E_OL_GND_WELLSTRUCTURE	237	Continuous	existing oil ground well structure
UT_E_OL_UND_PIPE	237	UND_OIL	existing oil underground pipe
UT_E_TV_AER_WIRE	227	AERIAL_CATV	existing TV aerial wire

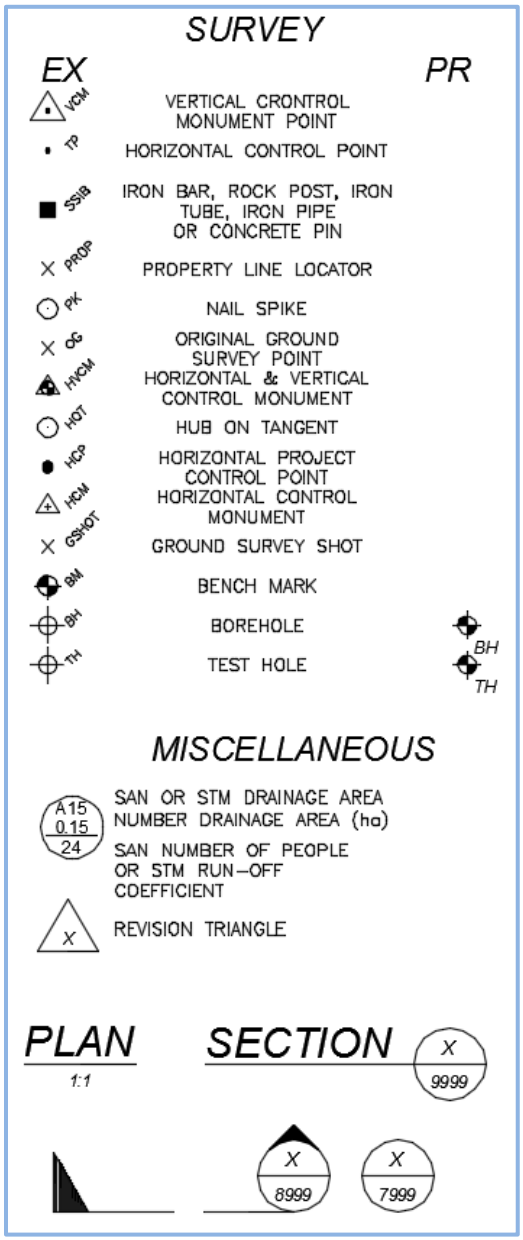
Name	Color	Linetype	Description
UT_E_TV_GND_JUNCTIONBOX	227	Continuous	existing TV ground junction box
UT_E_TV_GND_PEDESTAL	227	Continuous	existing TV ground pedestal
UT_E_TV_GND_POLE	227	Continuous	existing TV ground pole
UT_E_TV_SER_CABLE	227	UND_CATV	existing TV service cable
UT_E_TV_UND_CABLE	227	UND_CATV	existing TV underground cable
UT_E_TV_UND_CONDUIT	227	UND_CATV	existing TV underground conduit
UT_E_TV_UND_VAULT	227	UND_CATV	existing TV underground vault

C.6.3 Proposed

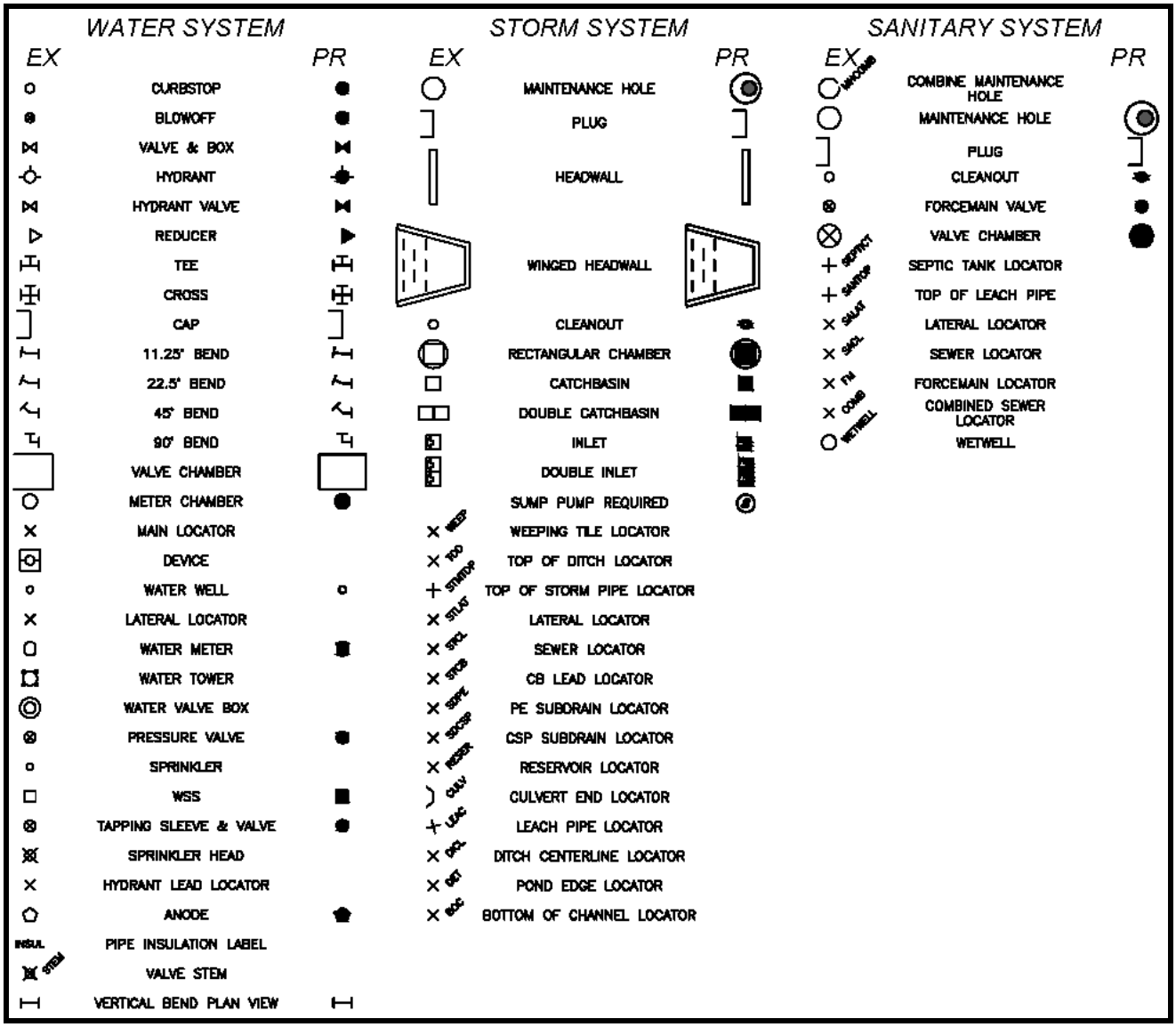
Name	Color	Linetype	Description
UT_P_BL_FEATURE	223	UND_BELL_PR	proposed bell feature
UT_P_BL_L	white	Continuous	proposed bell feature label
UT_P_BN_FEATURE	224	UND_BBND_PR	proposed broadband feature
UT_P_BN_L	white	Continuous	proposed broadband feature label
UT_P_GS_FEATURE	232	UND_GAS_PR	proposed gas feature
UT_P_GS_L	white	Continuous	proposed gas label
UT_P_HY_FEATURE	244	UND_HYDRO_PR	proposed hydro feature
UT_P_HY_L	white	Continuous	proposed hydro feature label
UT_P_OL_FEATURE	233	UND_OIL_PR	proposed oil feature
UT_P_OL_L	white	Continuous	proposed oil label
UT_P_TV_FEATURE	222	UND_CATV_PR	proposed TV feature
UT_P_TV_GND_JUNCTIONBOX	222	Continuous	proposed TV ground junction box
UT_P_TV_L	white	Continuous	proposed TV label

APPENDIX D
BLOCK LIBRARY

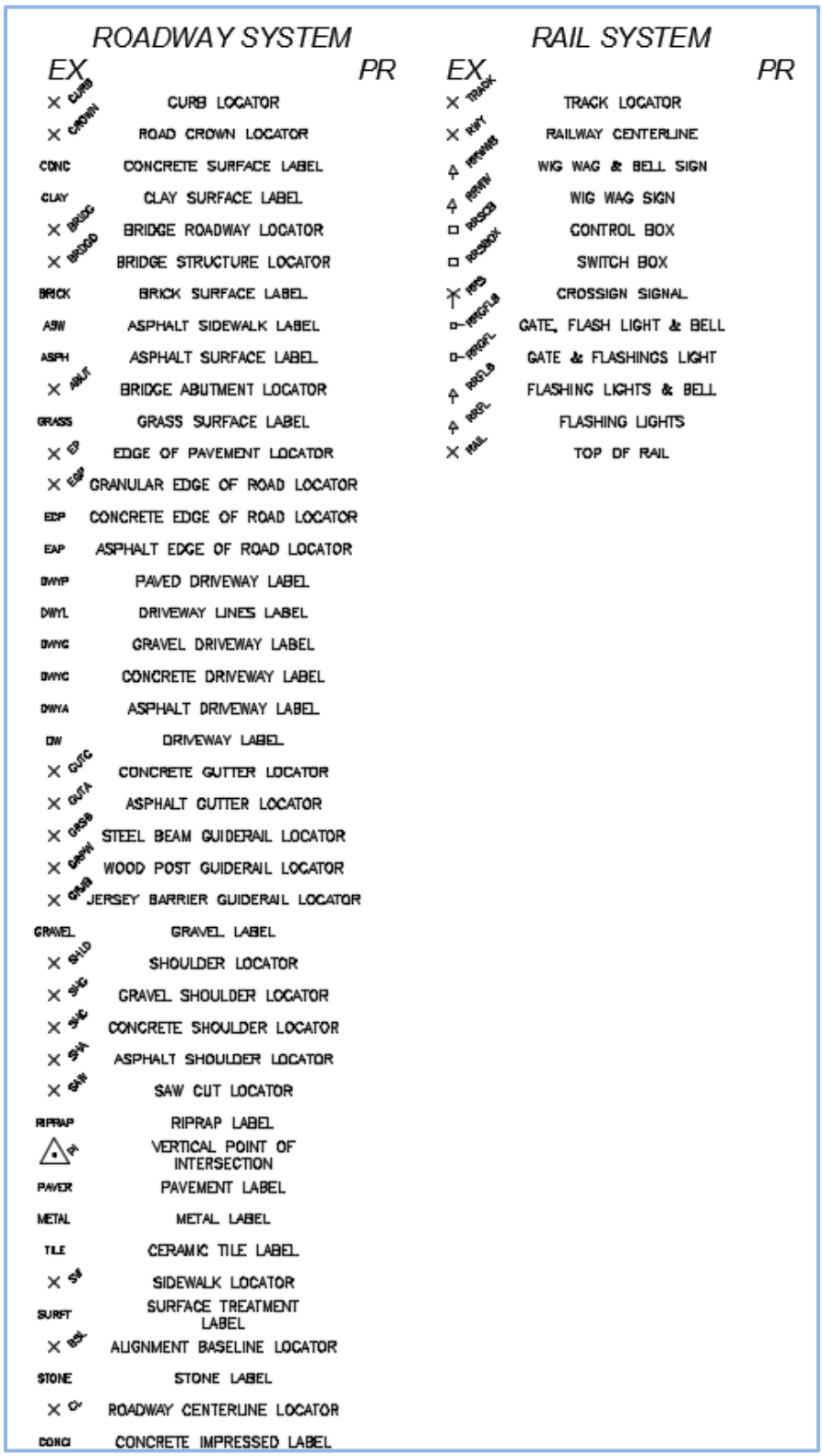
D.1 SURVEY & MISCELLANEOUS BLOCKS



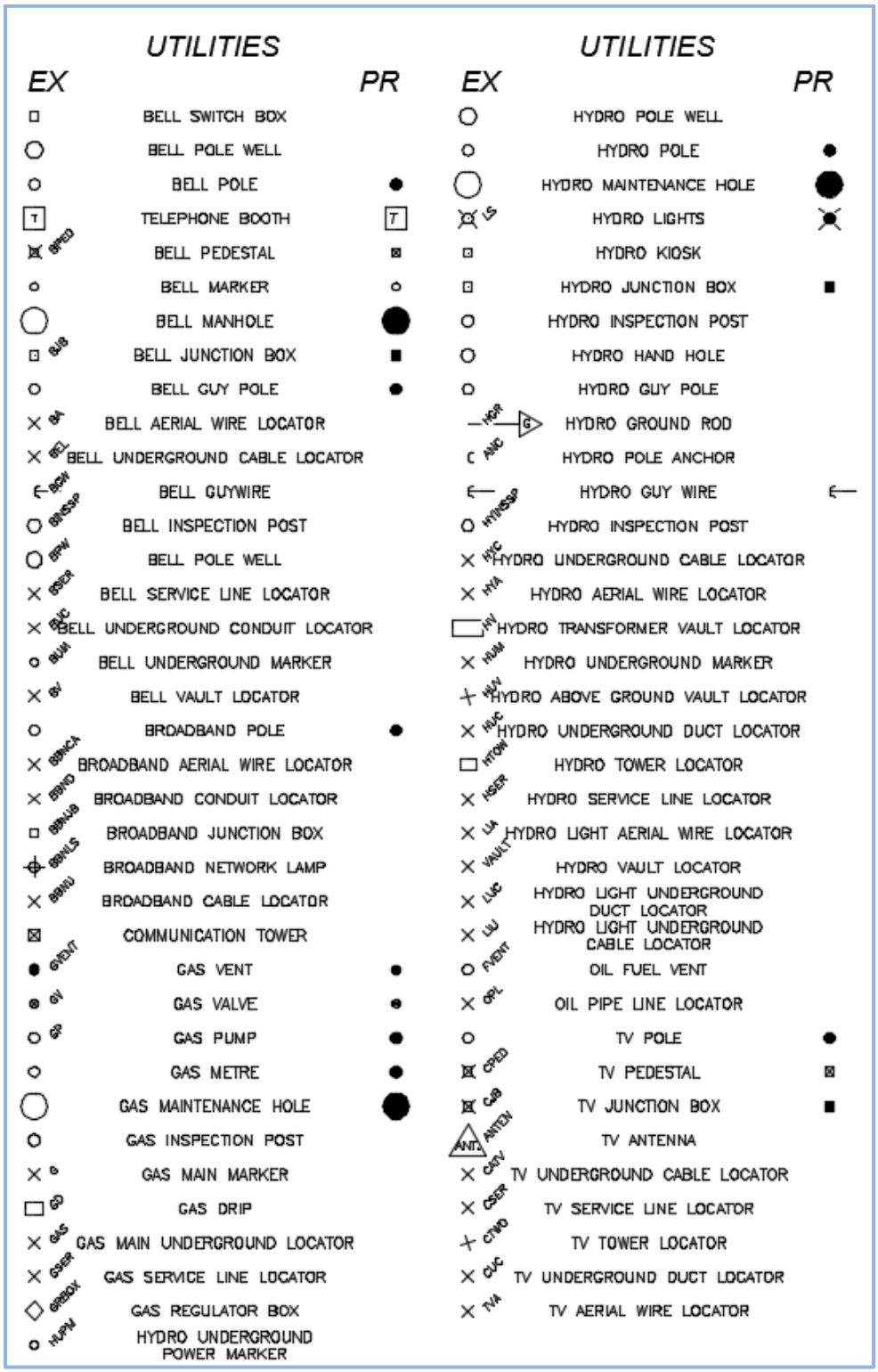
D.2 WATER, STORM & SANITARY SYSTEM BLOCKS



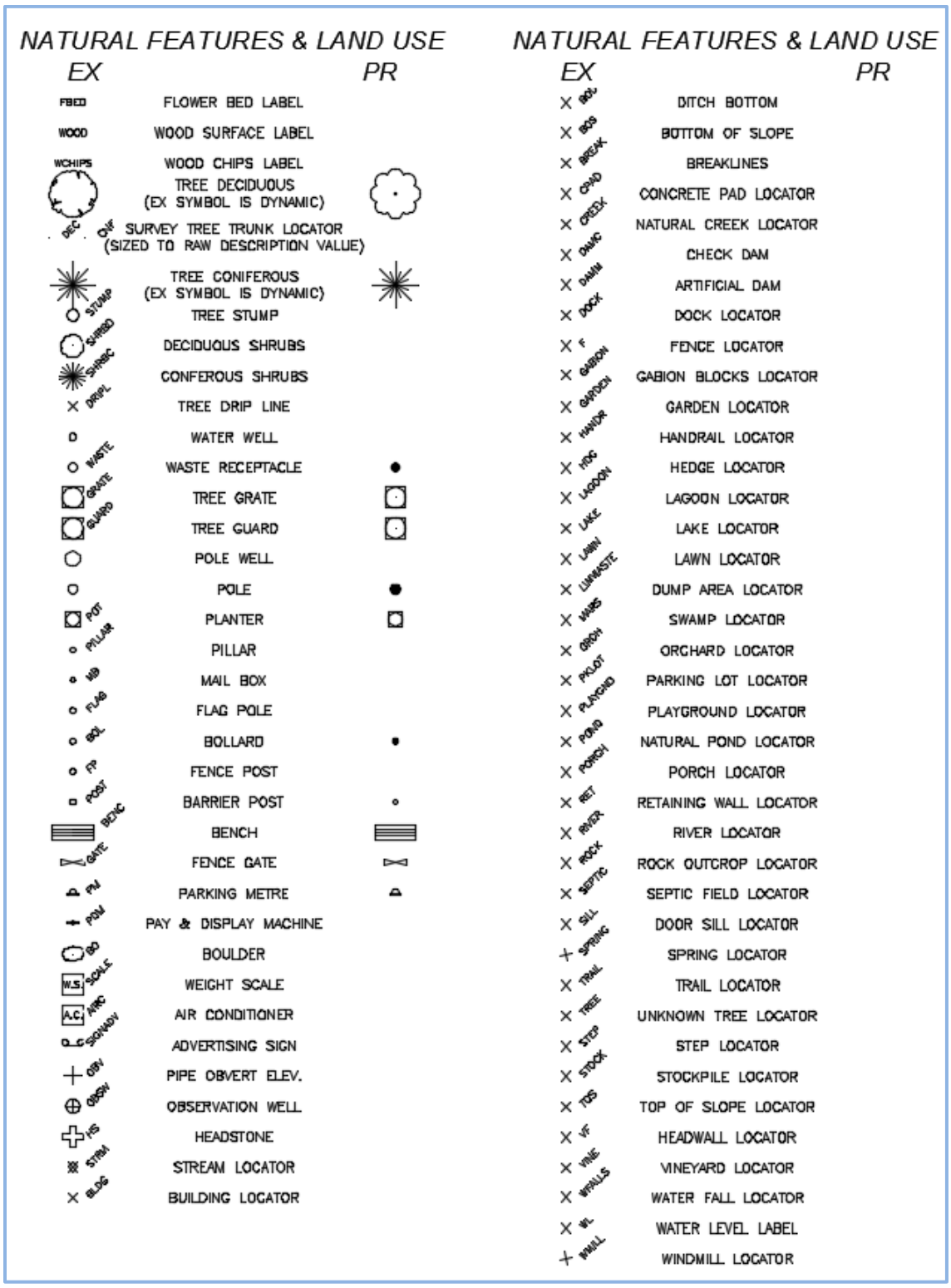
D.3 ROADWAY & RAIL SYSTEM BLOCKS



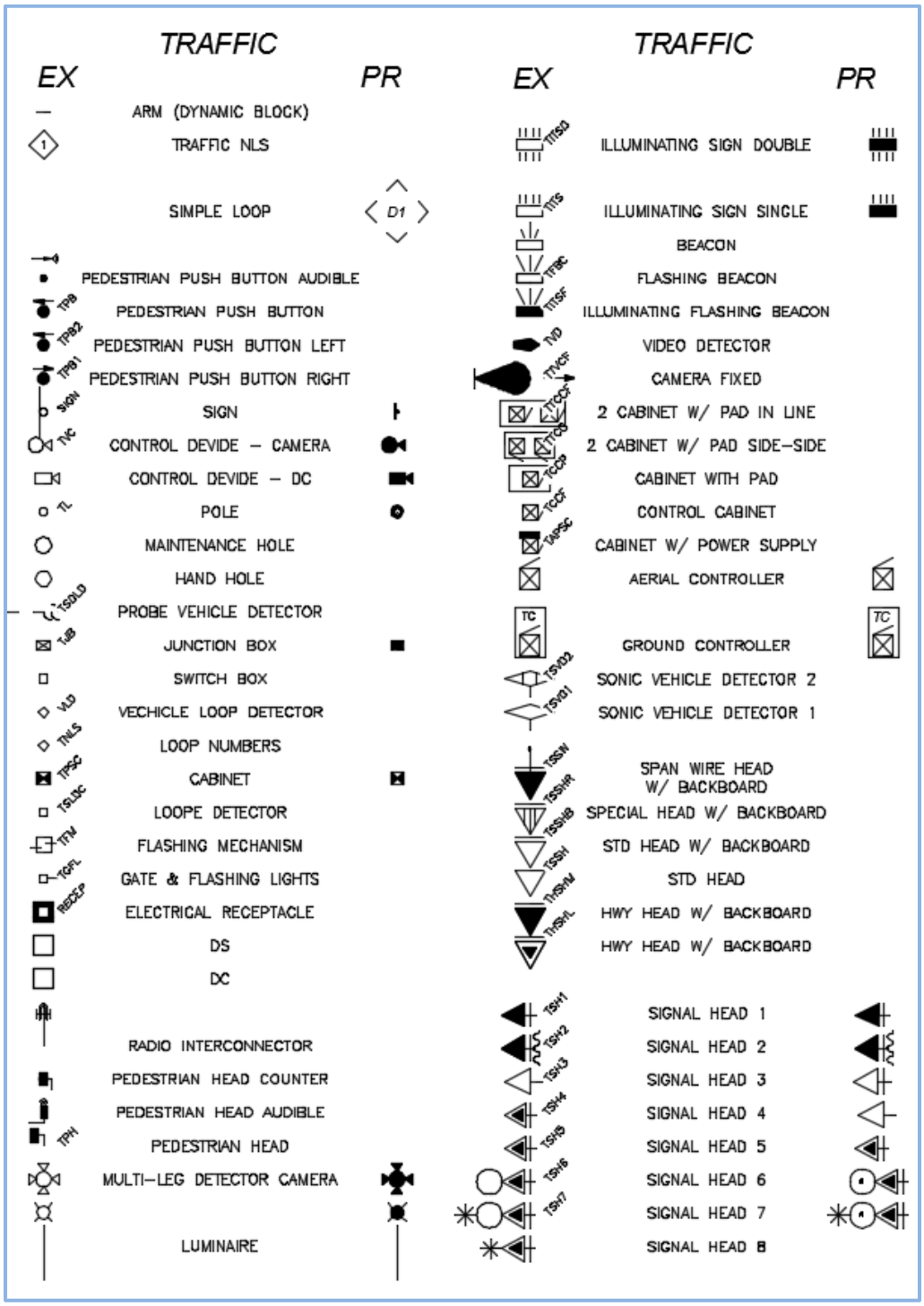
D.4 UTILITIES BLOCKS

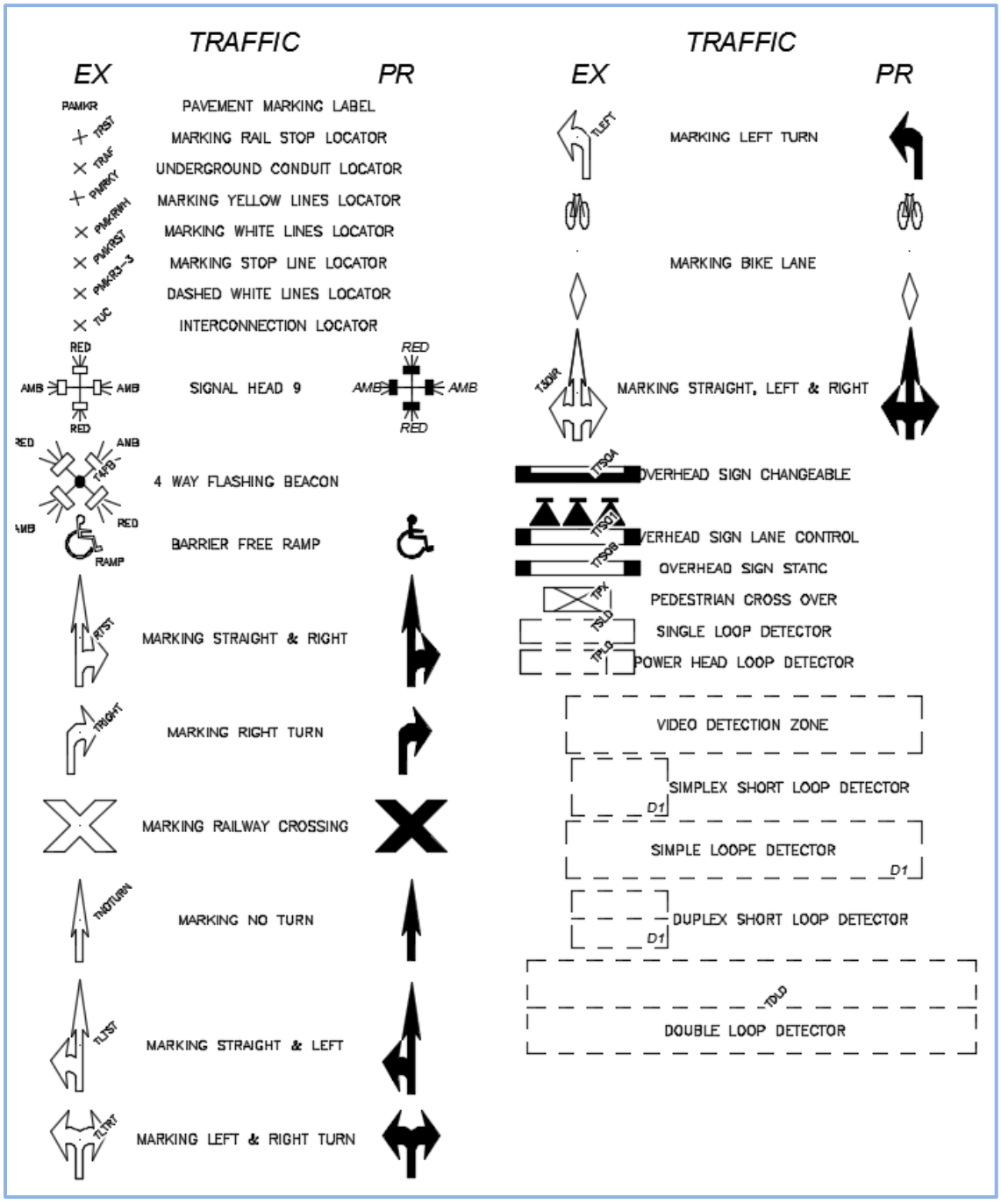


D.5 NATURAL FEATURES & LAND USE BLOCKS



D.6 TRAFFIC BLOCKS




TRAFFIC
EX
PR
PAMKR
PAVEMENT MARKING LABEL
TRST
MARKING RAIL STOP LOCATOR
TRAF
UNDERGROUND CONDUIT LOCATOR
PMRKY
MARKING YELLOW LINES LOCATOR
PMKRWH
MARKING WHITE LINES LOCATOR
PMKRST
MARKING STOP LINE LOCATOR
PMKR3-3
DASHED WHITE LINES LOCATOR
TUC
INTERCONNECTION LOCATOR
RED
AMB
SIGNAL HEAD 9
4 WAY FLASHING BEACON
RAMP
BARRIER FREE RAMP
RTST
MARKING STRAIGHT & RIGHT
TRIGHT
MARKING RIGHT TURN
MARKING RAILWAY CROSSING
TNOTURN
MARKING NO TURN
TLST
MARKING STRAIGHT & LEFT
TLTRT
MARKING LEFT & RIGHT TURN
TRAFFIC
EX
PR
TLEFT
MARKING LEFT TURN
MARKING BIKE LANE
T3OMR
MARKING STRAIGHT, LEFT & RIGHT
T7SOA
OVERHEAD SIGN CHANGEABLE
T7SOT
VERHEAD SIGN LANE CONTROL
T7SOB
OVERHEAD SIGN STATIC
TPX
PEDESTRIAN CROSS OVER
TSLD
SINGLE LOOP DETECTOR
TPLD
POWER HEAD LOOP DETECTOR
VIDEO DETECTION ZONE
SIMPLEX SHORT LOOP DETECTOR
D1
SIMPLE LOOPE DETECTOR
D1
DUPLEX SHORT LOOP DETECTOR
D1
TDLD
DOUBLE LOOP DETECTOR

APPENDIX E
CHECKLISTS

E.1 DESIGN CHECKLIST

DESIGN CHECKLIST	
PROJECT NO.	
PROJECT NAME	
DATE	

INITIAL	WATERMAIN
	Existing watermain on plan & profile
	Year constructed, mat'l, of watermain on plan & profile
	Exist. Valve & box on plan & profile
	Exist. Curb stops located
	Exist. Curb stop to be relocated check 1.0m. From p/l tolerance
	Exist. Watermain to be abandoned - label on proper layer
	Horizontal clearance from sewers
	Vertical clearance from sewers
	1.8m. Min. Depth of cover (as required)
	Conflict check with prop. & exist. C.B. laterals, sewers
	Conflict check with prop. & exist. Watermains, & other utilities
	Prop. Exist curb stop relocation
	Prop. Fire hydrant spacing res. Max 150 commercial 75 Up to 200m for light residential/rural (according to water supply for public fire protection. And at intersections
	Prop. Water valve spacing res. 220 commercial 150
	Prop. Anode banks and individual anodes where applicable
	Prop. Connection by city forces note
	Distance to next W.V.
	Watermain break info watbreak.mdb
	When reconnecting exist service to prop watermain add the following Note - reconnect exist. Water service to prop. 150mm Dia WTMN (typ)
	Tie in prop. WTMN
	Label prop WTMN

INITIAL	SANITARY
	Exist. Manhole info. - m.h. forms from surveyors
	Drainage area plan - consistent with prop. Plans
	Conflict check at intersections
	Prop. M.H. spacing min. – 120m (200-450mm dia.) Max. – 150m (>525mm dia.) MECP guidelines
	Prop. Drop structure M.H. required see OPSD.1003.030
	Sewer call info from infrastructure
	Exist. San. tees from t.v. inspection from infrastructure

INITIAL	SANITARY
	Lengths, diameter & grades of exist. Sewers on plan & profiles
	Year constructed mat'l, of exist. Sewermain on plan & profile
	Mh label id's - from infrastructure department
	Existing comb. & san. Sewermain on plan & profile
	Minimum standard cover - 1.2m.
	Minimum crossing clearance 0.50m to watermain
	Exist. San. Sewer to be grouted or removed label on proper layer

INITIAL	STORM
	Exist. Manhole info. - M.H. forms from surveyors
	Drainage area plan - consistent with prop. Plans
	Conflict check at intersections
	Min. – 120m (200-450mm dia.) Max. – 150m (>525mm dia.) MECP guidelines
	Prop. Drop structure M.H. required see opsd.1003.030
	Sewer call info from infrastructure
	Exist. STM. Tees from T.V. inspection from infrastructure
	Lengths, diameter & grades of exist. Sewers on plan & profiles
	Year constructed Mat'l, of exist. Sewermain on plan & profile
	Prop. CB spacing min. – 76m max. – 107m (section 5.3.8)
	Prop and exist CB leads in plan and profile
	Prop CB charts

INITIAL	ROAD
	Existing driveway cross sections
	Typical cross section
	Min. Desirable longitudinal grade lengths - 20m.
	Desirable longitudinal grade 0.5% - min 0.4%
	Radius grade 0.50% min, 10% max
	Vertical curve req'd. - >2% gradient change (delta g)
	RADIUS AT INTERSECTION - 10m PREFERRED, 6m MIN.
	Prop. Driveway depression dimensions - city zoning by-law
	Driveway grades min. 2%, max. 8%
	Driveway material type - exist. Label
	Prop. Driveway material type - hatch pattern
	Prop. Sawcuts for all trenches and limits
	Curve table
	Existing driveway depressions
	Proposed 0.6m - 40mm milling on each side of sawcut for trench repair (typical note)
	Regional Niagara road cut permit application form

INITIAL	ROAD
	check if road needs to be designed for bike lanes
	for new road reconstruction have a meeting with traffic to determine if there are any plans for that street what vehicle to use for turning radius

INITIAL	UTILITIES
	Prel. Base Plans to Bell
	Prel. Base Plans to Peninsula Energy
	Prel. Base Plans to N.F. Hydro
	Prel. Base Plans to OPG
	Prel. Base Plans to Can. Niagara Power Co. Hydro (CNPC)
	Prel. Base Plans to Consumers Enbridge Gas
	Prel. Base Plans to Cogeco Cable Systems (Catv)
	Prel. Base Plans to Bridge Comm.
	Prel. Base Plans to Street Light Maintenance Contractor
	Prel. Base Plans to Niagara Regional Broadband Network (NRBN)
	Utility Information Filled Out On Titleblock
	T.V. Inspection Required

INITIAL	PLAN & PROFILE CHECKS
	Augerhole info on plan & profile
	Borehole info on plan & profile
	Testhole info on plan & profile
	Observation well info on plan & profile
	Stations to survey momumentation
	Benchmark info. - G.B.M. , and local B.M.
	Prop. baseline to be dimensioned from exist. Survey momuments
	Exist. Parking meter locations
	Exist. Building lines, corners
	Exist. Apron and driveway mat'l on plan
	Dashed linework for exist. Entities on profile
	Exist. Rock profile / data copied from exist. Plans
	Basement elevations on profile
	Baseline stations - left to right

INITIAL	MISCELLANEOUS CHECKS
	Photographs required of project site
	Drainage investigation O.B.M. 1:1000m. plan for inspector's
	Copies of exist. Extraneous flow survey forms for inspector's (downspouts)
	Memo to flood'g tech. For further investigation
	Testhole plans - 1 for inspectors, 1 for design file
	Up to date assessment info on plans
	Street file correspondence check (homeowners)
	Exist. Monumentation to be tied to baseline
	Check survey for adequate monumentation
	Exist. Forms CB, MH, valve chambers, & V&B info from survey
	Call Forestry at service centre for tree conflicts
	Add tree diameter information, scale to drip lines
	Add existing sidewalk labels

E.2 PRESENTATION CHECKLIST

2D & 3D ELECTRONIC STANDARD PRESENTATION CHECKLIST		
PROJECT NO.		
PROJECT NAME		
DATE		
COMMENTS	**INITIAL**	**PAPERSPACE LAYOUT**
		architectural D size (24 by 36)
		drawing information (titleblock attribute) populated
		city and/or consultant logo in place
		revision indicated
		benchmark datum information populated
		north arrow pointing 315^{o} to 135^{o} in proper rotation angle
		spell check completed
		viewports to scale and locked
		titleblock insertion point at 0,0
		printable area = plot area
		reference to general notes (CC-5300 and legend)
		keyplan properly indicating design area
		multi sheet tab label with drawing number in sequential order
		page setup options
		sheet set attached
		alignment at 0^{o} as possible

COMMENTS	INITIAL	FILE PROPERTIES
		file name follows naming convention
		created from NFO template
		submitted via compressed file through eTransmit command maintaining folder structure and links
		drawing set includes cover and standard details (CC-5300)

COMMENTS	INITIAL	MODELSPACE LAYOUT 2D
		proper coordinate system in world coordinate with north direction up
		annotative properties used
		roadway name shown on all layouts (sheets)
		easements and right-of-way clearly labeled
		NFO blocks
		external reference or image used and linked
		Overrides through vports only

COMMENTS	INITIAL	MODELSPACE LAYOUT 3D
		accurate map entities
		proper description key set used in survey data transfer
		use template point groups to generate OG surface
		assembly/subassemblies from tool palette
		use template pipe networks
		No 2D linework instead of pipe line or structures
		use template grading criteria
		use template quantity takeoff criteria
		use template part rules
		data shortcuts used
		use template object styles
		use template label styles
		use template table styles

E.3 DESIGN CRITERIA CHECKLIST

DESIGN CRITERIA	
PROJECT DATA	
project number	
project name	
location	
length	
project manager	
designer	
EA/ESR	

PROJECT SCHEDULE	
project start	
design completion	
land acquisition	
tender project	
tender close	
council approval	
pre-construction meeting	
construction start	

DESIGN REQUIREMENTS	
standard X-section	
modify X-section	
traffic volume	
design speed	
posted speed	
no. lanes	
sidewalk	
bicycle path	
structures	
storm sewer	
outlet	
sanitary sewer	
watermain	

UTILITY RELOCATIONS	
Bell Canada	
Niagara Peninsula Energy (hydro)	
Enbridge gas	
Cogeco cable	
Telus	

APPROVALS REQUIRED	
land acquisition	
traffic signals	
railway	
conservation authority	
MECP	
MNR	
other	
prepared by:	
date:	

E.4 AS-BUILT SURVEY CHECKLIST

AS-BUILT SURVEY			
PROJECT NO.			
PROJECT NAME			
DATE		13-Feb-15	
COMMENTS		**INITIAL**	**GENERAL**
			file naming convention used
			3D objects in dwg format
			correct coordinate system
			city CAD standards used
			drawing orientation with north pointing up
			inspector's redline markup drawing provided with underground information

COMMENTS		**INITIAL**	**WATER SYSTEM**
			all water valves ground elevation
			all water valves top of operating nut elevation
			top nut of hydrant elevation
			hydrant valve elevation
			all curb box ground elevation
			all blow off elevations

COMMENTS		**INITIAL**	**SANITARY SEWER SYSTEM**
			all maintenance hole inverts and lid elevation
			all sanitary cleanout lid elevation and the tee elevation
			elevation of any stub ends

COMMENTS		**INITIAL**	**STORM SEWER SYSTEM**
			all maintenance hole inverts and lid elevations
			all catchbasin inverts and pipe size
			elevation of any stub ends

COMMENTS		**INITIAL**	**ROADWAY**
			cross section shots every 20m, including shots at property line, back & front of sidewalk, top of curb, lip of gutter and centreline of road
			any changes that were made during construction is included in survey

E.5 AS-CONSTRUCTED RECORD DRAWING CHECKLIST

AS-CONSTRUCTED RECORD DRAWINGS			
PROJECT NO.			
PROJECT NAME			
DATE			
COMMENTS		**INITIAL**	**GENERAL**
			file naming convention used
			correct coordinate system
			city CAD standards used
			drawing orientation with north pointing up
			Civil 3D objects in dwg format
			change all proposed layers to new layers using the method mentioned in the CAD manual
			same IFC layouts (sheets) with titleblock information including submittal revision
			all items as listed in the 2D & 3D electronic standard checklist
			private utility system is identified
			location and elevation of benchmark reference shown
			location and description of any utility
			location and dimensions to building and structure changes
			correct grade on road alignment
			correct elevations to changes made on site grading
			changes in detail of design or additional information
			where drawing and/or specification allows options, only the option actually used shown

COMMENTS		**INITIAL**	**ELECTRICAL/CABLE/STREET LIGHTING/FIBRE OPTIC SYSTEM**
			locate and clearly label all conduit runs, fittings, splice vaults, pull boxes, meter pedestals, light assets, transformers or switch gear pads, poles and other appurtenances
			all sizes and material types of pipes and conduits
			location and elevation on pipes and fittings where changes/deflections in direction occurs
			typical service installation details with deviations from original plans or standard details

COMMENTS		INITIAL	WATER SYSTEM
			locate valves, fittings, services, bends, tees and fire hydrants
			all sizes and types of valves and pipes
			special details drawings may be required where installations are now shown on approved construction drawings
			location and elevation on pipes and fittings where changes in direction occur
			typical water services installation details with deviations from original plans
			special details drawings required where installation were not as shown on the drawing due to field conditions

COMMENTS		INITIAL	SANITARY SEWER SYSTEM
			all piping, wyes, tees, valves, cleanouts, maintenance holes and special cases shall be located
			identify runs of gravity mains and label year of construction - 90.0m-300mmØ PVC SAN @ 0.44% (2013)
			elevations given for the top of maintenance hole cover and for all inverts
			service laterals are identified with location and end service or plug (station and offset measure upstream)
			maintenance holes identify by diameter
			special details drawings required where installation were not as shown on the drawing due to field conditions

COMMENTS		INITIAL	FORCEMAIN SYSTEM
			locate all valves, fittings, etc. in two directions
			location of pipe shown at all changes in direction
			all sizes and types of valves, fittings, pipes etc.
			special details drawing required where installation were not as shown on the drawing due to field conditions
			identify runs of forcemains and label year of construction - 90.0m-300mmØ PVC FM @ 0.44% (2013)

COMMENTS		INITIAL	DRAINAGE SYSTEM
			all piping, wyes, tees, valves, cleanouts, maintenance holes and special cases shall be located
			elevations for all drainage structures, top, invert, bottom, etc.
			identify size, material and slope of all piping

COMMENTS		INITIAL	DRAINAGE SYSTEM
			storage volume of detentions, retention basins or structures
			all drainage easements and encroachments
			spot elevation on top of banks to confirm minimum design band elevations
			elevation of water storage at date of as-constructed
			elevation of top of control structure, throat, face and under drain
			location of top bank and existing water edges at time and date of taken elevations
			identify runs of gravity mains and label year of construction - 90.0m-300mmØ PVC STM @ 0.44% (2013)

COMMENTS		INITIAL	ROADWAY, SIDEWALKS AND TRAIL SYSTEM
			all right-of-way or easement lines clearly labeled
			typical offset dimensions from property, right-of-way or easement lines
			typical ramp or curb openings installation details that deviate from original plans
			special details drawings are required where installations were not as shown on original drawings due to field conditions
			locate and describe all installed regulatory or warning signage and pavement markings
			location and species information on trees
			locate irrigation lines, controllers, sprinkler heads, backflow devices, pressure reducing valves, meters, supply sources and taps. Location, type, material, and reinforcement, height, drainage system and foundation information on all retaining walls
			note any changes to the alignment either vertically or horizontally of curbs & gutter, sidewalks, pavers or any other surface improvements
			provide crown lines spot elevation approximately on 20m stations, or as field condition warrants.

APPENDIX F
SURVEY POINT CODES TABLE

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
ABUT*	M	Y	NFO EX Basic X	LU_E_BS_BRG_BRIDGEABUT	NFO EX DESC ONLY			X									Bridge Abutment
AIRC*	B		AIRC	LU_E_LF_MSC_AIRCOND	NFO EX DESC ONLY			AIRC*									Air Conditioner
ANC*	B		ANC	UT_E_HY_GND_ANCHOR	NFO EX DESC ONLY				ANC*								Anchor
ANODE*	B		ANODE	IN_E_WS_DST_ANODE	NFO EX DESC ONLY							ANODE*					Water - Anode
ANTEN*	B		ANTEN	LU_E_LF_MSC_ANTENNA	NFO EX DESC ONLY			ANTEN*									Antenna Television
ASPH	M		NFO EX Basic X	IN_E_RS_GND_ASPH	NFO EX MATERIALS	X											ASPHALT
ASW*	M	Y	NFO EX Basic X	IN_E_RS_SWK_SWASPH	NFO EX MATERIALS	X											ASPHALT SWK
BA	M		NFO EX Basic X	UT_E_BL_AER_WIRE	NFO EX DESC ONLY										X		Bell Wire Aerial
BBNCA	M		NFO EX Basic X	UT_E_BN_AER_WIRE	NFO EX DESC ONLY										X		Broadband Network Wire Aerial

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP										DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
BBND	M		NFO EX Basic X	UT_E_BN_UND_CONDUIT	NFO EX DESC ONLY										X		Broadband Network Conduit
BBNJB*	M		BBNJB	UT_E_BN_GND_JUNCTIONBOX	NFO EX DESC ONLY										BBNJB*		Junction Box $+
BBNLS*	M		BBNLS	UT_E_BN_AER_LAMP	NFO EX DESC ONLY										BBNLS*		Broadband Network Lamp $+
BBNU	M		NFO EX Basic X	UT_E_BN_UND_CABLE	NFO EX DESC ONLY										X		Broadband Network Cable
BEL	M		NFO EX Basic X	UT_E_BL_UND_CABLE	NFO EX DESC ONLY										X		Bell Underground Cable
BENC	B		BENC	LU_E_PK_MSC_BENCH	NFO EX DESC ONLY				BENC								Bench
BGW	M		BGW	UT_E_BL_GND_GUYWIRE	NFO EX DESC ONLY										X		Bell Guy Wire
BH*	M		BH	LB_E_GL_MSC_BOREHOLE	NFO EX DESC ONLY	BH*											Borehole $+
BINSSP	M		BINSSP	UT_E_BL_GND_INSPECTPOST	NFO EX DESC ONLY										BINSSP		Bell Inspection Post

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP										DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
BJB*	M		BJB	UT_E_BL_GND_JUNCTIONBOX	NFO EX DESC ONLY										BJB*		Junction Box $+
BLDG*	M	Y	NFO EX Basic X	LU_E_BS_BLD_BUILDING	NFO EX DESC ONLY			X									Building / House Footprint
BM*	B		BM	LB_E_SV_CNT_VERTICAL	NFO EX DESC ONLY	X	BM*										Bench Mark
BO	B		BO	LB_E_NF_ETH_BOULDER	NFO EX DESC ONLY	BO											Boulder
BOC*	M	Y	NFO EX Basic X	IN_E_DS_DDS_CHANNEL	NFO EX DESC ONLY	X							X				Bottom of Channel
BOD*	M	Y	NFO EX Basic X	IN_E_DS_DDS_DITCHBOT	NFO EX DESC ONLY	X							X				Ditch Bottom
BOL	M		BOL	LU_E_LF_MSC_POST	NFO EX DESC ONLY			BOL									Bollard
BOOTH	M		BOOTH	UT_E_BL_GND_TELEBOOTH	NFO EX DESC ONLY				BOOTH								Bell / Telephone Booth
BOS*	M	Y	NFO EX Basic X	LB_E_TM_GND_SLOPEBOTTOM	NFO EX MHs	X											Bottom of Slope

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
BOX*	B	Y	BOX	IN_E_DS_DDS_CULVERTCONC	NFO EX DESC ONLY								BOX*				Culvert - Concrete Corner
BP*	M		BP	UT_E_BL_GND_POLE	NFO EX DESC ONLY										BP*		$+
BPED	M		BPED	UT_E_BL_GND_PEDESTAL	NFO EX DESC ONLY										BPED		Bell Pedestal
BPG*	M		BPG	UT_E_BL_GND_GUYPOLE	NFO EX DESC ONLY										BPG*		Bell Guy Pole $+
BPW	M		BPW	UT_E_BL_GND_POLE	NFO EX DESC ONLY										BPW		Bell Pole Well
BRDGO*	M	Y	NFO EX Basic X	LU_E_BS_BRG_BRIDGE	NFO EX DESC ONLY			X									Bridge Other
BREAK*	M	Y	NFO EX Basic X	LB_E_TM_FLT_BREAKLINE	NFO EX DESC ONLY	X											Breaklines
BRICK	M		NFO EX Basic X	IN_E_RS_GND_BRICK	NFO EX MATERIALS	X											BRICK
BRIDG*	M	Y	NFO EX Basic X	IN_E_RS_STR_BRIDGE	NFO EX DESC ONLY	X				X							Bridge Road

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
BSBOX	M		BINSSP	UT_E_BL_GND_SWITCHBOX	NFO EX DESC ONLY										BSBOX		Bell Switch Box
BSER*	M		NFO EX Basic X	UT_E_BL_SER_CABLE	NFO EX DESC ONLY										X		Bell Service Line
BSL*	M	Y	NFO EX Basic X	IN_E_RS_RDY_BASELINE	NFO EX DESC ONLY	X				X							Alignment / Baseline
BUC*	M		NFO EX Basic X	UT_E_BL_UND_CABLE	NFO EX DESC ONLY										X		Bell Underground Conduit / Ducts
BUM	M		BUM	UT_E_BL_GND_PNT	NFO EX DESC ONLY										BUM		Bell Underground Marker
BUOY	B		BUOY	TR_E_MR_MSC_BUOY	NFO EX DESC ONLY			BUOY									Buoy
BUS	B		BUS	TR_E_TN_STR_BUSSHELTER	NFO EX DESC ONLY				BUS								Bus Shelter
BUSH	M		NFO EX Basic X	LB_E_NF_VEG_BUSHLINE	NFO EX DESC ONLY											X	Bush Edge Symbol
BV*	M		NFO EX Basic X	UT_E_BL_UND_VAULT	NFO EX DESC ONLY										X		Bell Underground Structure

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP										DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
CATV*	M		NFO EX Basic X	UT_E_TV_UND_CABLE	NFO EX DESC ONLY										X		CATV (Cable TV) Underground Cable
CB	M		CB	IN_E_DS_SEW_CB	NFO EX CBs	X							CB				Catchbasin
CBMH	M		CBMH	IN_E_DS_SEW_CBMH	NFO EX MHs	X							CBMH				Catchbasin Manhole
CC	B		CC	LB_E_SV_CNT_CUTCROSS	NFO EX DESC ONLY	X	CC										Cut Cross
CCF	B		CC	LB_E_SV_CNT_CUTCROSS	NFO EX DESC ONLY	X	CCF										Cut Cross Found
CJB	M		CJB	UT_E_TV_GND_JUNCTIONBOX	NFO EX DESC ONLY										CJB		Junction Box $+
CL*	M	Y	NFO EX Basic X	IN_E_RS_RDY_CENTRELINE	NFO EX DESC ONLY	X				X							Centerline Roadway
CLAY	M		NFO EX Basic X	IN_E_RS_GND_CLAY	NFO EX MATERIALS	X											CLAY
CLAYC	B		CLAYC	IN_E_DS_DDS_CULVERTCLAY	NFO EX DESC ONLY								CLAYC				Culvert End Clay $+

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP										DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
CM	B		CM	LB_E_SV_MON_MONUMENT	NFO EX DESC ONLY		CM										Concrete Monument Found $+
CNF*	B		CNF	LB_E_NF_VEG_TREECONIF	NFO EX DESC ONLY											CNF	Tree Coniferous $1
CO	M		CO	IN_E_WW_SER_CLEANOUT	NFO EX DESC ONLY									CO			Sanitary Sewer Lateral Cleanout $+
COLUM*	M		NFO EX Basic X	LU_E_BS_BLD_COLUMN	NFO EX DESC ONLY			X									Columns / Pillars Building Stone/Concrete
COMB*	M		NFO EX Basic X	IN_E_WW_COM_PIPE	NFO EX DESC ONLY									X			Combined Sewer
CON*	M	Y	NFO EX Basic X	IN_E_RS_MSC_CONCRETE	NFO EX DESC ONLY	X		X									$*
CONC	M		NFO EX Basic X	IN_E_RS_GND_CONC	NFO EX MATERIALS	X											CONC.
CONCC	M		CONCC	IN_E_DS_DDS_CULVERTCONC	NFO EX DESC ONLY	X							CONCC				Culvert End Concrete $+
CONCI	M		NFO EX Basic X	IN_P_RS_GND_CONC	NFO EX MATERIALS	X		X									CONC. IMPRESSED

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
CPAD*	M	Y	NFO EX Basic X	IN_E_RS_MSC_CONCRETEPAD	NFO EX DESC ONLY	X		X									Concrete Pad
CPED	M		CPED	UT_P_BL_GND_PEDESTAL	NFO EX DESC ONLY										CPED		Cable TV Pedestal
CPIN	B		CPIN	LB_E_SV_CNT_NAIL	NFO EX DESC ONLY	X	CPIN										Concrete Pin Found
CREEK*	M	Y	NFO EX Basic X	LB_E_NF_WAT_CREEK	NFO EX DESC ONLY	X											Creek Edge of
CROWN*	M	Y	NFO EX Basic X	IN_E_RS_RDY_CROWN	NFO EX DESC ONLY	X				X							Road Crown
CS*	M		CS	IN_E_WS_SER_CURBSTOP	NFO EX DESC ONLY	CS*						CS*					Water - Curbstop $+
CSER*	M		NFO EX Basic X	UT_E_TV_SER_CABLE	NFO EX DESC ONLY										X		CATV (Cable TV) Service Line
CSP*	B		CSP	IN_E_DS_DDS_CULVERT	NFO EX DESC ONLY								CSP*				Culvert CSP Invert End - $+
CTOW	M		CTOW	UT_E_CO_GND_TOWER	NFO EX DESC ONLY			CTOW									Communications Tower

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
CUC*	M		NFO EX Basic X	UT_E_TV_UND_CONDUIT	NFO EX DESC ONLY										X		CATV Underground Ducts
CULV*	B		CULV	IN_E_DS_DDS_CULVERT	NFO EX DESC ONLY								CULV*				Culvert TOP
CURB*	M	Y	NFO EX Basic X	IN_E_RS_RDY_CURB	NFO EX DESC ONLY	X				X							Curb Lip or Edge or Top
DAMC*	M	Y	NFO EX Basic X	IN_E_DS_DDS_DAM	NFO EX DESC ONLY	X											Check Dam
DAMM*	M	Y	NFO EX Basic X	LU_E_LF_MSC_DAM	NFO EX DESC ONLY	X		X									Dam Man Made
DCB	B		DCB	IN_E_DS_SEW_DCB	NFO EX CBs	X							DCB				Double CatchBasin
DCL*	M	Y	NFO EX Basic X	IN_E_DS_DDS_DITCH	NFO EX DESC ONLY	X							X				Ditch Centerline Plan
DEC*	B		DEC	LB_P_NF_VEG_TREEDECID	NFO EX DESC ONLY											DEC	Tree Deciduous $1
DET*	M	Y	NFO EX Basic X	IN_E_DS_DDS_POND	NFO EX DESC ONLY	X							X				Pond Edge

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
DICB	B		DICB	IN_E_DS_SEW_DICB	NFO EX CBs	X							DICB				Ditch Inlet CatchBasin
DICL*	M	Y	NFO EX Basic X	IN_E_DS_DDS_SWALE	NFO EX DESC ONLY	X							X				Swale Centerline
DOCK*	M	Y	NFO EX Basic X	LU_E_LF_MSC_DOCK	NFO EX DESC ONLY			X									Dock – Wharf - Pier
DRAIN	M	Y	NFO EX Basic X	IN_E_DS_DDS_DRAIN	NFO EX DESC ONLY								X				$*
DRIPL*	M		NFO EX Basic X	LB_E_NF_VEG_DRIPLINE	NFO EX DESC ONLY											X	Dripline of Tree
DW	M		NFO EX Basic X	IN_E_RS_DWY_DRIVEWAY	NFO EX MATERIALS	X											DRIVEWAY
DWYA*	M	Y	NFO EX Basic X	IN_E_RS_DWY_ASPH	NFO EX MATERIALS	X											DWY ASPHALT
DWYC*	M	Y	NFO EX Basic X	IN_E_RS_DWY_CONC	NFO EX MATERIALS	X											DWY CONC.
DWYG*	M	Y	NFO EX Basic X	IN_E_RS_DWY_GRAV	NFO EX MATERIALS	X											DWY GRAVEL

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
DWYL*	M	Y	NFO EX Basic X	IN_E_RS_DWY_DRIVEWAY	NFO EX DESC ONLY	X											Driveway Line
DWYP*	M	Y	NFO EX Basic X	IN_E_RS_DWY_PAVER	NFO EX MATERIALS	X											DWY INTERLOCKING STONE
EAP*	M	Y	NFO EX Basic X	IN_E_RS_RDY_ROADEDGEASPH	NFO EX DESC ONLY	X											Pavement – Edge of Asphalt
ECP*	M	Y	NFO EX Basic X	IN_E_RS_RDY_ROADEDGECONC	NFO EX DESC ONLY	X											Concrete Edge of Pavement
EGP*	M	Y	NFO EX Basic X	IN_P_RS_RDY_ROADEDGEGRAN	NFO EX DESC ONLY	X				X							Granular Road Edge
EM*	M	Y	NFO EX Basic X	IN_E_RS_RDY_MEDIAN	NFO EX DESC ONLY	X				X							Median – Driveable
EP*	M	Y	NFO EX Basic X	IN_E_RS_RDY_ROADEDGEPAVE	NFO EX DESC ONLY	X				X							Road Edge of Pavement
FBED	M		NFO EX Basic X	LU_E_LF_MSC_GARDEN	NFO EX MATERIALS	X											FLOWER BED
FECL*	M		NFO EX Basic X	LU_E_LF_FNC_FENCECHAINLINK	NFO EX DESC ONLY			X									Fence (Chainlink)

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP										DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
FEM*	M		NFO EX Basic X	LU_E_LF_FNC_FENCEMETAL	NFO EX DESC ONLY			X									Fence (Metal)
FENC*	M		NFO EX Basic X	LU_E_LF_FNC_FENCE	NFO EX DESC ONLY			X									Fence
FEPI*	M		NFO EX Basic X	LU_E_LF_FNC_FENCE	NFO EX DESC ONLY			X									Fence (Picket)
FEPW*	M		NFO EX Basic X	LU_E_LF_FNC_FENCEWIRE	NFO EX DESC ONLY			X									Fence (Post and Wire)
FESED*	M		NFO EX Basic X	LU_E_LF_FNC_FENCESEDIMENT	NFO EX DESC ONLY			X									Fence Sediment
FESNOW*	M		NFO EX Basic X	LU_E_LF_FNC_FENCESNOW	NFO EX DESC ONLY			X									Fence (Snow Temporary)
FESR*	M		NFO EX Basic X	LU_E_LF_FNC_FENCESNAKE	NFO EX DESC ONLY			X									Fence Snakerail
FEST*	M		NFO EX Basic X	LU_E_LF_FNC_FENCESTONE	NFO EX DESC ONLY			X									Fence Stone
FEW*	M		NFO EX Basic X	LU_E_LF_FNC_FENCEWOOD	NFO EX DESC ONLY			X									Fence (Wood)

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP										DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
FLAG	M		FLAG	LU_E_LF_MSC_FLAGPOLE	NFO EX DESC ONLY			FLAG									Flag Pole
FM*	M		NFO EX Basic X	IN_E_WW_SEW_FORCEMAIN	NFO EX DESC ONLY									X			Forcemain Sanitary Plan
FMV	B		FMV	IN_E_WW_SEW_VALVE	NFO EX DESC ONLY									FMV			Sanitary Forcemain Valve
FMVC	B		FMVC	IN_E_WW_SEW_FORCEMAINVC	NFO EX DESC ONLY									FMVC			Sanitary Forcemain Valve Chamber
FP	B		FP	LU_E_LF_FNC_FENCEPOST	NFO EX DESC ONLY			FP									Fence Post $+
FVENT	M		FVENT	UT_A_OL_GND_FUELVENT	NFO EX DESC ONLY										FVENT		Fuel Oil Vent
G	M		NFO EX Basic X	UT_E_GS_GND_PIPE	NFO EX DESC ONLY										X		Gas Main Marker
GABIO*	M	Y	NFO EX Basic X	LU_E_LF_WAL_GABIONWALL	NFO EX DESC ONLY	X		X									GABIONWALL
GARDEN*	M	Y	NFO EX Basic X	LU_E_LF_MSC_GARDEN	NFO EX DESC ONLY	X										X	Garden Edge / Flower Bed

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
GAS*	M		NFO EX Basic X	UT_E_GS_UND_PIPE	NFO EX DESC ONLY										X		Gas Main Underground
GATE	B		GATE	LU_E_LF_FNC_GATE	NFO EX DESC ONLY			GATE									Fence Gate
GCOVER*	M		NFO EX Basic X	LU_E_LF_MSC_GCOVER	NFO EX DESC ONLY	X										X	Ground Cover / Vine
GD	B		GD	UT_E_GS_GND_PIPE	NFO EX DESC ONLY										GD		Gas Drip
GINSSP	M		GINSSP	UT_E_GS_GND_INSPECTPOST	NFO EX DESC ONLY										GINSSP		Gas Inspection Post
GM	M		GM	UT_E_GS_GND_METRE	NFO EX DESC ONLY										GM		Gas Meter
GP	M		GP	UT_E_OL_GND_FUELPUMP	NFO EX DESC ONLY										GP		Gas Pump
GRASS	M		NFO EX Basic X	IN_E_RS_GND_GRASS	NFO EX MATERIALS	X										X	GRASS
GRATE	M		GRATE	LU_E_LF_MSC_TREEGRATE	NFO EX DESC ONLY	X			GRATE								Tree Grate Streetscaping

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
GRAVEL	M		NFO EX Basic X	IN_E_RS_GND_GRAVEL	NFO EX MATERIALS	X											GRAVEL
GRBOX	M		GRBOX	UT_E_GS_GND_REGULATOR	NFO EX DESC ONLY										GRBOX		Gas Regulator Box
GRJB*	M	Y	NFO EX Basic X	IN_E_RS_STR_JERSBARRIER	NFO EX DESC ONLY			X									Jersey Barrier
GRPW*	M	Y	NFO EX Basic X	IN_E_RS_STR_GUIDERAILWIRE	NFO EX DESC ONLY			X									$*
GRSB*	M	Y	NFO EX Basic X	IN_E_RS_STR_GUIDERAILSTEEL	NFO EX DESC ONLY			X									Steel Beam Guiderail
GSER*	M		NFO EX Basic X	UT_E_GS_SER_PIPE	NFO EX DESC ONLY										X		Gas Service Line
GSHOT	M		NFO EX Basic X	LB_E_TM_GND_ELEV	NFO EX DESC ONLY	X											Ground Shot $+
GUARD	M		GUARD	LU_E_LF_MSC_TREEGUARD	NFO EX DESC ONLY				GUARD								Tree Guard Streetscaping
GUTA*	M	Y	NFO EX Basic X	IN_E_RS_RDY_GUTTERASPH	NFO EX DESC ONLY	X				X							Gutter of Curb Asphalt

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
GUTC*	M	Y	NFO EX Basic X	IN_E_RS_RDY_GUTTERCONC	NFO EX DESC ONLY	X				X							Gutter of Curb Concrete
GV	B		GV	UT_E_GS_GND_VALVE	NFO EX DESC ONLY										GV		Gas Valve
GVENT	B		GVENT	UT_E_GS_GND_GASVENT	NFO EX DESC ONLY										GVENT		Gas Vent
HANDR*	M		NFO EX Basic X	IN_E_RS_FNC_HANDRAIL	NFO EX DESC ONLY			X									Hand Rail
HCM	B		HCM	LB_E_SV_CNT_HORIZONTAL	NFO EX DESC ONLY	X	HCM										Horizontal Control Monument $+
HCP	B		HCP	LB_E_SV_CNT_HORIZONTAL	NFO EX DESC ONLY	X	HCP										Horizontal Project Control Point
HDG*	M		NFO EX Basic X	LB_E_NF_VEG_BUSHLINE	NFO EX DESC ONLY											X	Hedge / Bush
HGR	B		HGR	UT_A_HY_GND_GROUNDROD	NFO EX DESC ONLY										HGR		Hydro Ground Rod
HGW*	B		HGW	UT_E_HY_GND_GUYWIRE	NFO EX DESC ONLY										HGW*		Hydro Guy Wire $+

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP										DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
HH	M		HH	UT_E_HY_GND_MH	NFO EX DESC ONLY										HH		Hydro Handhole
HJB	M		HJB	UT_A_HY_GND_JUNCTIONBOX	NFO EX DESC ONLY										HJB		Hydro Junction Box $+
HK	M		HK	UT_E_HY_GND_VAULT	NFO EX DESC ONLY										HK		Hydro Kiosk
HOT	M		HOT	LB_E_SV_CNT_HUB	NFO EX DESC ONLY		HOT										Hub On Tangent
HP	M		HP	UT_A_HY_GND_POLE	NFO EX DESC ONLY										HP		Hydro Pole with $+
HPG	M		HPG	UT_A_HY_GND_POLE	NFO EX DESC ONLY										HPG		Hydro Guy Pole
HPW	M		HPW	UT_E_HY_GND_POLE	NFO EX DESC ONLY										HPW		Hydro Pole Well
HS	B		HS	LU_E_CM_GRV_HEADSTONE	NFO EX DESC ONLY			HS									Headstone
HSER*	M		NFO EX Basic X	UT_E_HY_SER_CABLE	NFO EX DESC ONLY										X		Hydro Service Line

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
HTOW	B		HTOW	UT_E_HY_GND_TOWER	NFO EX DESC ONLY										HTOW		Hydro Tower
HUC*	M		NFO EX Basic X	UT_A_HY_UND_CONDUIT	NFO EX DESC ONLY										X		Hydro Underground Ducts
HUM	M		NFO EX Basic X	UT_E_HY_GND_INSPECTPOST	NFO EX DESC ONLY										X		Hydro Underground Marker
HUPM	M		HUPM	UT_E_HY_GND_PNT	NFO EX DESC ONLY										HUPM		Hydro Underground Power Marker
HV	M		NFO EX Basic X	UT_E_HY_GND_VAULT	NFO EX DESC ONLY										X		Hydro Underground Transformer Vault
HV*	B		HV	UT_E_HY_GND_TRANSFORMER	NFO EX DESC ONLY										HV*		Hydro Underground Vault
HVCM	B		HVCM	LB_E_SV_CNT_HORZVERT	NFO EX DESC ONLY	X	HVCM										Horizontal Vertical Control Monument
HYA*	M		NFO EX Basic X	UT_E_HY_AER_WIRE	NFO EX DESC ONLY										X		Hydro Overhead Wire
HYC*	M		NFO EX Basic X	UT_E_HY_UND_CABLE	NFO EX DESC ONLY										X		Hydro Underground Cable

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
HYD	B		HYD	IN_E_WS_DST_HYDRANT	NFO EX DESC ONLY							HYD					Water - Hydrant
HYDL*	M		NFO EX Basic X	IN_E_WS_SER_HYDRANTLEAD	NFO EX DESC ONLY							X					Hydrant Lead
HYDV*	B		HYDV	IN_E_WS_DST_HYDRANTVALVE	NFO EX DESC ONLY	X						HYDV*					Water - Hydrant Valve $+
HYINSSP	M		HYINSSP	UT_E_HY_GND_INSPECTPOST	NFO EX DESC ONLY										HYNSSP		Hydro Inspection Post
IB	B		IB	LB_E_SV_MON_BAR	NFO EX DESC ONLY	X	IB										Iron Bar Found
INSUL	M		NFO EX Basic X	IN_E_WS_DST_INSULATION	NFO EX DESC ONLY							X					Material Insulation Label
INV*	M		NFO EX Basic X	IN_E_DS_SEW_CBLEAD	NFO EX DESC ONLY								X				$*
IP	B		IP	LB_E_SV_MON_BAR	NFO EX DESC ONLY	X	IP										Iron Pipe Found
IT	B		IT	LB_E_SV_MON_BAR	NFO EX DESC ONLY	X	IT										Iron Tube Found

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
LAGOON*	M	Y	NFO EX Basic X	LB_E_NF_WAT_LAGOON	NFO EX DESC ONLY	X											Lagoon Edge of
LAKE*	M	Y	NFO EX Basic X	LB_E_NF_WAT_LAKE	NFO EX DESC ONLY	X											Lake
LANC	B		ANC	UT_E_HY_GND_ANCHOR	NFO EX DESC ONLY										LANC		$*
LAWN*	M	Y	NFO EX Basic X	LU_E_LF_MSC_LAWN	NFO EX DESC ONLY	X										X	Lawn Edge
LDISCON	M		NFO EX Basic X	UT_E_HY_GND_DISCONNECT	NFO EX DESC ONLY										X		$*
LEACH	B		LEACH	IN_E_WW_SER_LEACHATEPIPE	NFO EX DESC ONLY									X			Sanitary Leachpipe End Symbol $+
LEACH*	M		NFO EX Basic X	IN_E_WW_SER_LEACHATEPIPE	NFO EX DESC ONLY									LEACH*			Sanitary Leachpipe
LGR*	M		HGR	UT_E_HY_GND_GROUNDROD	NFO EX DESC ONLY										LGR*		$*
LGW*	M		HGW	UT_E_HY_GND_GUYWIRE	NFO EX DESC ONLY										X		$*

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
LIA*	M		NFO EX Basic X	UT_E_HY_AER_WIRE_LIGHT	NFO EX DESC ONLY										X		Lighting Aerial Wire
LIMWASTE*	M	Y	NFO EX Basic X	IN_E_WM_BND_DUMPAREA	NFO EX DESC ONLY	X											Dump Area Boundary
LIU*	M		NFO EX Basic X	UT_E_HY_UND_CABLE_LIGHT	NFO EX DESC ONLY										X		Lighting Underground Cable
LJB*	M		HJB	UT_E_HY_GND_JUNCTIONBOX	NFO EX DESC ONLY										LJB*		$*
LPANEL	M		NFO EX Basic X	UT_E_HY_GND_PANELLIGHT	NFO EX DESC ONLY										X		$*
LS	B		LS	UT_E_HY_GND_LIGHTSTANDARD	NFO EX DESC ONLY										LS		Hydro Light Standard $+
LUC*	M		NFO EX Basic X	UT_E_HY_UND_CONDUIT_LIGHT	NFO EX DESC ONLY										X		Lighting Underground Ducts
MARS*	M	Y	NFO EX Basic X	LB_E_NF_WAT_SWAMP	NFO EX DESC ONLY	X											SWAMP
MB	M		MB	LU_E_LF_MSC_MAILBOX	NFO EX DESC ONLY				MB								Mail Box

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP										DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
METAL	M		NFO EX Basic X	IN_E_RS_GND_METAL	NFO EX MATERIALS	X		X									METAL
MH	M		MH	IN_E_WW_MSC_MH	NFO EX MHs	MH									MH		Unknown or Unidentified Manhole
MHB	M		MHB	UT_E_BL_GND_MH	NFO EX MHs	MHB									MHB		Bell Manhole
MHCOMB	M		MHCOMB	IN_E_WW_COM_MH	NFO EX MHs	X								MHCOMB			Combined Sewer Manhole
MHG	M		MHG	UT_E_GS_GND_MH	NFO EX MHs	MHG									MHG		Gas Manhole
MHH	M		MHH	UT_E_HY_GND_MH	NFO EX MHs	MHSA									MHH		Hydro Electric Manhole
MHSA	M		MHSA	IN_E_WW_SEW_MH	NFO EX MHs	X								MHSA			Sanitary Sewer Manhole
MHST	M		MHST	IN_E_DS_SEW_MH	NFO EX MHs	X							MHST				Storm Manhole
MHT	M		MHT	IN_E_TS_GND_MH	NFO EX MHs	X					MHT						Traffic Manhole

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
NL	M		NL	LB_E_SV_CNT_NAIL	NFO EX DESC ONLY	X	NL										Nail
OBSW	M		OBSW	LB_E_GL_MSC_OBSERVWELL	NFO EX DESC ONLY			OBSW									Observation Well
OBV	M		OBV	IN_E_DS_DDS_PIPE	NFO EX DESC ONLY								OBV				Obvert Pipe Elevation Symbol Block
OG*	M	Y	NFO EX Basic X	LB_E_TM_GND_ELEV	NFO EX DESC ONLY	X											Original Ground Line
OPL*	M		NFO EX Basic X	UT_E_OL_UND_PIPE	NFO EX DESC ONLY										X		Oil Pipe Line
ORCH*	M	Y	NFO EX Basic X	LU_E_LF_MSC_ORCHARD	NFO EX DESC ONLY	X										X	ORCHARD
PAMKR*	M		NFO EX Basic X	IN_E_TS_PMK_PMARKS	NFO EX DESC ONLY	X				X							Pavement Marking
PAVER	M		NFO EX Basic X	IN_E_RS_GND_PAVER	NFO EX MATERIALS	X											PAVEMENT
PDM	B		PDM	IN_E_TS_MSC_PARKINGMACHINE	NFO EX DESC ONLY				PDM								Pay & Display Machine

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP										DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
PEC	B		PEC	IN_E_DS_DDS_CULVERT	NFO EX DESC ONLY								PEC				Culvert End Polyethylene
PI	B		PI	LB_E_SV_CNT_PI	NFO EX DESC ONLY	X	PI										Vertical Point of Intersection
PILLAR	M		PILLAR	LU_E_BS_BLD_PILLAR	NFO EX DESC ONLY			PILLAR									Pillars Building Stone/Concrete
PK	M		PK	LB_E_SV_CNT_NAIL	NFO EX DESC ONLY	X	PK										P.K. Nail, Spike, Rock Rivet
PKLOT*	M	Y	NFO EX Basic X	IN_E_RS_PRK_PARKINGLOT	NFO EX DESC ONLY	X											PARKINGLOT
PLAQ	M		NFO EX Basic X	LU_E_LF_MSC_PLAQUE	NFO EX DESC ONLY		X										$*
PLAYGND*	M		NFO EX Basic X	LU_E_PK_MSC_PLAYEQUIP	NFO EX DESC ONLY			X									Playground Equipment
PM	B		PM	IN_E_TS_MSC_PARKINGMETRE	NFO EX DESC ONLY				PM								Traffic Parking Meter

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
PMKR3-3*	M		NFO EX Basic X	IN_E_TS_PMK_LINE3-3	NFO EX DESC ONLY	X				X							Pavement Marks - 3-3
PMKRPED	M		NFO EX Basic X	IN_E_TS_PMK_LINE3-6	NFO EX DESC ONLY	X				X							$*
PMKRST*	M		NFO EX Basic X	IN_E_TS_PMK_LINE450_150	NFO EX DESC ONLY	X				X							Pavement Marking - Stop Line
PMKRWH*	M		NFO EX Basic X	IN_E_TS_PMK_LINE600	NFO EX DESC ONLY	X				X							Pavement Marking - White Line
PMKRY*	M		NFO EX Basic X	IN_E_TS_PMK_LINE100YELLOW	NFO EX DESC ONLY	X				X							Pavement Marking - Yellow Line
POND*	M	Y	NFO EX Basic X	LB_E_NF_WAT_POND	NFO EX DESC ONLY	X											Pond Edge
PORCH*	M		NFO EX Basic X	LU_E_BS_BLD_PORCH	NFO EX DESC ONLY			PORCH*									Porch Top

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
POST	M		POST	LU_E_LF_MSC_POST	NFO EX DESC ONLY				POST								Barrier Post $+
POT	M		NFO EX Basic X	LU_E_LF_MSC_PLANTER	NFO EX DESC ONLY				X								Planter Streetscaping
PROP*	M		NFO EX Basic X	LB_E_SV_BND_PROPERTY	NFO EX DESC ONLY	X	X										Property Line
PVCC*	B		PVCC	IN_E_DS_DDS_CULVERTPVC	NFO EX DESC ONLY								PVCC				Culvert End PolyVinyl Chloride
RAIL*	M	Y	NFO EX Basic X	TR_E_RL_TRK_CL	NFO EX DESC ONLY			X									Rail Top
RAMP	M	Y	RAMP	IN_E_TS_PMK_SYMBOLS	NFO EX DESC ONLY	X		X									Wheelchair Ramp Symbol
RB	B		RB	LB_E_SV_MON_BAR	NFO EX DESC ONLY	X	RB										Rock Bar Found
RECEP	B		RECEP	IN_E_TS_AER_POWER	NFO EX DESC ONLY										RECEP		Electrical Receptacle
RESER*	M	Y	NFO EX Basic X	IN_E_WS_DST_PIPE	NFO EX DESC ONLY	X						X					Watermain (Distribution) Plan View

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP										DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
RETB*	M	Y	NFO EX Basic X	LU_E_LF_WAL_RETAINWALL_BRK	NFO EX DESC ONLY	X		X									RETAINWALL_BRK
RETC*	M	Y	NFO EX Basic X	LU_E_LF_WAL_RETAINWALLCONC	NFO EX DESC ONLY	X		X									RETAINWALLCONC
RETG*	M	Y	NFO EX Basic X	LU_E_LF_WAL_GABIONWALL	NFO EX DESC ONLY	X		X									TOP OF GABIONS
RETW*	M	Y	NFO EX Basic X	LU_E_LF_WAL_RETAINWALL	NFO EX DESC ONLY	X		X									Retaining Wall Wood Timber
RIB	B		RIB	LB_E_SV_MON_BAR	NFO EX DESC ONLY	X	RIB										Round Iron Bar Found
RIPRAP	M		NFO EX Basic X	IN_E_RS_GND_RIPRAP	NFO EX MATERIALS	X											RIPRAP
RIVER*	M	Y	NFO EX Basic X	LB_E_NF_WAT_RIVER	NFO EX DESC ONLY	X											RIVER
ROCK*	M		NFO EX Basic X	LB_E_NF_ETH_OUTCROP	NFO EX DESC ONLY	X											Rock Outcrop Line
RP	B		RP	LB_E_SV_MON_BAR	NFO EX DESC ONLY	X	RP										Rock Post

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP										DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
RPL	B		RPL	LB_E_SV_MON_BAR	NFO EX DESC ONLY	X	RPL										Rock Plug Found
RRFL	B		RRFL	TR_E_RL_SGN_FLASHLIGHT	NFO EX DESC ONLY			RRFL									Railway Crossing Flashing Light
RRFLB	B		RRFL	TR_E_RL_SGN_FLASHLIGHT	NFO EX DESC ONLY			RRFLB									Railway Crossing Flashing Light & Bell
RRGFL	B		RRGFL	TR_E_RL_SGN_FLASHLIGHT	NFO EX DESC ONLY			RRGFL									Railway Crossing Gate and Flashing Light
RRGFLB	B		RRGFL	TR_E_RL_SGN_FLASHGATE	NFO EX DESC ONLY			RRGFLB									Railway Crossing Gate and Flashing Light & Bell
RRS	B		RRS	IN_E_TS_SGN_WARNING	NFO EX DESC ONLY			RRS									Railway Crossing Sign
RRSBOX	M		RRSBOX	TR_E_RL_GND_SWITCHBOX	NFO EX DESC ONLY			RRSBOX									Railway Switch Box
RRSCB	M		RRSCB	TR_E_RL_GND_SIGNALCONTROLBOX	NFO EX DESC ONLY			RRSCB									Railway Signal Control Box
RRWW	B		RRWW	TR_E_RL_GND_WIGWAG	NFO EX DESC ONLY			RRWW									Railway Wig Wag Sign

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP										DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
RRWWB	B		RRWW	TR_E_RL_GND_WIGWAG	NFO EX DESC ONLY			RRWWB									Railway Wig Wag & Bell Sign
RWY*	M	Y	NFO EX Basic X	TR_E_RL_TRK_CL	NFO EX DESC ONLY	X		X									CLTRACKS
SACL*	M		NFO EX Basic X	IN_E_WW_SEW_PIPE	NFO EX DESC ONLY									X			Sanitary Sewer
SALAT*	M		NFO EX Basic X	IN_E_WW_SER_LATERAL	NFO EX DESC ONLY									X			Sanitary Lateral
SANTOP	M		SANTOP	IN_E_WW_SER_LEACHATEPIPE	NFO EX DESC ONLY									SANTOP			Top of Sanitary Leachpipe Pipe Elevation Label
SAW*	M		NFO EX Basic X	IN_E_RS_RDY_SAWCUT	NFO EX DESC ONLY	X				X							SAWCUT
SCALE	B		SCALE	LU_E_LF_MSC_BENCH	NFO EX DESC ONLY			SCALE									Weigh scale
SDCSP*	M		NFO EX Basic X	IN_E_DS_SEW_PIPE_SD_CSP	NFO EX DESC ONLY								X				Subdrain CSP
SDPE*	M		NFO EX Basic X	IN_E_DS_SEW_PIPE_SD_PE	NFO EX DESC ONLY								X				Subdrain PE

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
SEPTIC*	M	Y	NFO EX Basic X	IN_E_WW_BND_SEPTICFIELD	NFO EX DESC ONLY	X								X			SEPTICFIELD
SEPTICT	M		SEPTICT	IN_E_WW_MSC_MH	NFO EX DESC ONLY									SEPTICT			Top of Septic Tank Elevation Label
SH	M		SH	IN_E_WS_DST_HEAD	NFO EX DESC ONLY							SH					Sprinkler Head
SHA*	M	Y	NFO EX Basic X	IN_E_RS_RDY_SHDASPH	NFO EX DESC ONLY	X				X							Asphalt - Shoulder
SHC*	M	Y	NFO EX Basic X	IN_E_RS_RDY_SHDCONC	NFO EX DESC ONLY	X				X							Concrete - Shoulder
SHG*	M	Y	NFO EX Basic X	IN_E_RS_RDY_SHDGRAN	NFO EX DESC ONLY	X				X							Shoulder Granular
SHLD*	M	Y	NFO EX Basic X	IN_E_RS_RDY_SHOULDER	NFO EX DESC ONLY	X				X							SHOULDER
SHRBC	B		SHRBC	LB_E_NF_VEG_SHRUBCONIF	NFO EX DESC ONLY											SHRBC	Shrub Coniferous $+
SHRBD	B		SHRBD	LB_E_NF_VEG_SHRUBDECID	NFO EX DESC ONLY											SHRBD	Shrub Deciduous $+

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
SIB	B		SIB	LB_E_SV_MON_BAR	NFO EX DESC ONLY	X	SIB										Standard Iron Bar $+
SIGN	B		SIGN	IN_E_TS_SGN_WARNING	NFO EX DESC ONLY						SIGN						Traffic Sign - Warning $+
SIGNADV	B		SIGNADV	LU_E_LF_MSC_SIGN	NFO EX DESC ONLY				ADV								Sign Advertising (Private)
SIGNADV	B		SIGNADV	IN_E_TS_SGN_SIGN	NFO EX DESC ONLY				SIGNADV								Advertising Sign $+
SIGNBUS	B		SIGNBUS	TR_E_TN_SGN_BUSSTOPSIGN	NFO EX DESC ONLY				SIGNBUS								Bus Stop Sign
SIGNINFO	B		SIGNINFO	IN_E_TS_SGN_INFORMATION	NFO EX DESC ONLY						SIGNINFO						Traffic Sign - Information $+
SIGNNOID	B		SIGNNOID	IN_E_TS_SGN_SIGNUNIDENTIFIED	NFO EX DESC ONLY						SIGNNOID						Traffic Sign - No Identification $+
SIGNREG	B		SIGNREG	IN_E_TS_SGN_REGULATORY	NFO EX DESC ONLY						SIGNREG						Traffic Sign - Regulatory $+

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP										DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
SIGNSTOP	B		SIGNSTOP	IN_E_TS_SGN_REGULATORY	NFO EX DESC ONLY						SIGNSTOP						Stop Sign
SILL*	M		NFO EX Basic X	LU_E_BS_BLD_SILL	NFO EX DESC ONLY			X									DOOR SILL
SSIB	B		SSIB	LB_E_SV_MON_BAR	NFO EX DESC ONLY	X	SSIB										Short Standard Iron Bar Found
STATU	M		NFO EX Basic X	LU_E_LF_MSC_STATUE	NFO EX DESC ONLY			X									$*
STCB*	M		NFO EX Basic X	IN_E_DS_SEW_CBLEAD	NFO EX DESC ONLY								X				Storm Sewer Catchbasin Lead
STCL*	M		NFO EX Basic X	IN_E_DS_SEW_PIPE	NFO EX DESC ONLY								X				PIPESTM
STEM	M		STEM	IN_E_WS_DST_VALVESTEM	NFO EX DESC ONLY							STEM					Water Valve Stem (Distribution)
STEP*	M	Y	NFO EX Basic X	LU_E_BS_BLD_STAIRS	NFO EX DESC ONLY	X		X									STAIRS
STLAT*	M		NFO EX Basic X	IN_E_DS_SER_LEAD	NFO EX DESC ONLY								X				Rear Yard Catch Basin Lead

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
STMTOP	M		STMTOP	IN_E_DS_SEW_PIPE	NFO EX DESC ONLY								STMTOP				Top of Storm / Outfall Pipe
STOCK*	M	Y	NFO EX Basic X	LU_E_LF_MSC_STOCKPILE	NFO EX DESC ONLY	X											STOCKPILE
STONE	M		NFO EX Basic X	IN_E_RS_GND_STONE	NFO EX MATERIALS	X											STONE
STRM*	M	Y	STRM	LB_E_NF_WAT_STREAM	NFO EX DESC ONLY	STRM*											STREAM
STUMP	M		STUMP	LB_E_NF_VEG_STUMP	NFO EX DESC ONLY											STUMP	Stump $+
SURFT	M		NFO EX Basic X	IN_E_RS_GND_SURFTREAT	NFO EX MATERIALS	X											SURFACE TREATMENT
SW*	M	Y	NFO EX Basic X	IN_E_RS_SWK_SIDEWALK	NFO EX DESC ONLY	X			X								SIDEWALK
T3DIR	B		T3DIR	IN_E_TS_PMK_SYMBOLS	NFO EX DESC ONLY	X				T3DIR							Traffic Pavement Arrow - Left - Right - Straight
T4FB	B		T4FB	IN_E_TS_AER_SIGNALHEAD	NFO EX DESC ONLY						T4FB						Traffic Control Device - 4 - Way Flashing Beacon

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
TA	M		NFO EX Basic X	IN_E_TS_AER_WIRE	NFO EX DESC ONLY						X						$*
TANC	B		TANC	IN_E_TS_GND_ANCHOR	NFO EX DESC ONLY						TANC						$*
TAPSC	B		TAPSC	IN_E_TS_AER_POWER	NFO EX DESC ONLY						TAPSC						Traffic Control Equipment - Cabinet w/ Power Supply
TCCF	B		TCCF	IN_E_TS_GND_CONTROLLER	NFO EX DESC ONLY						TCCF						Traffic Control Equipment - Cabinet
TCCP	B		TCCP	IN_E_TS_GND_CONTROLLER	NFO EX DESC ONLY						TCCP						Traffic Control Equipment - Cabinet w/ Pad
TDISCON	M		NFO EX Basic X	IN_E_TS_GND_DISCONNECT	NFO EX DESC ONLY						X						$*
TDLD	B		TDLD	IN_E_TS_GND_LOOPS	NFO EX DESC ONLY						TDLD						Traffic Detectors - Double Loop Detector
TFBC	B		TFBC	IN_E_TS_AER_SIGNALHEAD	NFO EX DESC ONLY						TFBC						Traffic Control Device - Flashing Beacon
TFM	B		TFM	IN_E_TS_AER_SIGNALHEAD	NFO EX DESC ONLY						TFM						Traffic Control Device - Flashing Mechanism

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP										DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
TGFL	B		TGFL	IN_E_TS_SGN_WARNING	NFO EX DESC ONLY						TGFL						Traffic Symbol - Gate with Flashing Light
TGR	M		TGR	IN_E_TS_GND_POLE	NFO EX DESC ONLY						TGR						$*
TGW	M		TGW	IN_E_TS_GND_GUYWIRE	NFO EX DESC ONLY						X						$*
TH	M		TH	LB_E_GL_TST_TESTHOLE	NFO EX DESC ONLY	TH											Test Hole
THSHL	B		THSHL	IN_E_TS_AER_SIGNALHEAD	NFO EX DESC ONLY						THSHL						Traffic Signals - Highway Head w Backboard
THSHM	B		THSHM	IN_E_TS_AER_SIGNALHEAD	NFO EX DESC ONLY						THSHM						Traffic Signals - Highway Head w Backboard
TILE	M		NFO EX Basic X	IN_E_RS_GND_CERAMICTILE	NFO EX MATERIALS	X											TILE
TITS	B		TITS	IN_E_TS_SGN_WARNING	NFO EX DESC ONLY						TITS						Traffic Control Device - Illumimated Traffic Sign - Single
TITSD	B		TITSD	IN_E_TS_SGN_WARNING	NFO EX DESC ONLY						TITSD						Traffic Control Device - Illumimated Traffic Sign - Double

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
TITSF	B		TITSF	IN_E_TS_SGN_WARNING	NFO EX DESC ONLY						TITSF						Traffic Control Device - Illumimated Traffic Sign / Beacon
TJB	M		TJB	IN_E_TS_GND_JUNCTIONBOX	NFO EX DESC ONLY						TJB						Traffic Signal Junction Box $+
TL	M		TL	IN_E_TS_GND_POLE	NFO EX DESC ONLY						TL						Traffic Pole
TLD	M		NFO EX Basic X	IN_E_TS_GND_LOOPS	NFO EX DESC ONLY						X						$*
TLEFT	B		TLEFT	IN_E_TS_PMK_PMARKS	NFO EX DESC ONLY	X				TLEFT							Traffic Pavement Arrow - Left
TLTRT	B		TLTRT	IN_E_TS_PMK_PMARKS	NFO EX DESC ONLY	X				TLTRT							Traffic Pavement Arrow - Left - Right
TLTST	B		TLTST	IN_E_TS_PMK_PMARKS	NFO EX DESC ONLY	X				TLTST							Traffic Pavement Arrow - Left - Straight
TLUM	M		NFO EX Basic X	IN_E_TS_AER_LUMINAIRE	NFO EX DESC ONLY						X						$*
TNLS	M		TNLS	IN_E_TS_GND_LOOPS	NFO EX DESC ONLY						TNLS						Traffic Detectors - Loop Numbers

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
TNOTURN	B		TNOTURN	IN_E_TS_PMK_PMARKS	NFO EX DESC ONLY	X				TNOTURN							Traffic Pavement Arrow - No turn
TOD*	M	Y	NFO EX Basic X	IN_E_DS_DDS_DITCHTOP	NFO EX DESC ONLY	X							X				DITCH TOP
TOS*	M	Y	NFO EX Basic X	LB_E_TM_GND_SLOPETOP	NFO EX DESC ONLY	X											Top of Slope
TP*	B		TP	LB_E_SV_CNT_CONTROLPNT	NFO EX DESC ONLY	X	TP*										Control Point Horizontal
TPB	B		TPB	IN_E_TS_AER_HEAD	NFO EX DESC ONLY				TPB								Pedestrian Push button
TPB1	B		TPB1	IN_E_TS_AER_HEAD	NFO EX DESC ONLY						TPB1						Traffic Detectors - Pedestrian Pushbutton w Arrow Right
TPB2	B		TPB	IN_E_TS_AER_HEAD	NFO EX DESC ONLY						TPB2						Traffic Detectors - Pedestrian Pushbutton w Arrow Left
TPH	B		TPH	IN_E_TS_AER_SIGNALHEAD	NFO EX DESC ONLY						TPH						Traffic Signals - Pedestrian Head
TPLD	B		TPLD	IN_E_TS_GND_LOOPS	NFO EX DESC ONLY						TPLD						Traffic Detectors - Powerhead Loop Detector

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
TPSC	B		TPSC	IN_E_TS_AER_POWER	NFO EX DESC ONLY						TPSC						Traffic Power Supply Cabinet
TPX	B		TPX	IN_E_TS_AER_HEAD	NFO EX DESC ONLY						TPX						Traffic Control Device - Pedestrian Crossover
TRACK*	M	Y	NFO EX Basic X	TR_E_RL_TRK_RAIL	NFO EX DESC ONLY			X									Railway Track
TRAF*	M		NFO EX Basic X	IN_E_TS_UND_CONDUIT	NFO EX DESC ONLY						X						Traffic Underground Conduit
TRAIL*	M	Y	NFO EX Basic X	LU_E_LF_MSC_TRAIL	NFO EX DESC ONLY	X											TRAIL
TREE*	M		NFO EX Basic X	LB_E_NF_VEG_TREE	NFO EX DESC ONLY											X	Tree Line
TRIGHT	B		TRIGHT	IN_E_TS_PMK_SYMBOLS	NFO EX DESC ONLY	X				TRIGHT							Traffic Pavement Arrow - Right
TRTST	B		TRTST	IN_E_TS_PMK_SYMBOLS	NFO EX DESC ONLY	X				TRTST							Traffic Pavement Arrow - Right - Straight
TSDLD	M		TSDLD	IN_E_TS_GND_LOOPS	NFO EX DESC ONLY						TSDLD						Traffic Detectors - Probe Vehicle Detector

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP										DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
TSH1	B		TSH1	IN_E_TS_AER_SIGNALHEAD	NFO EX DESC ONLY						TSH1						HWY SIGNAL W/ 30cm RED & 20 cm AMB/GR LENSES
TSH2	B		TSH2	IN_E_TS_AER_SIGNALHEAD	NFO EX DESC ONLY						TSH2						STD. SIGNAL W/ 20cm LENSES
TSH3	B		TSH3	IN_E_TS_AER_SIGNALHEAD	NFO EX DESC ONLY						TSH3						STD. SIGNAL W/O BACKBOARD
TSH4	B		TSH 4 or 5	IN_E_TS_AER_SIGNALHEAD	NFO EX DESC ONLY						TSH4						HWY SIGNAL W/ 30cm LENSES
TSH5	B		TSH 4 or 5	IN_E_TS_AER_SIGNALHEAD	NFO EX DESC ONLY						TSH5						SPECIAL SIGNAL W/ ARROW INDICATION
TSH6	B		TSH6	IN_E_TS_AER_SIGNALHEAD	NFO EX DESC ONLY						TSH6						HWY SIGNAL W/ 30cm RED & OVERHEAD CABLE
TSH7	B		TSH7	IN_E_TS_AER_SIGNALHEAD	NFO EX DESC ONLY						TSH7						SPECIAL SIGNAL W/ ONE OR MORE PROGRAMMABLE LENSES
TSLD	B		TSLD	IN_E_TS_GND_LOOPS	NFO EX DESC ONLY						TSLD						Traffic Detectors - Simple Loop Detector
TSLDC	B		TSLDC	IN_E_TS_GND_LOOPS	NFO EX DESC ONLY						TSLDC						Traffic Detectors - Loop Detector

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
TSSH	B		TSSH	IN_E_TS_AER_SIGNALHEAD	NFO EX DESC ONLY						TSSH						Traffic Signals - Standard Head
TSSHB	B		TSSHB	IN_E_TS_AER_SIGNALHEAD	NFO EX DESC ONLY						TSSHB						Traffic Signals - Standard Head w Backboard
TSSHR	B		TSSHR	IN_E_TS_AER_SIGNALHEAD	NFO EX DESC ONLY						TSSHR						Traffic Signals - Special Head w Backboard
TSSW	B		TSSW	IN_E_TS_AER_SIGNALHEAD	NFO EX DESC ONLY						TSSW						Traffic Signals - Span Wire Head w Backboard
TSV	B		TSV	IN_E_WS_DST_VALVE	NFO EX DESC ONLY							TSV					Tapping Sleeve and Valve
TSVD1	B		TSVD1	IN_E_TS_GND_LOOPS	NFO EX DESC ONLY						TSVD1						Traffic Detectors - Sonic Vehicle Detector
TSVD2	B		TSVD2	IN_E_TS_GND_LOOPS	NFO EX DESC ONLY						TSVD2						Traffic Detectors - Sonic Vehicle Detector 2
TTCC	B		TTCC	IN_E_TS_GND_CONTROLLER	NFO EX DESC ONLY						TTCC						Traffic Control Equipment - 2 Cabinets w/ Pad Side by Side
TTCCF	B		TTCCF	IN_E_TS_GND_CONTROLLER	NFO EX DESC ONLY						TTCCF						Traffic Control Equipment - 2 Cabinets w/ Pad In Line

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
TTSO1	B		TTSO1	IN_E_TS_SGN_WARNING	NFO EX DESC ONLY						TTSO1						Traffic Control Device - Overhead Sign - Lane Control
TTSOA	B		TTSOA	IN_E_TS_SGN_WARNING	NFO EX DESC ONLY						TTSOA						Traffic Control Device - Overhead Sign - Changeable
TTSOB	B		TTSOB	IN_E_TS_SGN_WARNING	NFO EX DESC ONLY						TTSOB						Traffic Control Device - Overhead Sign - Static
TTVCF	B		TTVCF	IN_E_TS_AER_MSC	NFO EX DESC ONLY						TTVCF						Traffic Control Device - Camera - Fixed Location
TTVCP	B		TTVCF	IN_E_TS_AER_MSC	NFO EX DESC ONLY						TTVCP						Traffic Control Device - Camera - Pan and Tilt
TUC*	M		NFO EX Basic X	IN_E_TS_UND_INTERCONNECT	NFO EX DESC ONLY										X		INTERCONNECT
TVA*	M		NFO EX Basic X	UT_E_TV_AER_WIRE	NFO EX DESC ONLY										X		CATV Wire Aerial
TVC	B		TVC	IN_E_TS_AER_MSC	NFO EX DESC ONLY						TVC						Traffic Control Device - Video Camera
TVD	B		TVD	IN_E_TS_AER_MSC	NFO EX DESC ONLY						TVD						Traffic Detectors - Video Detector

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP										DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
UP	M		UP	LU_E_LF_MSC_POSTUNIDENTIFIED	NFO EX DESC ONLY										UP		Utility Pole Unidentified $+
VAULT*	M		NFO EX Basic X	UT_E_HY_UND_VAULT	NFO EX DESC ONLY										X		VAULT
VCM	B		VCM	LB_E_SV_CNT_VERTICAL	NFO EX DESC ONLY	X	VCM										VERTICAL CONTROL MONUMENT
VF*	M	Y	NFO EX Basic X	IN_E_DS_DDS_HEADWALL	NFO EX DESC ONLY			X									HEADWALL
VINE*	M	Y	NFO EX Basic X	LU_E_LF_MSC_VINEYARD	NFO EX DESC ONLY	X										X	VINEYARD
VLD*	M		VLD	IN_E_TS_GND_LOOPS	NFO EX DESC ONLY										VLD*		Vehicle Loop Detector
WALL*	M	Y	NFO EX Basic X	LU_E_LF_WAL_RETAINWALL	NFO EX DESC ONLY	X		X									RETAINWALL
WASTE	B		WASTE	LU_E_LF_MSC_WASTERECEPTACLE	NFO EX DESC ONLY				WASTE								Waste Receptacle $+
WAT	M		NFO EX Basic X	IN_E_WS_DST_PIPE	NFO EX DESC ONLY							X					Watermain (Distribution) Plan View

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
WCHIPS	M		NFO EX Basic X	IN_E_RS_GND_WOODCHIPS	NFO EX MATERIALS	X											WOOD CHIPS
WDEV	B		WDEV	IN_E_WS_DST_WATERDEVICE	NFO EX DESC ONLY							WDEV					Water Device - Blow off/Sample Station/Chlorine Booster Station
WEEP*	M		NFO EX Basic X	IN_E_DS_SEW_PIPE_SD	NFO EX DESC ONLY								X				Weeping Tile
WELL	M		WELL	LU_E_LF_MSC_WELL	NFO EX DESC ONLY							WELL					Water Well
WETWELL	M		WETWELL	IN_E_WW_STR_PUMPSTATION	NFO EX DESC ONLY			WETWELL									Wet Well at Sewage Pumping Station
WFALLS	M		NFO EX Basic X	LB_E_NF_WAT_FALLS	NFO EX DESC ONLY	X											Water Falls Label
WINDM	M		NFO EX Basic X	LU_E_LF_MSC_WINDMILL	NFO EX DESC ONLY			X									Wind Mill
WL	M		NFO EX Basic X	LB_E_NF_WAT_WATERLEVEL_L	NFO EX DESC ONLY	X											Water Level Label
WLAT*	M		WLAT	IN_E_WS_SER_LATERAL	NFO EX DESC ONLY							WLAT*					Water Service Line

CODES IN DKS	Block or Marker	BREAKLINE	POINT STYLE	POINT LAYER	POINT LABEL	POINT GROUP											DESCRIPTION
						TIN-DTM	SURVEY MON	STURCTURES	STREETSCAPE	ROAD	TRAFFIC	WATER	STORM	SANITARY	UTILITIES	VEGETATION	
WM	B		WM	IN_E_WS_DST_METRE	NFO EX DESC ONLY							WM					Water Meter
WMC	M		WMC	IN_E_WS_DST_VALVECHAMBER	NFO EX DESC ONLY							X					Water Meter Chamber
WOOD	M		NFO EX Basic X	IN_E_RS_GND_WOOD	NFO EX MATERIALS	X											WOOD
WTOW	B		WTOW	IN_E_WS_DST_TOWER	NFO EX DESC ONLY			WTOW									Water Tower
WV	B		WV	IN_E_WS_DST_VALVE	NFO EX DESC ONLY	X						WV					Water Valve (Distribution) $+
WVBOX	B		WVBOX	IN_E_WS_DST_VALVEBOX	NFO EX DESC ONLY	X						WVBOX					$*
WVC	M		WVC	IN_E_WS_DST_VALVECHAMBER	NFO EX DESC ONLY	X						WVC					Water Valve Chamber

APPENDIX G
SAMPLE DRAWINGS

CC-1234

X-REFERENCES:

IMAGES:

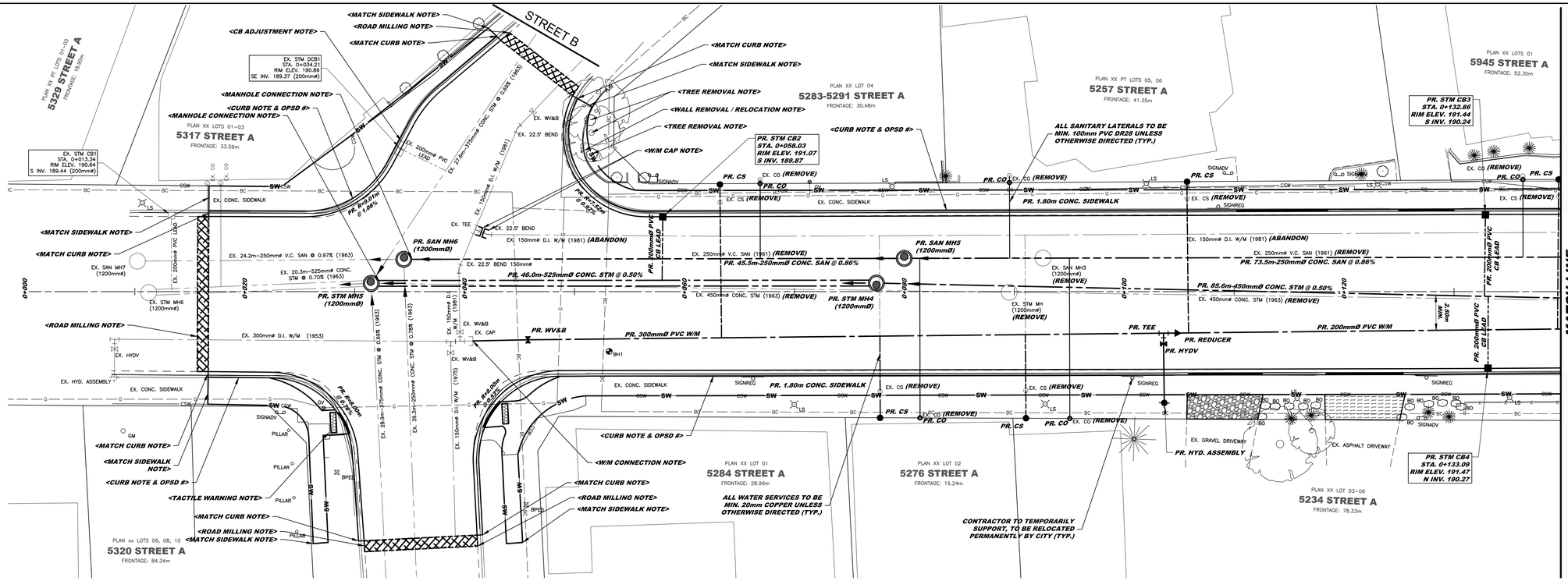
DRAWING NAME:

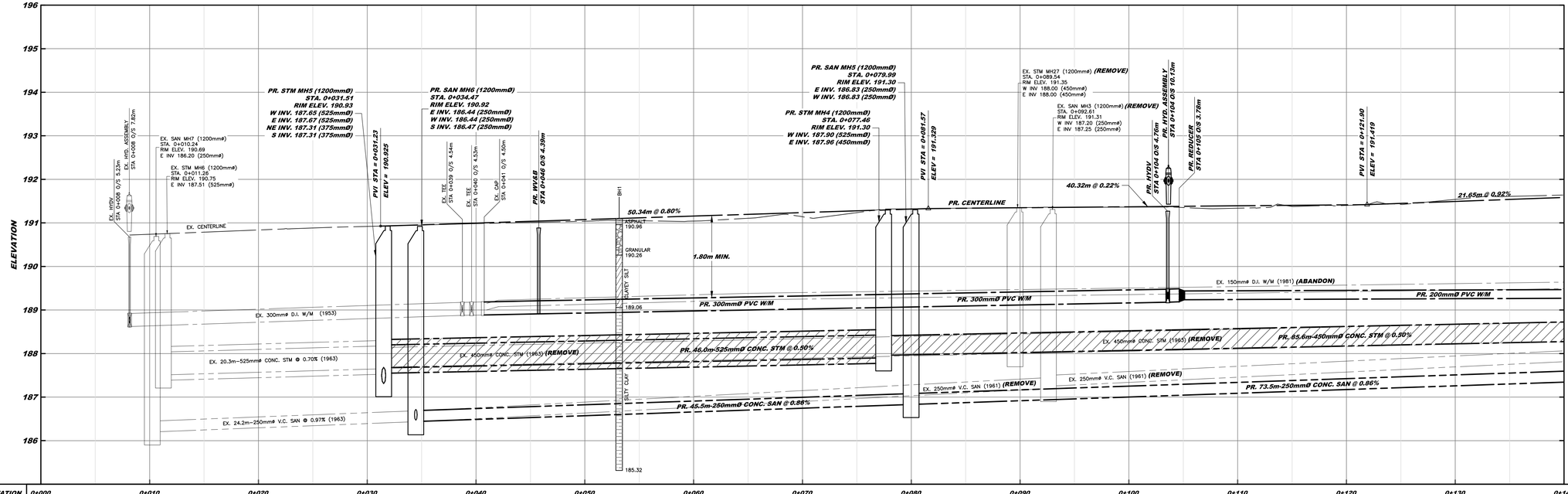
APPROVALS

MCE	YYYY/MM/DD
MTO/A	YYYY/MM/DD
REGION	YYYY/MM/DD
CHK	YYYY/MM/DD
NPCA	YYYY/MM/DD

UTILITIES

NRBH	YYYY/MM/DD
NRWM	YYYY/MM/DD
LOCAL HYDRO	YYYY/MM/DD
BAC	YYYY/MM/DD
CATV	YYYY/MM/DD





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EX ℄ ELEV		190.74	190.84	190.92	190.98	191.04	191.04	191.14	191.32	191.35	191.36	191.34	191.40	191.54	191.64	EX ℄ ELEV
C/L ELEV					191.00	191.08	191.16	191.24	191.32	191.35	191.37	191.39	191.41	191.49	191.59	C/L ELEV
EP SOUTH							191.01	191.09	191.15	191.19	191.23	191.27	191.31	191.36	191.45	EP SOUTH
EP NORTH					190.86	190.94	191.02	191.10	191.15	191.20	191.25	191.29	191.33	191.37	191.44	EP NORTH

NO.	REVISION	DATE	INIT.
		YYYY/MM/DD	XX
		YYYY/MM/DD	XX
		YYYY/MM/DD	XX
1	ISSUED FOR CONSTRUCTION	YYYY/MM/DD	XX
0	ISSUED FOR TENDER	YYYY/MM/DD	XX
A	ISSUED FOR APPROVAL	YYYY/MM/DD	XX

NOTES

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APPROVED BY	XXX

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BENCHMARK DATUM
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ELEVATION - XXX.XXX

Niagara Falls CANADA
City of Niagara Falls
4310 Queen Street
Niagara Falls, ON, Canada
L2E 6X5 T: 905-356-7521

CONSULTANT LOGO

CONSULTANT CONTACT INFORMATION

CONTRACT No. 2018-678-90
STREET A
FROM STREET B TO 140m E
ROAD RECONSTRUCTION & INFRASTRUCTURE REPLACEMENT
PLAN & PROFILE STA 0+000 TO STA 0+140

CONSULTANT FILE No.	123456
DATE	YYYY/MM/DD
SCALE	HOR: 1:200 m VER: 1:50 m
SHEET No.	1 OF XX
DWG No.	CC-1234
REV.	1

CC-5678

X-REFERENCES:

IMAGES:

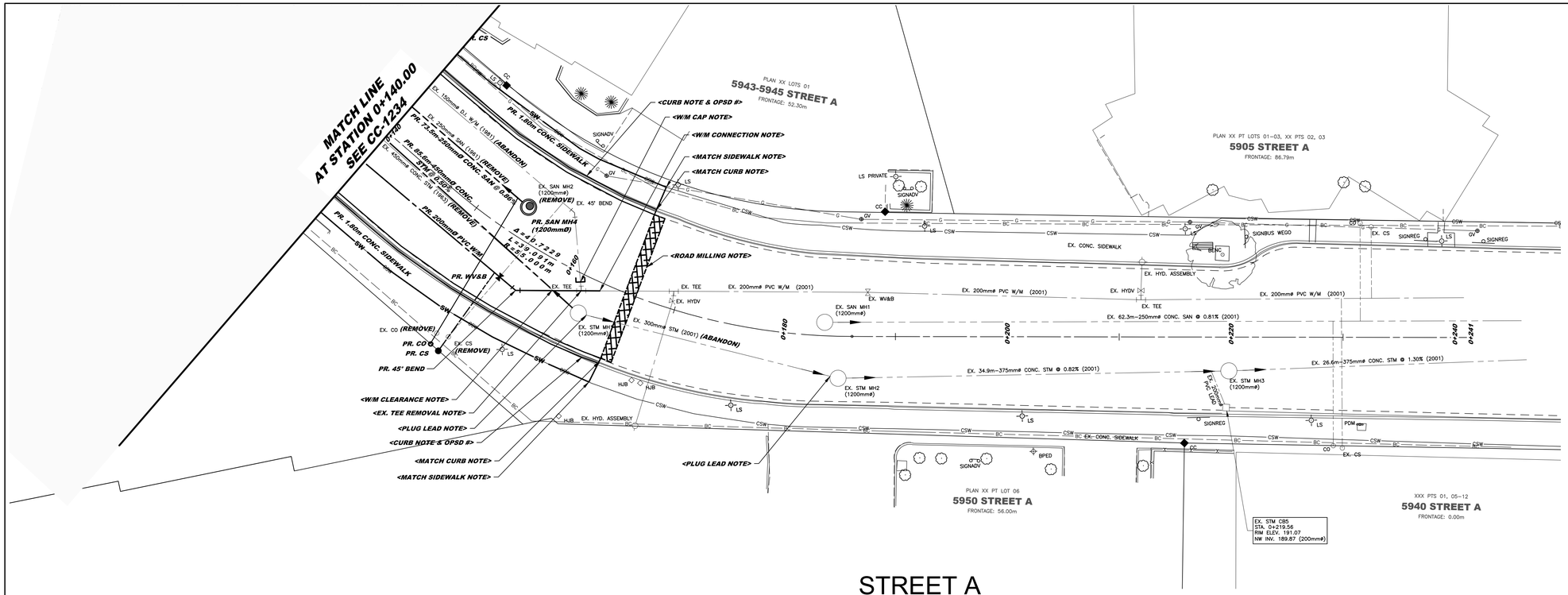
DRAWING NAME:

APPROVALS

MCE	YYYY/MM/DD
MTO	YYYY/MM/DD
MECP	YYYY/MM/DD
CNR	YYYY/MM/DD
NPCA	YYYY/MM/DD

UTILITIES

NRBN	YYYY/MM/DD
BELL	YYYY/MM/DD
LOCAL HYDRO	YYYY/MM/DD
GAS	YYYY/MM/DD
CATV	YYYY/MM/DD



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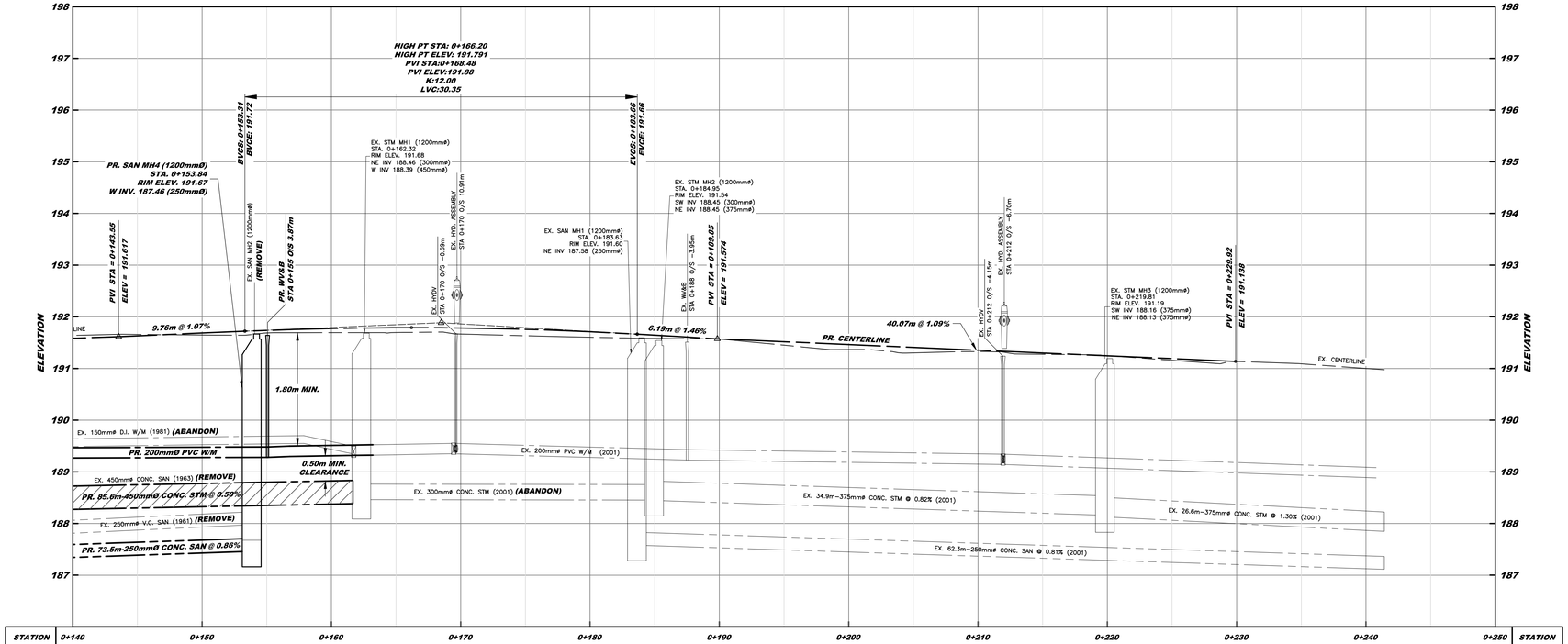

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EX ℄ ELEV	191.64	191.65	191.69	191.67	191.61	191.57	191.37	191.33	191.25	191.14	191.00		EX ℄ ELEV
C/L ELEV	191.58	191.69	191.77	191.78	191.71	191.57	191.46	191.35	191.25				C/L ELEV
EP SOUTH	191.45	191.55	191.64	191.66	191.59	191.45	191.34	191.23	191.12				EP SOUTH
EP NORTH	191.44	191.54	191.62	191.63	191.57	191.44	191.33	191.23	191.12				EP NORTH

NO.	REVISION	DATE	INIT.
		YYYY/MM/DD	XX
		YYYY/MM/DD	XX
		YYYY/MM/DD	XX
		YYYY/MM/DD	XX
		YYYY/MM/DD	XX
1	ISSUED FOR CONSTRUCTION	YYYY/MM/DD	XX
0	ISSUED FOR TENDER	YYYY/MM/DD	XX
A	ISSUED FOR APPROVAL	YYYY/MM/DD	XX

NOTES

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ELEVATION - XXX.XXX

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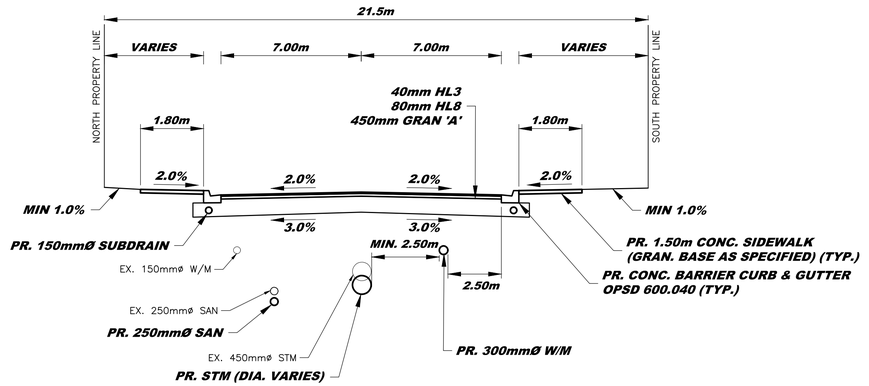
4310 Queen Street
Niagara Falls, ON, Canada
L2E 6X5 T: 905-356-7521

CONSULTANT CONTACT INFORMATION

CONTRACT No. 2018-678-90
STREET A
FROM STREET B TO 250m E
ROAD RECONSTRUCTION & INFRASTRUCTURE REPLACEMENT
PLAN & PROFILE STA 0+140 TO STA 0+250

CONSULTANT FILE No. 123456
DATE YYYY/MM/DD
SCALE HOR: 1:200 m VER: 1:50 m
SHEET No. 2 OF XX
DWG No. CC-5678
REV. 1



STREET A

FROM STA 0+060 TO STA 0+140

N.T.S.

TS-1

X-REFERENCES:

IMAGES:

APPROVALS

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MTO/CN	YYYY/MM/DD
MTO/CN	YYYY/MM/DD
CNR	YYYY/MM/DD
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DRAWING NAME:

UTILITIES

NRBN	YYYY/MM/DD
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LOCAL HYDRO	YYYY/MM/DD
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CATV	YYYY/MM/DD

NO.	REVISION	DATE	INIT.
1	ISSUED FOR CONSTRUCTION	YYYY/MM/DD	XX
0	ISSUED FOR TENDER	YYYY/MM/DD	XX
A	ISSUED FOR APPROVAL	YYYY/MM/DD	XX

NOTES

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DRAFTING	XXX
DESIGN	XXX
CHECKED BY	XXX
APPROVED BY	XXX

STAMP

STAMP

BENCHMARK DATUM
(PLACE # HERE)
(PLACE DESCRIPTION HERE)

ELEVATION - XXX.XXX

CONSULTANT LOGO

City of Niagara Falls
4310 Queen Street
Niagara Falls, ON, Canada
L2E 6X5 T: 905-356-7521

CONSULTANT CONTACT INFORMATION

CONTRACT No. 2018-678-90
STREET A

ROAD RECONSTRUCTION
INFRASTRUCTURE REPLACEMENT
TYPICAL SECTION

CONSULTANT FILE No.	123456
DATE	YYYY/MM/DD
SCALE	HOR: 1:200 m VER: 1:100 m
SHEET No.	5 OF XX
DWG No.	TS-1
REV.	1

CS-1

X-REFERENCES:

IMAGES:

DRAWING NAME:

APPROVALS

MOE	YYYY/MM/DD
UTILITIES	YYYY/MM/DD
NRBN	YYYY/MM/DD
NPCA	YYYY/MM/DD
LOCAL HYDRO	YYYY/MM/DD
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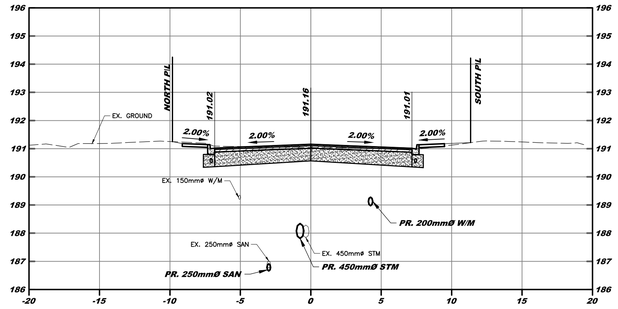
GAS	YYYY/MM/DD
BELL	YYYY/MM/DD
CATV	YYYY/MM/DD

0+060



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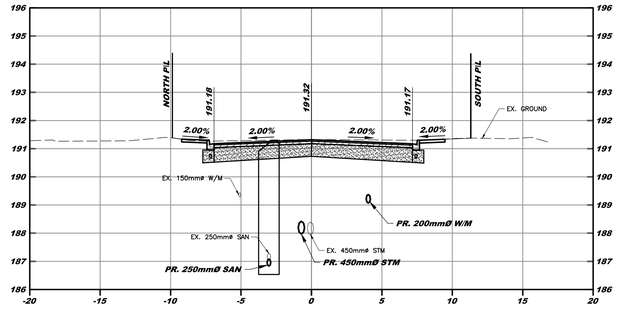

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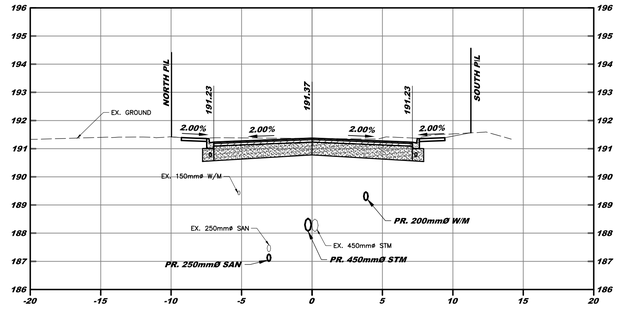

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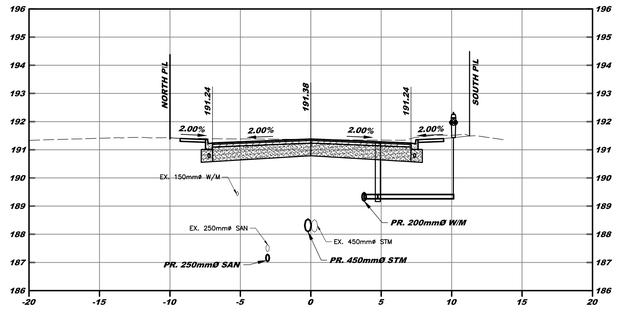

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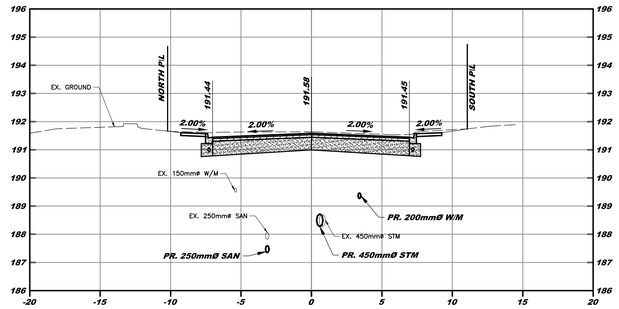

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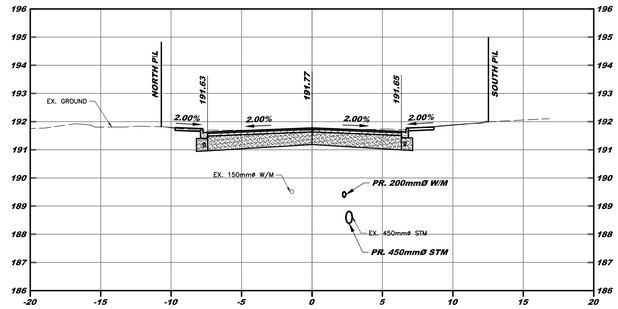

NO.	REVISION	DATE	INIT.
A	ISSUED FOR APPROVAL	YYYY/MM/DD	XX

NOTES

VISUAL EXAMPLE ONLY

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DRAFTING	XXX
DESIGN	XXX
CHECKED BY	XXX
APPROVED BY	XXX

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BENCHMARK DATUM
(PLACE # HERE)
(PLACE DESCRIPTION HERE)

ELEVATION - XXX.XXX

NiagaraFalls CANADA
City of Niagara Falls
4310 Queen Street
Niagara Falls, ON, Canada
L2E 6X5 T: 905-356-7521

CONSULTANT LOGO

CONSULTANT CONTACT INFORMATION

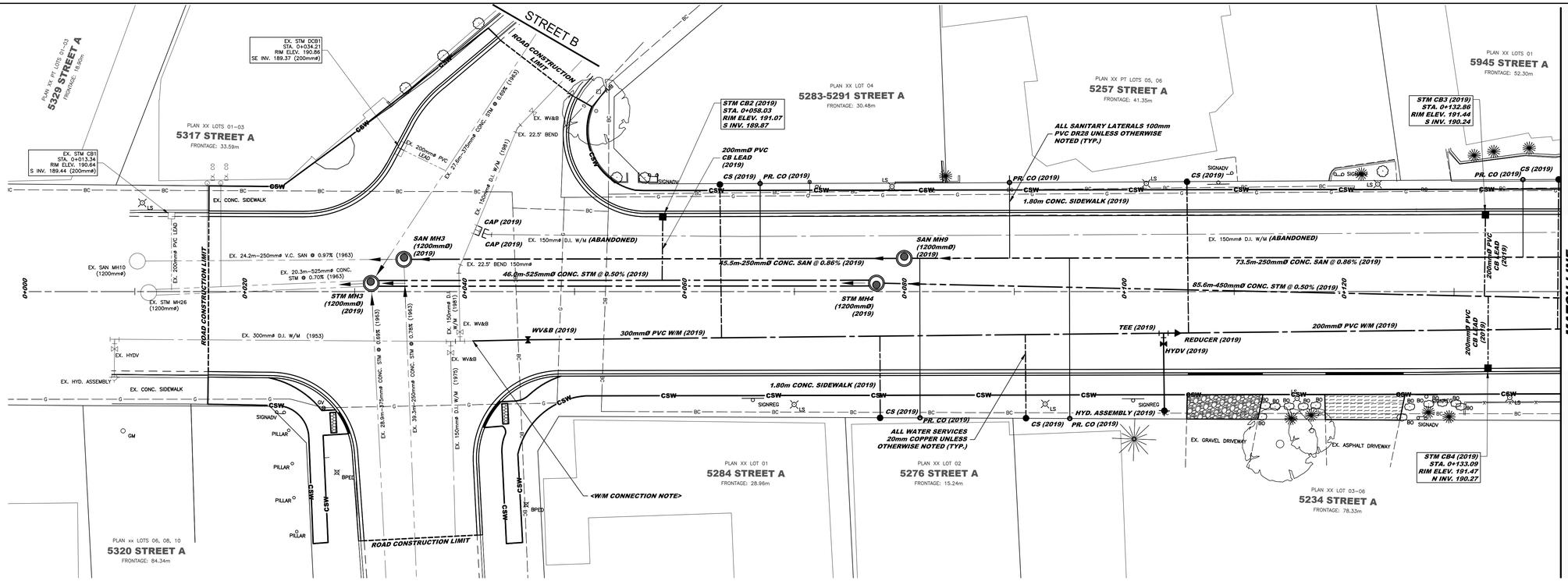
CONTRACT No. 2018-678-90
STREET A

ROAD RECONSTRUCTION
INFRASTRUCTURE REPLACEMENT
CROSS SECTIONS

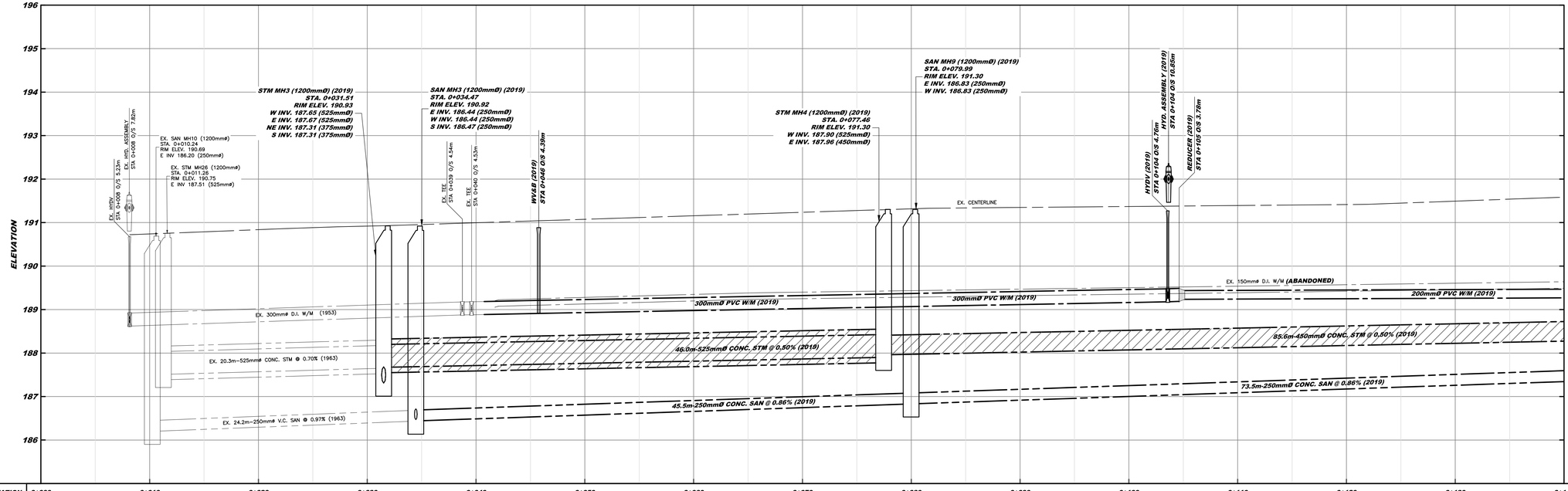
CONSULTANT FILE No.	123456
DATE	YYYY/MM/DD
SCALE	HOR: 1:200 m VER: 1:100 m
SHEET No.	6 OF XX
DWG No.	CS-1
REV.	1

CC-1234

X-REFERENCES:



STREET A



STATION	0+000	0+010	0+020	0+030	0+040	0+050	0+060	0+070	0+080	0+090	0+100	0+110	0+120	0+130	0+140	STATION
EX ℄ ELEV C/L ELEV		190.74	190.84	190.92	190.98	191.04	191.04	191.14	191.32	191.35	191.36	191.34	191.40	191.54	191.64	EX ℄ ELEV C/L ELEV
EP SOUTH							191.01	191.09	191.15	191.19	191.23	191.27	191.31	191.36	191.45	EP SOUTH
EP NORTH					190.86	190.94	191.02	191.10	191.15	191.20	191.25	191.29	191.33	191.37	191.44	EP NORTH

IMAGES:

APPROVALS

MSE	YYYY/MM/DD	
MTO/A	YYYY/MM/DD	
MECP	YYYY/MM/DD	
CNR	YYYY/MM/DD	
NPCA	YYYY/MM/DD	

DRAWING NAME:

UTILITIES

NRBN	YYYY/MM/DD
NRBN	YYYY/MM/DD
LOCAL HYDRO	YYYY/MM/DD
BELL	YYYY/MM/DD
GAS	YYYY/MM/DD
CATV	YYYY/MM/DD

NO.	REVISION	DATE	INIT.
2	AS-CONSTRUCTED	YYYY/MM/DD	XX
1	ISSUED FOR CONSTRUCTION	YYYY/MM/DD	XX
0	ISSUED FOR TENDER	YYYY/MM/DD	XX
A	ISSUED FOR APPROVAL	YYYY/MM/DD	XX

NOTES

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DESIGN	XXX
CHECKED BY	XXX
APPROVED BY	XXX

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BENCHMARK DATUM (PLACE # HERE)
(PLACE DESCRIPTION HERE)

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City of Niagara Falls
4310 Queen Street
Niagara Falls, ON, Canada
L2E 6X5 T: 905-356-7521

CONSULTANT CONTACT INFORMATION

CONTRACT No. 2018-678-90
STREET A
FROM STREET B TO 140m E
ROAD RECONSTRUCTION & INFRASTRUCTURE REPLACEMENT
PLAN & PROFILE STA 0+000 TO STA 0+140

CONSULTANT FILE No. 123456
DATE YYYY/MM/DD
SCALE HOR: 1:200 m VER: 1:50 m
SHEET No. 1 OF XX
DWG No. CC-1234
REV. 2

CC-5678

X-REFERENCES:

IMAGES:

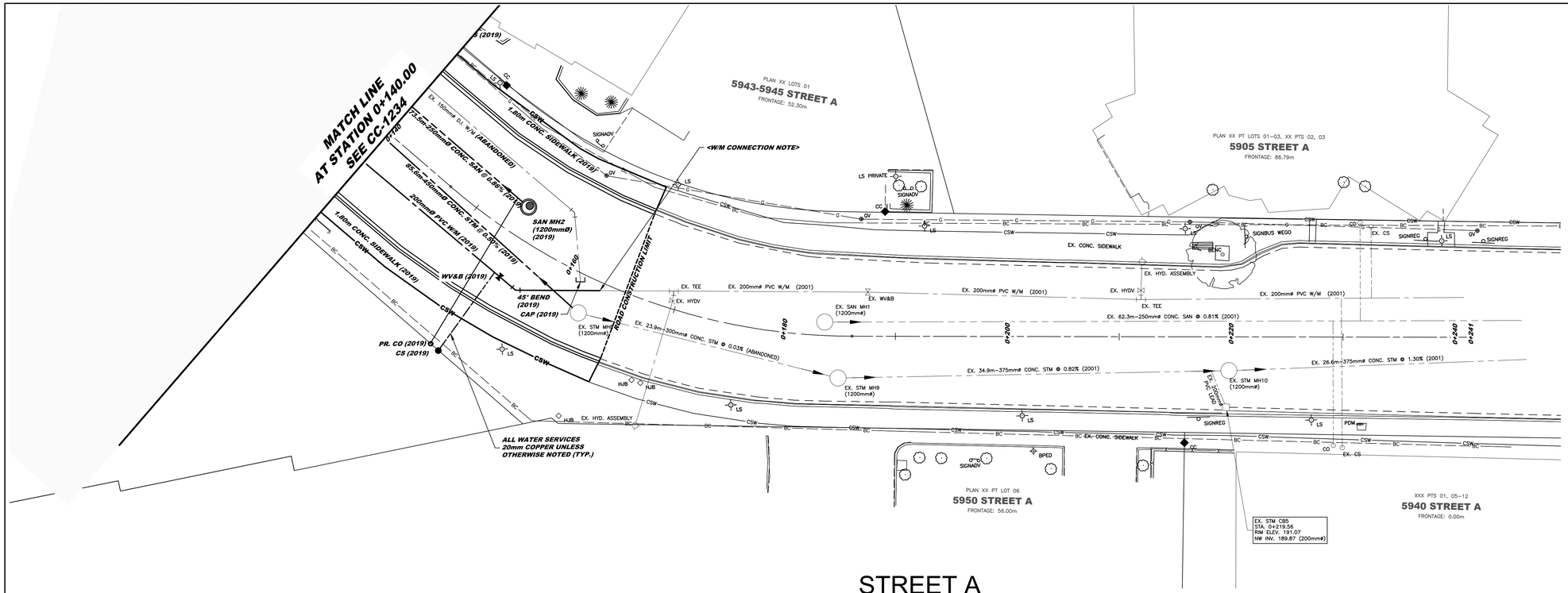
DRAWING NAME:

APPROVALS

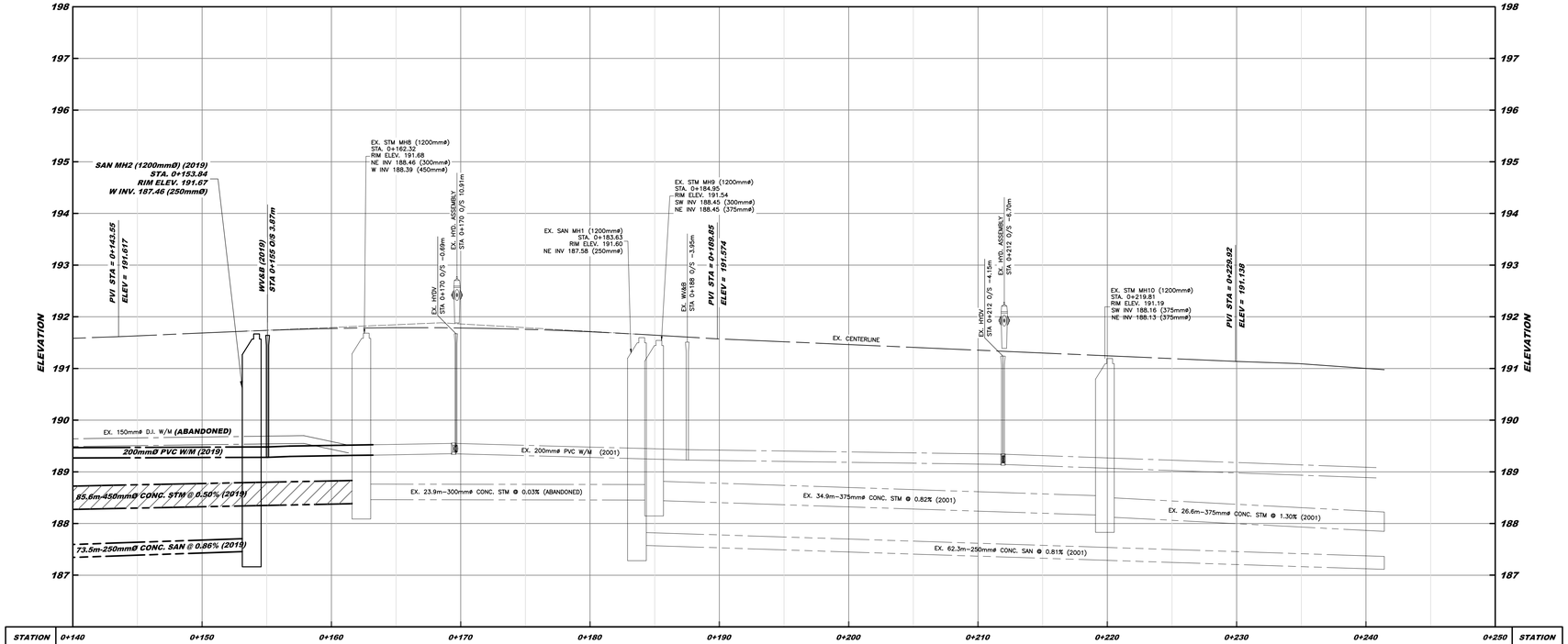
MCE	YYYY/MM/DD
MTO	YYYY/MM/DD
MECP	YYYY/MM/DD
CNR	YYYY/MM/DD
NPCA	YYYY/MM/DD

UTILITIES

NRBN	YYYY/MM/DD
BELL	YYYY/MM/DD
LOCAL HYDRO	YYYY/MM/DD
ENBRIDGE HYDRO	YYYY/MM/DD
GAS	YYYY/MM/DD
CATV	YYYY/MM/DD



STREET A



STATION	0+140	0+150	0+160	0+170	0+180	0+190	0+200	0+210	0+220	0+230	0+240	0+250	STATION
EX ℄ ELEV	191.64	191.65	191.69	191.67	191.61	191.57	191.37	191.33	191.25	191.14	191.00		EX ℄ ELEV
C/L ELEV													C/L ELEV
EP SOUTH	191.45	191.55	191.64	191.66	191.59	191.45	191.34	191.23	191.12				EP SOUTH
EP NORTH	191.44	191.54	191.62	191.63	191.57	191.44	191.33	191.23	191.12				EP NORTH

NO.	REVISION	DATE	INIT.
2	AS-CONSTRUCTED	YYYY/MM/DD	XX
1	ISSUED FOR CONSTRUCTION	YYYY/MM/DD	XX
0	ISSUED FOR TENDER	YYYY/MM/DD	XX
A	ISSUED FOR APPROVAL	YYYY/MM/DD	XX

NOTES

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DRAFTING	XXX
DESIGN	XXX
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APPROVED BY	XXX

STAMP

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BENCHMARK DATUM
(PLACE # HERE)
(PLACE DESCRIPTION HERE)

ELEVATION - XXX.XXX

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4310 Queen Street
Niagara Falls, ON, Canada
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CONSULTANT LOGO

CONSULTANT CONTACT INFORMATION

CONTRACT No. 2018-678-90
STREET A
FROM STREET B TO 250m E
ROAD RECONSTRUCTION &
INFRASTRUCTURE REPLACEMENT
PLAN & PROFILE STA 0+140 TO STA 0+250

CONSULTANT FILE No.	123456
DATE	YYYY/MM/DD
SCALE	HOR: 1:200 m VER: 1:50 m
SHEET No.	2 OF XX
DWG No.	CC-5678
REV.	2