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ELECTRICAL DISTRIBUTION CAD & GIS CONSTRUCTION DRAWING STANDARD

REVISION SHEET

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1 Introduction

This standard document was developed to ensure consistency in the preparation of new distribution construction proposal drawings. All proposal drawings shall be prepared following the standards outlined in this document.

2 Reference Documents

Hydro Ottawa - DFS0002 “Electrical Distribution As-Built Construction Drawings”
Hydro Ottawa - DFS0007 “Control, Revision, Obsolete, and Retention of Engineering technical based Standards Documents”
Hydro Ottawa - DFS0008 “Date and Time General Standard”
Hydro Ottawa - DFS0011 “Unit of Standard Measurement – Metric”
Hydro Ottawa - DFS0012 “Signing Authority for Technical Based Documents”
Hydro Ottawa - DFS0017 “Placing Construction Proposals in GIS”
Hydro Ottawa - DFS0019 “Technical Drawing Profiles Requirements”
Hydro Ottawa - DNS0002 “CAD Symbology Definition”
Hydro Ottawa - DSS0006 “Distribution and SCADA Drawing and Mapping Symbology Standard ”
Hydro Ottawa - ESG0001 “Construction Verification Program (CVP)”
Hydro Ottawa - ECS0031 “Digital Base Mapping Requirements for Electrical Servicing”
Hydro Ottawa - GAP0006 “Paper & Digital Folder Layout”
Hydro Ottawa - GCS0012 “Cable Tagging Identification”
Hydro Ottawa - GDP0004 “Operating Maps Updates - the Patch Process”
Hydro Ottawa - GDG0010 “Project Coach”
Hydro Ottawa - NPS0001 “Nomenclature for the Electrical System and Associated Functions”

3 Scope

This standard document sets the minimum requirements for the preparation of proposed commercial, residential, underground, overhead, and fibre routing proposal drawings using Computer-Aided Drafting (CAD) and Geographic Information System (GIS) tools.

4 Definitions

As-Built Drawings: Any proposal drawing that has been returned from the field with or without installation design changes following construction shall be processed as a final legal record of the installation.

CAD/GIS Technician: A Hydro Ottawa staff position whose role is to prepare drawings using CAD and/or GIS.

Central Registry: Digital mapping maintained and provided by the City of Ottawa. The maps indicate the location of underground utilities contained within the public right-of-way. For the utilities that participate in the Ottawa Utility Coordinating Committee (UCC).

Civil Drawings: Shows proposed geo-referenced Hydro Ottawa supporting structures that are not connected electrically to the distribution system. Typically these structures include trench lines, ducts, transformer pads, poles, manholes, and service drops. A civil drawing will generally not include a display of electrical distribution equipment unless deemed necessary for clarity.

Construction Data Table: Used in conjunction with reference note numbers on the plan view; the Construction Data Table provides detailed information on which standard to use and includes relevant construction notes associated with the reference number. See Schedule 1 for examples of data tables.

Electrical Drawings: Shows proposed Hydro Ottawa electrical equipment in a semi-geographic state. Includes display of transformers, switches, switchgear and associated hardware, elbows, FCI's, etc. Duct formations are populated with cable routing tag data, as well as, primary and secondary nomenclature.

Formations: A formation is a cross-section of a duct or duct bank placed immediately adjacent to the duct in plain view. The formation graphics will indicate the duct structure layout, type of duct structure, cables/circuits, and duct status (i.e capped or blocked) for each duct.

Geo-Referencing: Process of assigning spatial coordinates to data.

GIS & Distribution Records: The department that maintains ownership of the old and new equipment identification records and systems.

Landbase: Refers to the non-electrical map fabric background display in GIS. Landbase includes buildings, pavement edges, property lines, etc.

Operating Maps: Electrical distribution maps created in a non-geographic/schematic format. These drawings are used to indicate the current status of the primary distribution system for Hydro Ottawa's System Office.

Project Management: The application of knowledge, skills, tools, and techniques to execute the project requirements.

Proposal Drawings: Any new electrical and civil drawing that is being prepared in a design state.

Records Administrator: A Hydro Ottawa staff position whose role is to provide administrative services, including maintaining existing/old nomenclature systems and issuing new permanent nomenclature.

System Office: Hydro Ottawa's primary operations centre; responsible for controlling the electrical operation of the distribution system and for issuing controlled temporary nomenclature.

System Designer: Hydro Ottawa staff position whose role is to design the proposed civil/electrical installation, coordinate all involved parties and manage the project through to completion.

5 Software Applications

5.1 AutoCAD

The standard vector CAD software used at Hydro Ottawa is AutoCAD and will be used to prepare or edit the following:

- All Landbase files which includes; topographic, cadastral and central registry maps to be used as the backdrop in GIS.
- New corporate technical standard drawings
- New and existing operating maps
- Patches for new proposals
- Profiles and cross sections
- Manhole details
- Importing of third party CAD software (i.e. Microstation, for translation to AutoCAD).
- New and existing secondary vault drawings
- New and existing station design drawings

5.1.1 AutoCAD Drawing Environment

All AutoCAD files will be created using a template file. They can be found in K:\AutoCAD\templates. Drawing units shall be in meters with a precision of 0.00. All drawings shall be created in a two-dimensional (2D) format.

5.2 Geographic Information System

The standard GIS software used at Hydro Ottawa is the Intergraph G/Technology, G/Electric suite of software. The G/Technology interface consists primarily of an application window that displays maps, plots, or details. The GIS is a real-time model of Hydro Ottawa's electrical distribution system. It is made up of several layers including; current and future landbase, civil structures, electrical equipment and aerial photos. It also provides links to Vault, Switchgear and Substation single line diagrams. The GIS is used for many applications including:

- Preparation of all new proposal drawings and as-builts
- Transferring data to the Outage Management System, CC&B and SCADA systems
- A point of reference for Hydro Ottawa Employees
- Preparation and maintenance of existing substation schematic drawings

6 Drawing Composition and Format

This section outlines the Standard Drawing format to be used. All General Notes, Project Notes, Project Details, Cable Works Table, and pre-populated Construction Data Tables shall be provided to the CAD/GIS Technician by the System Designer.

6.1 General Format

- All proposal drawings are on ANSI D size sheet. ISO AO may be used if absolutely necessary.
- Right hand edge of sheet from top to bottom: Place Key map, Project Specific Note Template (contains: general notes, discipline specific notes & project details, project index), and reconfigured Title Block (contains CVP certificate (see ESG0001), revision table, and title block).
- Plan view & profile (DFS0019) if required.
- Construction Data Table, Cable Routing Table (if required)
- Electrical Single-line Diagrams
- Vault Details, Manhole Details (if required)

- North Arrow – Top Left
- Legend

Refer to drawing examples in Schedule 10 for further clarification.

6.2 Source Landbase

Proposal drawings shall be prepared using the City of Ottawa 1:2000 topographic maps, Teranet's Polaris cadastral/property mapping, and the developer's geo-referenced proposed land development plan. The City provides a new cut of the CR data 3 times a year (February, June, and October).

Where available, the City of Ottawa's Central Registry (CR) mapping is to be utilized to indicate the locations of other utilities contained within the public right-of-way. In instances where CR mapping is not available, other utility information gathered from other outside sources will be added to the proposal.

6.3 Key Map

The purpose of the Key Map is to aid in the location of the project site. A bold outline of the project limits with a note indicating the 'SITE' will be shown on the key plan. The key map is to include a north arrow and shall indicate all roadways in proximity to the project.

6.4 Legend

A legend shall be included on all proposal drawings regardless of discipline to ensure an understanding of drawing symbology for internal and external parties referencing the document.

The sub-set of symbols and line styles from DSS0006 are used on proposed construction drawings to assist the reader.

See Schedule 3 for examples of horizontal and vertical legends

6.5 Title Block

Hydro Ottawa Proposal drawings shall be prepared using the standard Hydro Ottawa title blocks and border sheets. Each drawing sheet will contain a full title block. See Schedule 10 for further clarification.

6.5.1 Drawing Title

The drawing title shall indicate the civic address for a single property or the name of the development indicating project phase for larger, multi-property developments. Work within a public right-of-way shall indicate the street range (i.e. Bank Street from First Avenue to Second Avenue). The title shall also include the type of project (i.e. Voltage Conversion, Pole Replacement, etc). The title will be assigned by the Hydro Ottawa System Designer.

6.5.2 Project Numbers

Hydro Ottawa project numbers are required on all drawings within the title block area. All project drawing numbers will be assigned by the Hydro Ottawa System Designer. Refer to GAP0006 Appendix A for examples.

6.5.3 Drawing Preparation by External Parties

The drawing shall indicate the name of any external company responsible for preparation of the drawing in a floating text box located within a clear area of the drawing.

6.5.4 Revisions

The revision block shall be populated throughout the design stage of projects in order to keep a record of all changes. This revision block will be cleared once an approved drawing is completed and reset at “0” in the revision block of the drawing. Refer to DFS0007 for clarification.

Note: Revision blocks shall be populated on all sheets in a set of drawings, regardless of which sheet was revised.

6.5.5 Sheet Numbering

All drawing sheets shall indicate the total number of drawings contained in the drawing set and individual page numbers (i.e. ‘1 of 3’ where ‘3’ is the total number of sheets and ‘1’ is the individual page number).

6.5.6 General Notes

This section within the title block contains information that will pertain to all Commercial, Residential, Trunk Underground, and Trunk Overhead projects. This area should not be revised and shall remain visible on all proposal discipline types. See Schedule 8 for an example of the General Notes.

6.5.7 Project Notes

The default title block contains additional specific notes that are relative to each construction discipline. The System Designer will revise the Project Notes section of the title block by eliminating any non-pertinent project notes from the list supplied and adding any special notes if required. The System Designer will provide them to the CAD/GIS Technician. Notes on the mapping area of the drawing should be minimized and additional notes and comments are to be inserted in the project notes area or in the construction data table.

6.5.8 Technical Equipment Sizing

There are fields within the title block to include equipment sizing (i.e. conductors, transformers, fuses, etc) and affected primary circuit nomenclature. The values for these fields shall be provided by the System Designer to assist the construction crews with the field installation.

6.5.9 Related Projects

Other active Hydro Ottawa proposal project numbers within close proximity or directly related to the current project drawing shall be referenced within the appropriate title block fields.

6.5.10 Orientation North

All proposal drawings will be drawn with North oriented to the top of the page where possible. A North arrow symbol shall be shown on the following areas of the drawing.

- Proposal drawing plan view
- Key plan
- Manhole details

6.5.11 Units of Measurement

Digital drawings will be prepared at a 1:1 scale in true world metric units. All drawings are to use the Metric System of measurement. Refer to DFS0011.

6.5.12 Mapping Coordinate System Standard

3° Modified Transverse Mercator (MTM) Ontario Zone 9 mapping co-ordinate system adjusted to North American Datum (NAD) 83.

6.5.13 Dimensioning

Dimensions for locations of new installations are required for all new projects. Sufficient dimensioning shall be added to ensure clarity to layout the design in the field. Horizontal offset dimensions shall be provided for new support structures (i.e. poles, ducts, cable chambers to assist third party road authorities, other utilities, and property owners with their design approval). Dimensioning of existing location installations shall also be clearly displayed in order to assist with the design and locating of the existing facility in the field. Both existing and proposed dimensions will be clearly indicated and referenced to permanent, non-moveable above-ground structures and property lines.

6.5.14 Drawing Scale

The scale of the drawing will be displayed as a bar scale in the lower left-hand corner of all proposal and as-built drawings. The scale will also be represented in a text format within the designated area of the title block.

- The standard for non-downtown core projects is 1:500 scale. Drawings may be prepared at 1:250 for improved legibility if necessary.
- The standard for downtown core projects is 1:250 scale.

6.6 Drawing Sheet Size

ANSI 'D' (863.600 mm x 558.800 mm) shall be used for all new proposal drawings.

ISO 'A0' (1188.800 mm x 841.000 mm) may be used when absolutely necessary for large projects.

6.7 Plotting

The landbase files that are used as backdrop data to all proposal drawings and will be plotted using a 50% greyscale screened format. Existing civil and/or electrical work within the project area will also be screened at 50% greyscale. All proposed civil and electrical features, border sheets, and notes shall be plotted in black. All backgrounds shall be white. Drawings for work packages are to be plotted in colour.

6.8 Primary Single Line Diagrams

All drawings will include an electrical schematic drawing of the current status of the distribution network within the area of the proposed work. The single line drawings will be created using the information contained on the current operating maps. Existing or current state shall be plotted at 50% grey scale with new work plotted in black to clearly indicate the new configuration. For complex system changes, a single line drawing will be provided for existing conditions and a separate single line drawing will be prepared for the proposed electrical changes. Refer to Schedule 4 for clarification.

The proposed single line diagram must include the first operable device on each side of the proposed work. This is to provide orientation of where the proposed construction is to occur, what electrical devices are required for work protection, and what customers would be affected by the proposed construction.

6.9 Manhole Details

Manholes on proposal drawings will be accompanied by a manhole detail. This is an exploded wall butterfly drawing of the underground electrical cable chamber. The detail is to be displayed on the proposal drawing and stored in the manhole detail source file directory.

Existing manholes and cables will be displayed in 50% greyscale and proposed manholes and cables will be displayed in black. All manhole details will indicate a title including state (existing or proposed), followed by manhole nomenclature and scale located beneath the graphics. They will also include a north arrow.

All manhole details will be prepared using AutoCAD following Bulletin 069 – Managing DWG Manhole Details and Hyperlinks. This bulletin can be found in K:\GIS Bulletins. Any edits to existing raster manhole details will be completed by recreating the manhole detail in AutoCAD. Refer to Schedule 6 for an example of a manhole detail.

6.10 Construction Data Tables

Construction Data Tables on proposal drawings are used in conjunction with reference note numbers on the plan view. They provide detailed information on which standard to use and includes relevant construction notes associated with the reference number. See Schedule 1 for examples of data tables.

Data Table Abbreviations:

L – Location

S – Structure

6.11 Proposed Cable Works Tables

Proposed Cable Works Tables on proposal drawings provide the duct label, which will be populated in GIS, as well as the circuit ID and the cable tag used in the field. See Schedule 2 for an example of Proposed Cable Works Table.

6.12 Details

In instances where drawing congestion or more detailed technical design information is necessary, a detail drawing will be required. All detail drawings shall be prepared using AutoCAD. All details will indicate a title and scale located beneath the detail. A north arrow shall be shown if the detail is drawn geographically in plan view. Details shall be numbered sequentially (i.e. Detail 1, Detail 2).

6.13 Profiles and Cross Sections

To construct its electrical distribution system in sensitive or congested areas, Hydro Ottawa requires detailed drawings to specify the elevations of its proposed installations. For certain land/water/utility owners/authorities, profile drawings will be required before authorization to construct the electrical distribution crossing is provided. When elevation information is critical to construct the electrical distribution crossing, profile drawings will also be required.

All profiles or cross sections will be prepared using AutoCAD and shall follow the standard DFS0019 - Technical Drawing Profiles Requirements.

6.14 Residential Lot Servicing

The residential servicing layout options in Schedule 9 are standard configurations that are to be followed when drawing duct and trenching on residential proposal drawings. Confirmation of which option to use is to be provided by the System Designer prior to preparing new drawings.

The duct will always be drawn inside the property limits although which configuration to use will depend upon project requirements. Trench lines will be drawn 1m beyond the front of the building to the meter base if a building footprint is provided on the landbase. In the event no building footprint is available then all trench lines shall stop 5m inside the property line.

7 External Construction Standards

Hydro Ottawa maintains a library of internally approved technical standards that will be applied to new Hydro Ottawa construction projects. Although this library is extensive, it does not cover all technical combinations. If required, Hydro Ottawa shall use external technical standards that Hydro Ottawa has legal rights to utilize.

The following options may be used when preparing construction drawings that reference pre-amalgamation legacy standards and non-Hydro Ottawa approved construction specifications.

All efforts should be made to build to current approved HOL standards. When this is not practical, such as in some of the old Ottawa Hydro areas of town, the System Designer may reference and use the old OTT Legacy standards with HOL's Technical Signing Authorities approval. See DFS0012 for clarification. The System Designer may also use any of the above-mentioned external standards (HONI, ENER, OESC, OPS, EDA, CSA, CEATI, ANSI, and IEEE) in HOL's service territory if there are no approved HOL standards available.

Note: when external standards are referenced, HOL's Technical Signing Authorities approval is also required.

This provides three options to make use of when no HOL approved standards are available.

Option 1: Design and draft the construction detail as required, assign a number to the detail and have the CAD/GIS Technician include it in the Construction Drawings. The detail is also to be referenced in the Construction Drawing – Construction Data Table (i.e. – Detail 1).

Option 2: Reference an existing OTT Legacy standard in the Construction Drawings.

a) If the OTT Legacy standard can be utilized and built exactly as described in the OTT Legacy standard, the standard is to be copied and put in the blue folder. It shall also be referenced in the Construction Drawings – Construction Data Table using the internal pre-amalgamation abbreviated group name (see above), internal standard number or designation (i.e. – OTT, 5064-13).

b) If the OTT Legacy standard cannot be replicated and built exactly as described in the Legacy standard the modified OTT Legacy standard should be included on the Construction Drawing as a detail. Notes and/or dimension changes are to be added or removed as required to a copy of the OTT Legacy standard. The modified copy is to be scanned in JPEG or TIFF format and imported into the Construction Drawing as a detail by the CAD/GIS Technician and assigned a detail number. The detail is also to be referenced in the Construction Drawings – Construction Data Table indicating the assigned detail number, internal pre-amalgamation abbreviated group name (see above), internal standard number or designation (i.e. – Detail 1, OTT, 5064-13).

Option 3: Reference an external standard on the Construction Drawing from any of the external groups listed above (HONI, ENER, OESC, OPS, EDA, CSA, CEATI, ANSI, and IEEE).

a) If the standard can be utilized and built exactly as described in the external standard, the standard is to be copied and put in the blue project folder. It shall also be referenced in the Construction Drawing – Construction Data Table using the external abbreviated group name (see above), followed by the external standard number or designation (i.e. – HONI, DL3-127.1).

b) If the external standard cannot be replicated and built exactly as described in the external standard, the modified external standard should be brought into the Construction Drawing as a detail. Notes and/or dimension changes are to be added or removed as required using a copy of the external standard. The modified copy is to be scanned in JPEG or TIFF format and imported into the Construction Drawing as a detail by the CAD/GIS Technician and assigned a detail number. The detail is to be referenced in the Construction Drawings – Construction Data Table using the detail number, external abbreviated group name (see above), external standard number or designation (i.e. – Detail 1, HONI, DL3-127.1).

The application of approved technical standards shall meet requirements and provide a consistent process to be followed when using non-HOL approved standards.

This process should also help to identify where further standards development may be required. When using Option 1 or Option 3 above, the Hydro Ottawa standards department group shall be consulted in order to verify whether the detail is a unique one-time detail, if standards development is already in process, or if the detail required should be further developed.

8 CAD Data Delivery to Hydro Ottawa

8.1 CAD Data Delivery Requirements

The System Designer is responsible for providing the necessary CAD files to the CAD/GIS Technician prior to preparing new proposals and shall acquire files from external parties in an AutoCAD format, geo-referenced to the Hydro Ottawa mapping coordinate system standard. Specifically, the 3rd Modified Transverse Mercator (MTM) Ontario Zone 9 mapping co-ordinate system adjusted to North American Datum (NAD) 83 must be used. See ECS0031 – Digital Base Mapping Requirements for Electrical Servicing for more details.

The following lists the existing & proposed drawing features to be delivered:

Project Information

a. Project phase areas	b. Preliminary electrical design layout information	c. Associated design notes
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Cadastral Information

a. Property lines	b. Street names	c. Civic addresses if available
d. Road allowance lines	e. Lot numbers	

Topographic Information

a. Driveways and parking lots	b. Sidewalks	c. Building footprints- Single Line
d. Fences	e. Roadways and curbs	f. Rail lines
g. Open water	h. Retaining walls	i. Sound barriers
j. Ditches	k. Trees	l. Recreation

Utility Information

a. Water lines, valve chambers, valves, and hydrants	b. Storm sewer lines, related manholes, catch basins, catch basin leads, storm ponds, and culverts	c. Sanitary sewer lines and related manholes
d. Gas lines and valves	e. Telephone and communication lines	f. Poles
g. Street Lighting	h. Road cross section (profile) for non-standard roads	i. Cable and TV lines

Note: Contours or cross-hatching should not be included unless requested.

8.2 Delivery Media

The CAD drawings shall be submitted on CD, DVD, or via electronic mail.

8.3 Graphic Attributes and Symbology

Refer to DSS0006 for the graphic symbol standards.

9 Equipment Nomenclature

All Hydro Ottawa owned equipment requires a permanent unique numerical identifier. The equipment identifiers are to be assigned by the Records Administrator in the GIS & Distribution Records department at Hydro Ottawa during the design process. Refer to the NPS0001 – Identification of Electrical Distribution Equipment and Street Lighting Working Procedure.

For short term, temporary changes to the distribution system, drawings will be prepared in conjunction with System Office whereby System Office will issue temporary nomenclature.

10 Requests for Drafting Services

10.1 Drafting Request Form

When the Hydro Ottawa GIS & Distribution Records Unit is to prepare a project drawing, all requests to prepare a new proposal or as-built drawing will require submission of the standard Request for Drafting Services Form (see Schedule 5) to the Hydro Ottawa Supervisor of GIS. All fields on the form are to be populated in order for the request to be processed.

10.2 Construction Data Tables and Proposed Cable Works Tables

The project drawing requestor will be responsible for preparing and providing project related data tables along with the Request for Drafting Services Form at time of submission or alternately provides the data table to the CAD/GIS Technician during the preliminary design process. See Schedule 1 for examples.

Construction data tables will include a listing of internal Hydro Ottawa standards that will be used during the construction process. In the event an external approved standard is being used, reference to the external standard must be included in the table. The standard shall be prefixed with the abbreviation of the external agency. Refer to section 7.0 for a greater description of these requirements.

10.3 Project Specific Notes and Details

The project drawing requestor will be responsible for providing specific project notes and project details needed for title block population.

11 Drawing Approval

Ontario regulation 22/04 requires that Ontario Local Distribution Companies (LDC) have a professional engineer based approval process for standards, plans and material to ensure public safety. Proposal drawings are to be approved by one of Hydro Ottawa's current designated Technical Signing Authorities. See DFS0012.

12 As-Built Requirements and Project Closure

The System Designer is to ensure that all as-builts returned from the field are submitted to the GIS Supervisor for final processing within 2 months of installation completion. The submitted as-built package shall include:

- A drafting request form for as-builts
- A copy of the electrical and civil marked-up drawings from the field – refer to DFS0002 – Electrical As-Built Construction Drawings
- Signed O. Reg. 22/04 CVP certificates on the drawing – refer to ESG0001
- All worksheets and documentation associated with new equipment installation for GIS input.

As-built packages submitted with incomplete or unclear as-built information shall be returned to the System Designer for timely rectification and re-submission.

Once assigned to completing an as-built, the CAD/ GIS Technician will scan a copy of the field as-built to a .pdf or .jpg format, save the as-built scan with an AB suffix in the project directory, and input all changes to GIS.

Upon completion, the CAD/GIS Technician will sign-off the Drafting Request Form as completed and submit to a CAD/GIS Quality Assurance Specialist for review. The project documentation will then be returned to the System Designer. The System Designer will be responsible for reviewing the completed information in GIS for accuracy and shall return any necessary changes back to the GIS Supervisor for processing. The original field as-built shall be filed by the System Designer in the project folder.

For additional information, please refer to Hydro Ottawa Limited Internal Standard DFS0002 – Electrical As-Built Construction Drawings for As-Built drawing requirements.

Schedule 1 – Construction Data Table Examples

Overhead Projects

CONSTRUCTION DATA TABLE									
Structure Symbology: L – Location Number									
Structure #	Span Length (in m)	Nomenclature ID#	Pole Length (in ft), Class	Pole Setting Depth (ft)	Pole Deflection	Civil Standards	Electrical Standards	Anchor Distance(s) from Pole (m)	Instructions
L1	L1 to L2 27.0m	X56079	50ft Class 3	7.0 ft	0°	OAS0001 OAS0002 OAS0004 OAS0101 NPS0006		4.5m 6.0m	CIVIL -Guying -Anchors -Nomenclature ELECTRICAL -Leave top 10ft of pole vacant for HONI plant.
L2	L2 to L3 62.0m	X57175	Exist. 60 ft Class 2	NA	0°	OAS0002 OFS1009 NPS0006			CIVIL -Span Guy -Nomenclature ELECTRICAL -Make taps to existing dead end conductors
	36m								
L3	L3 to L2 62m	X560780	60ft Class 2	8.0 ft	18°	OAS0001 OAS0101 OFS1014 NPS0006		4.0m(south) 5.5m(south) 4.5m(north) 6.0 m(north) 7.5m(north)	CIVIL -Anchors -Nomenclature ELECTRICAL -Install new conductors
	50.0 m								
L4		X56081	60ft Class 2	8.0 ft	0°	OFS1007 NPS0006			CIVIL -18' Brackets -Nomenclature ELECTRICAL -Install new conductors
	50.0 m								
L5		X56082	60ft Class 2	8.0 ft	0°	OFS1007 NPS0006			CIVIL -18' Brackets -Nomenclature ELECTRICAL -Install new conductors
	50.0 m								
L6		X56083	60ft Class 2	8.0 ft	0°	OFS1007 OGS0001 NPS0006			CIVIL -Ground -18' Brackets -Nomenclature ELECTRICAL -Install new conductors

Residential Projects

CONSTRUCTION DATA TABLE – UNDERGROUND STRUCTURES AND DEVICES					
Structure #	Nomenclature ID#	Type of UG or OH Structure or Device	Civil Standards	Electrical Standards	Instructions
S1	TP11311,TP11310, TP11313,TP11314, TP11312,TP11309, TP11315,TP11316, TP11317,TP11318	SINGLE PHASE TRANSFORMER AND BASE	UCS0003 UCS0004 UTS0012 UTS0013 UTS0038 UCS0036 UGS0002	UTS0004 UTS0005 UTS0006 UTS0008	
S2		3 PARTY JUT	UDS0002		
S3		3 PARTY SERVICE TRENCH	UDS0003		
S4		3 PARTY ROAD CROSSING	UDS0025		

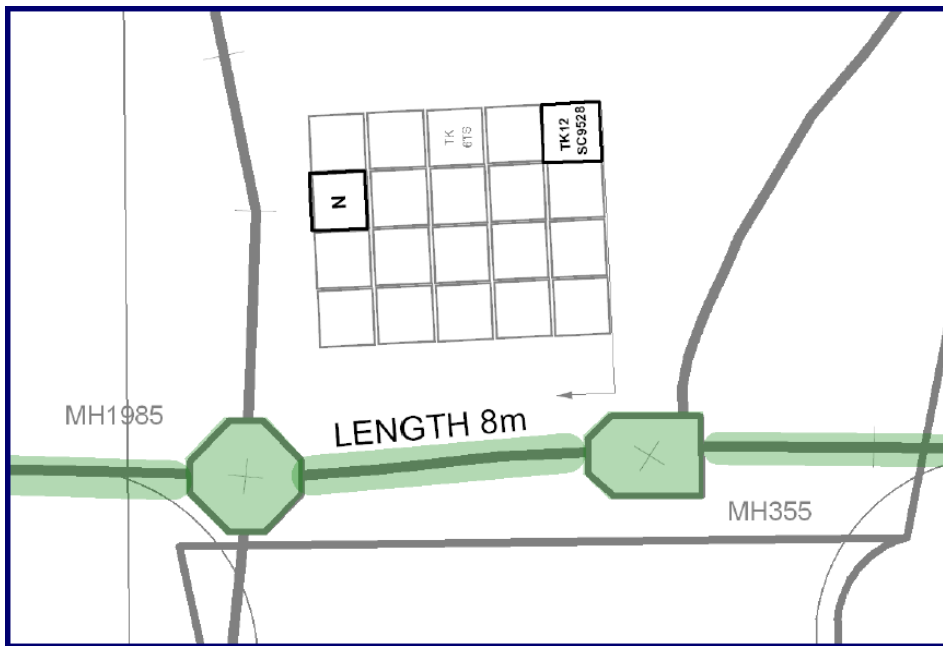
Underground Projects

CONSTRUCTION DATA TABLE					
Work Location #	Nomenclature ID#	Type of UG or OH Structure or Device	Civil Standards	Electrical Standards	Instructions
L1	X46937 S19952	Wood Pole 40' Class 2 6' pole depth Riser Pole lateral	UDS0023 Detail B and E	OFS0057 URS0001 UJS0567 UJS0200 UJS0502 OGS0001	CIVIL Install new wood pole. Install pole lateral. ELECTRICAL Install new 15kV 1/0 Cu XLPE primary cable in ducts from L1 to L14 Install new riser with single phase 200A power fuse cutout
L2 L4 L6 L8 L10 L12 L14		2-100 Direct Buried Ducts Formation: 1H x2W	UDS0008		CIVIL As per formation
L3 L11		2-100mm Concrete Encased Ducts Formation: 1H x2W	UDS0001 Detail K		CIVIL Install 2 cell concrete encased duct structure from pole to south side of Majestic (1.0m onto private property).
L5 L7	TP11482 TP11483	1Ø 100 kVA Transformer	UCS0003 UCS0004 UCS0036	UTS0004 UTS0005 UTS0006 UTS0008	ELECTRICAL Remove existing transformer (to be re-used) from existing base (to remain). Pull 15kV 1/0 Cu XLPE primary cables into new ducts. Re-install transformer and re-nomenclature. Ground and abandon existing direct buried primary supply cables
L9 L13	TP11484 TP11485	1Ø 100 kVA Transformer		UTS0012 UTS0013 UTS0038 UGS0002 UTS0004 UTS0005 UTS0006 UTS0008	ELECTRICAL Isolate existing transformer and remove. Pull in new primary cables (in new duct and into base). Split duct cables into new base. Install new transformer and elbows. Abandon existing direct buried primary cables.

Schedule 2 – Proposed Cable Works Table Example

- Underground Electrical Cable Proposal Drawings are to have a Proposed Cable Works Table
- Duct Labels in GIS to have the two adjacent Tier 1 devices
- See GCS0012 –Cable Tagging Identification

Proposed Cable Works Table		
Duct Label	Circuit	Cable Tag
TK12 SC9528	418	PRIMARY BETWEEN TK12 & SC9528-L1
N	NEUTRAL	SYSTEM NEUTRAL EXTENSION



Schedule 3 – Legend

Horizontal Legend

STANDARD DISTRIBUTION PROPOSAL LEGEND

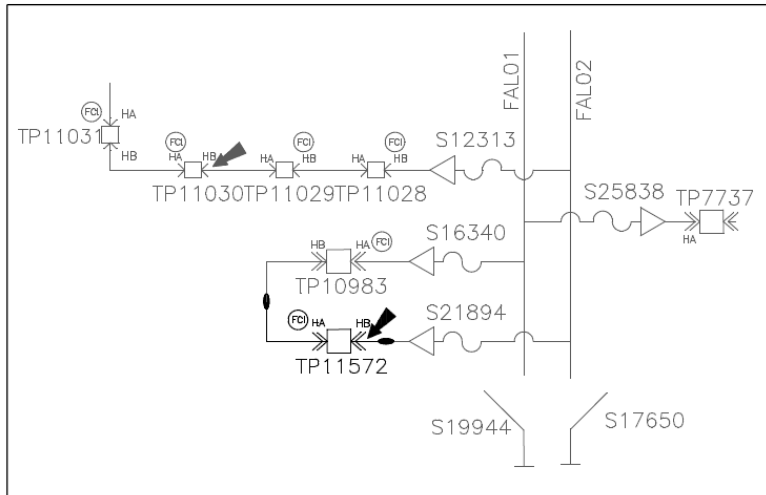
	HYDRO OTTAWA POLE		2-WAY MANHOLE		PRIMARY PEDESTAL PAD		TRAFFIC / STREETLIGHT HANDHOLE
	FOREIGN OWNED POLE		SWITCHING MANHOLE		DIRECT BURIED DUCT		SECONDARY PEDESTAL PAD
	JOINT USE POLE		4-WAY MANHOLE		CONCRETE ENCASED DUCT		SPLICE PIT
	POLE ANCHOR		3-WAY MANHOLE		DIRECT BURIED CABLE		TO BE REMOVED
	SPAN GUY		PMH SWITCHGEAR PAD		DIRECT BURIED DUCTBANK		TO BE ABANDONED
	HANDHOLE		TRANSFORMER / SWITCHGEAR PAD		CONCRETE ENCASED DUCTBANK		
	1-PHASE PRIMARY CONDUCTOR		POTHEAD		1-PHASE POLEMOUNT TRANSFORMER OR 3-PHASE POWERPAK		FIXED FUSE
	2-PHASE PRIMARY CONDUCTOR		PRIMARY METER ENCLOSURE		3-PHASE POLEMOUNT TRANSFORMERS (BANKED)		SWITCHABLE FUSE (NON-GANG, NON-LOAD BREAK)
	3-PHASE PRIMARY/SECONDARY CONDUCTOR		SECONDARY METER BANK (# PREMISES)		PADMOUNT TRANSFORMER		SOLID BLADE SWITCH (MANUAL, NON-GANG, NON-LOAD BREAK)
	UNDERGROUND CABLE		FAULT CIRCUIT INDICATOR		STEP TRANSFORMER (RABBIT)		SOLID BLADE SWITCH (MANUAL, GANG OPERATED, LOAD BREAK)
	1-PHASE O/H SECONDARY CONDUCTOR		SECONDARY PEDESTAL		KIOSK		REMOTELY OPERATED SWITCH (MOTORIZED, SIMPLE, GANG, LOAD BREAK)
	CONNECTION POINT, CABLE RISER		SECONDARY DISCONNECT ENCLOSURE		CAPACITOR		LOCALLY OPERATED SWITCH (MOTORIZED, SIMPLE, GANG, LOAD BREAK)
	GROUND		STREETLIGHT		VOLTAGE REGULATOR		DOUBLE SOLID BLADE SWITCH (GANG, DOUBLE LOAD BREAK)
	FULL SWITCHING ELBOW		AC GENERATOR		POLE MOUNTED RECLOSER		MID-SPAN OPENER
	NON-OPERABLE ELBOW (600A)		DC GENERATOR		REMOTELY OPERATED SWITCH (MOTORIZED, COMPLEX, GANG, LOAD BREAK)		LINE CLAMP
	STRESS CONE		CABLE SPLICE		NORMAL OPEN POINT		

Vertical Legend

STANDARD DISTRIBUTION PROPOSAL LEGEND

	HYDRO OTTAWA POLE		4-WAY MANHOLE		SECONDARY PEDESTAL PAD
	FOREIGN OWNED POLE		3-WAY MANHOLE		SPLICE PIT
	JOINT USE POLE		SWITCHGEAR PAD		DIRECT BURIED CABLE
	POLE ANCHOR		TRANSFORMER / SWITCHGEAR PAD		DIRECT BURIED DUCTBANK
	SPAN GUY		PRIMARY PEDESTAL PAD		CONCRETE ENCASED DUCTBANK
	HANDHOLE		DIRECT BURIED DUCT		TO BE REMOVED / ABANDONED
	2-WAY MANHOLE		CONCRETE ENCASED DUCT		TO BE ABANDONED
	SWITCHING MANHOLE		TRAFFIC / STREETLIGHT HANDHOLE		
	1-PHASE PRIMARY CONDUCTOR		FAULT CIRCUIT INDICATOR		KIOSK
	2-PHASE PRIMARY CONDUCTOR		SECONDARY PEDESTAL		NORMAL OPEN POINT
	3-PHASE PRIMARY / SECONDARY CONDUCTOR		SECONDARY DISCONNECT ENCLOSURE		POLE MOUNTED RECLOSER
	UNDERGROUND CABLE		STREETLIGHT		FIXED FUSE
	1-PHASE O/H SECONDARY CONDUCTOR		AC GENERATOR		SWITCHABLE FUSE (NON-GANG, NON LOAD BREAK)
	CONNECTION POINT, CABLE RISER		DC GENERATOR		SOLID BLADE SWITCH (MANUAL, NON-GANG, NON LOAD BREAK)
	GROUND		CABLE SPLICE		SOLID BLADE SWITCH (MANUAL, GANG OPERATED, LOAD BREAK)
	FULL SWITCHING ELBOW		1-PHASE POLEMOUNT TRANSFORMER OR 3-PHASE POWERPAK		REMOTELY OPERATED SWITCH (MOTORIZED, SIMPLE, GANG, LOAD BREAK)
	NON-OPERABLE ELBOW (600A)		3-PHASE POLE MOUNT TRANSFORMERS		LOCALLY OPERATED SWITCH (MOTORIZED, SIMPLE, GANG, LOAD BREAK)
	STRESS CONE		PADMOUNT TRANSFORMER		DOUBLE SOLID BLADE SWITCH (GANG, DOUBLE LOAD BREAK)
	POTHEAD		STEP TRANSFORMER (RABBIT)		MID-SPAN OPENER
	PRIMARY METER ENCLOSURE		CAPACITOR		LINE CLAMP
	SECONDARY METER BANK (# PREMISES)		VOLTAGE REGULATOR		REMOTELY OPERATED SWITCH (COMPLEX, MOTORIZED, GANG, LOAD BREAK)

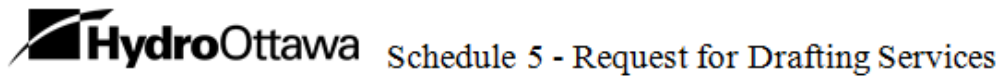
Schedule 4 – Primary Single Line Drawing Example



PROPOSED/EXISTING SINGLE LINE DIAGRAM

N.T.S.

Schedule 5 – Drafting Request Form



Project Number: - Phase:

Project Name / Address:

Drawing Contents Location:

Date Submitted: [Click here to enter a date.](#) **Date Required:** [Click here to enter a date.](#)
 RUSH (*Requires Supervisor Signature*)

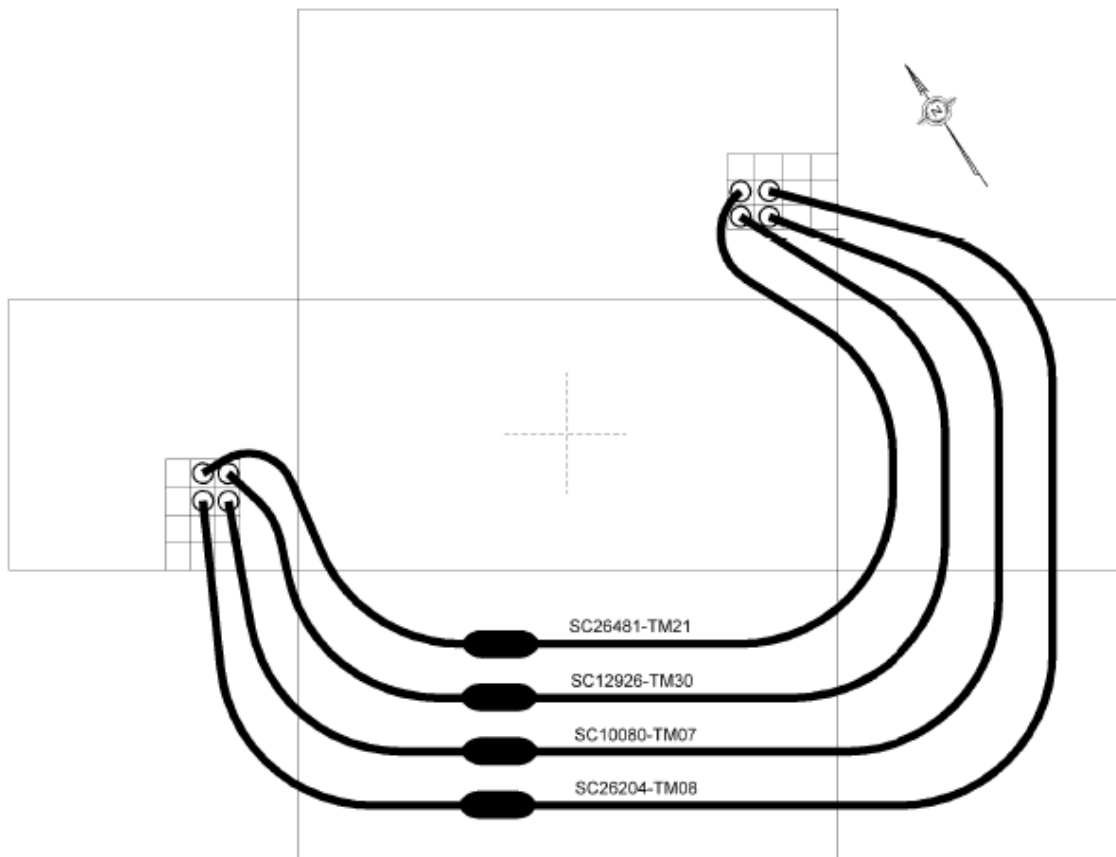
Drawing Type: Landbase Clean Base Plan
 Preliminary Design (*Requires Supervisor Signature*)
 Revisions MC
 As-Built

PDF Copy Required (*Provided by QA Specialists*) GIS Updates Only

Instructions / Comments:

Submitted by: Supervisor Signature: _____

Schedule 6 – Manhole Detail Example



EXISTING MH4085C
NTS

Schedule 7 – Project Proposal Drawing Abbreviations

The following lists abbreviations commonly used on proposal drawings:

TYP.	TYPICAL
CD	CAP DUCT
SD	SPARE DUCT
R.O.W.	RIGHT OF WAY
PL	PROPERTY LINE
CL	CENTER LINE
MH	MANHOLE
TP	TRANSFORMER PAD
HH	HANDHOLE
PP	PRIMARY PEDESTAL
SP	SECONDARY PEDESTAL
JUT	JOINT UTILITY TRENCH
N.I.C.	NOT IN CONTRACT
N.I.U.	NOT IN USE
DD	DUMMY DUCT
UG	UNDERGROUND
O/H	OVERHEAD
AL	ALUMINUM
CU	COPPER
XLPE	CROSS-LINKED POLYETHELENE
KVA	KILO-VOLT AMPERE
KV	KILO-VOLTS
AMP	AMPERE

V	VOLTS
PRIV.	PRIVATE
S	SWITCH
PH.	PHASE
STG.	STAGE
CCT.	CIRCUIT
DIST.	DISTRIBUTION
HOL	HYDRO OTTAWA LIMITED
EXIST.	EXISTING
ABAND.	ABANDONED
PROP.	PROPOSED
DWG.	DRAWING
R	RED PHASE CONDUCTOR
W	WHITE PHASE CONDUCTOR
B	BLUE PHASE CONDUCTOR
TEMP.	TEMPORARY
L	LOCATION
S	STRUCTURE
CB	CIRCUIT BREAKER
CA	CABLE
N.T.S.	NOT TO SCALE
CONC.	CONCRETE
ASPH.	ASPHALT
SL	STREETLIGHT
FF	FRONT FACE

BF	BACK FACE
ADJ.	ADJACENT
EL.	ELEVATION
MIN.	MINIMUM
S/W	SIDEWALK
FUT.	FUTURE
H1A, H1B	TRANSFORMER BUSHING
FCI	FAULT CIRCUIT INDICATOR
DIA.	DIAMETER
BLDG.	BUILDING

Schedule 8 – Standard Title Block General Notes

GENERAL NOTES

- A. All construction shall be completed using approved Hydro Ottawa construction standards (latest edition) and/or details specified in the project drawing(s).
 - B. External workforces may obtain the latest edition of applicable Hydro Ottawa standards and/or design specifications at www.hydroottawa.com.
 - C. Prior to undertaking work within the safe limits of approach to Hydro Ottawa overhead plant (as defined in the Occupational Health and Safety Act), contact the designated Hydro Ottawa project manager or Hydro Ottawa Service Desk at 613-738-6400, Option 4.
 - D. Obtain utility locates prior to commencement of any excavation.
 - E. Where excavation within 1.5 metres of Hydro Ottawa underground plant, contact the designated Hydro Ottawa project manager or Hydro Ottawa Service Desk at 613-738-6400, Option 4.
-

Schedule 9 - Residential Servicing Guideline

3 PARTY WITH 3 METER SETBACK - SINGLE FAMILY

DUCT BANK
P/L
3m
2m
0.5m
TRENCH TO METER BASE

3 PARTY WITH 2 METER SETBACK - FOR EXAMPLE, MATTAMY HOMES - SINGLE FAMILY OR AS DIRECTED BY DESIGNER

DUCT BANK
P/L
2m
1m
0.5m
PORCH
TRENCH TO METER BASE

3 PARTY - ALL SETBACKS - TOWNHOMES

DUCT BANK
P/L
0.5m
1m
0.5m
TRENCH TO METER BASE
INDICATE NUMBER OF UNITS INSIDE SYMBOL

3 PARTY - ALL SETBACKS - LANEWAY SIDE SINGLE FAMILY AND ESTATE LOTS

DUCT BANK
P/L
0.5m
1m
0.5m
TRENCH TO METER BASE

DUCT BANK
P/L
0.5m
1.2m
1m
TRENCH TO METER BASE

4 PARTY - ALL SETBACKS - TOWNHOUSES, SINGLE FAMILY, AND ESTATE LOTS

DUCT BANK
P/L
DUCT
1.5m

REVISIONS	PREP	CHKD	APPD	TITLE				
REV: 1 CHANGE: ADJUSTED DUCT BANK LENGTH	KM			 www.HYDRO-OTTAWA.COM PREP: K.MACDONALD CHKD: K.McROBERTS APPD: M.MORIN DATE: 2011/07/18 SCALE: NTS				
REV: 2 CHANGE: ADJUSTED METER SYMBOL LOCATION	KM							
REV: 3 CHANGE: REVISED ALL LAYOUTS	SJ							
				NO: <table border="1"> <tr> <td>1</td> <td>REV:</td> </tr> <tr> <td>1</td> <td>3</td> </tr> </table>	1	REV:	1	3
1	REV:							
1	3							

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Schedule 10 - Proposal Drawing Examples

Attached externally are examples

Schedule 10.1 – Overhead Proposal Drawing Example

Schedule 10.2 – Underground Proposal Drawing Example

Schedule 10.3 – Commercial Proposal Drawing Example

Schedule 10.4 – Residential Proposal Drawing Example.

Schedule 10.5 – Overhead Fibre Optic Proposal Example

Schedule 10.6 – Underground Fibre Optic Proposal Example

Schedule 10.7 – Municipal Consent (MC) Example

Schedule 10.8 – Underground Secondary Single Line Diagram Example