



TAC: Guideline for the Coordination of Utility Relocations

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What can we do to reduce Risks associated with the proper management of Utilities as part of a capital project?

Managing Utility Risks

A Transit Project EA stated:

**Minor Utility Relocations will be required,
total Project Budget \$14M.**

**SUE was not completed within the EA process...
An experienced Utility Coordinator was not used
on the project...**

Managing Utility Risks



- Water
- Sewer
- Telecom
- Gas
- OH
- THES

Managing Utility Risks

Original estimate within the EA was ~\$14M

Utility impacts increase cost to ~\$105M ++

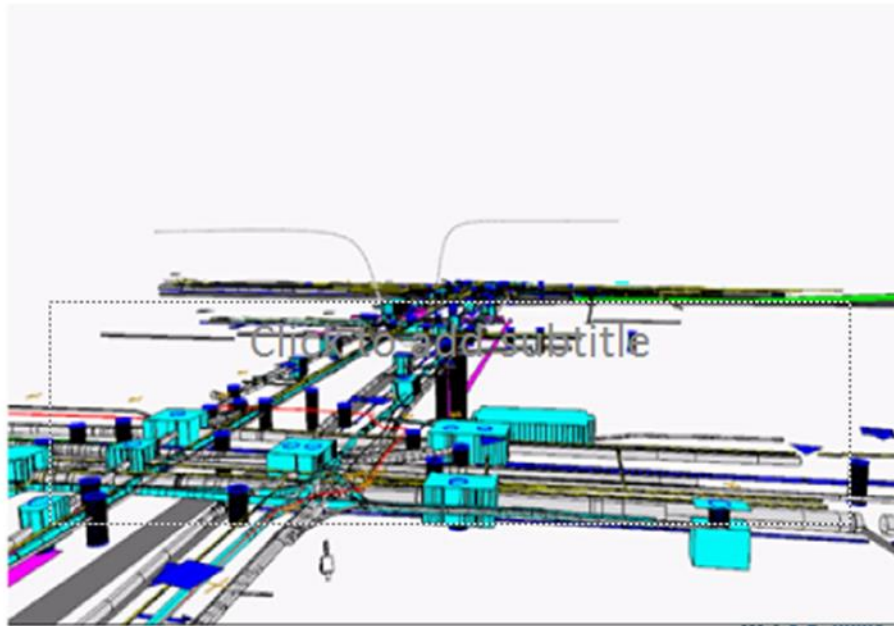
Key Lessons Learned

Accurate, reliable utility drawings at the design stage – ASCE 38-02.

Clear Utility Coordination process with experienced UC's

Reliable records of Utilities – CSA S250.

Why do we need it?



No Hyperlink

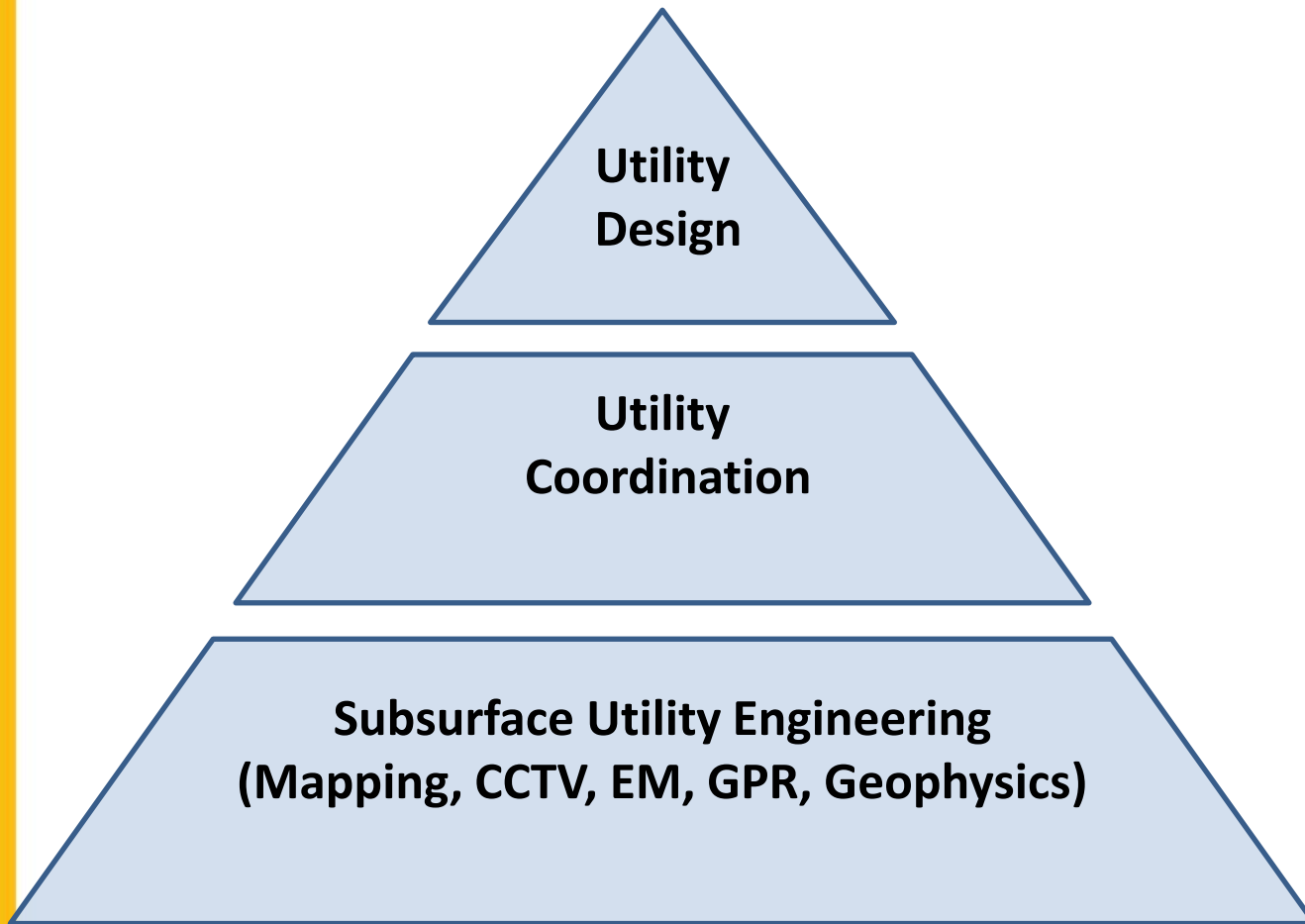
Agenda

- Intro Existing Tools and UESI
- Intro to the TAC-PUMS Guideline
- Relevant Standards and Practices
- Case Study

Who is T2 Utility Engineers?



How do we manage Utility Risks



The Vision Collaboration



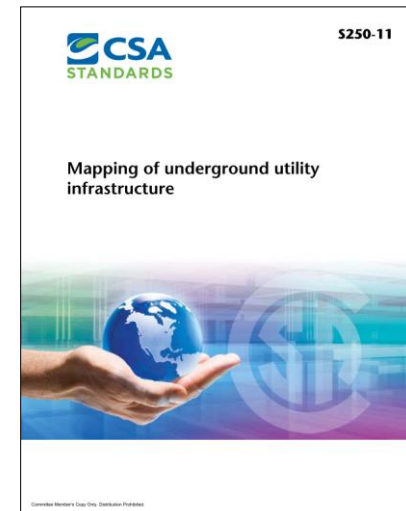
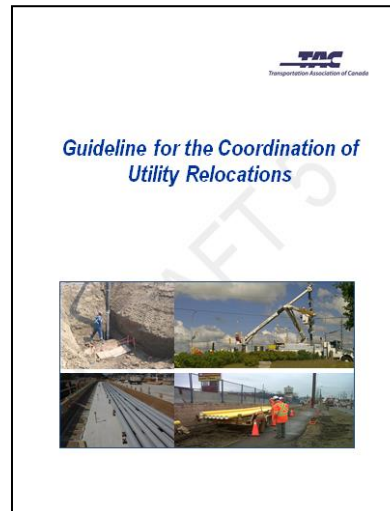
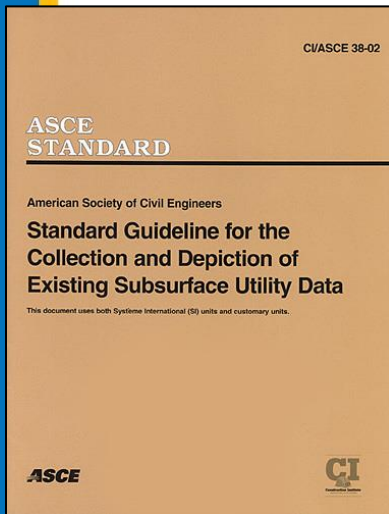
UESI VISION

UESI will be the worldwide leader in generating products and services that promote and reward excellence in the engineering, planning, design, construction, operations, and asset management for utility infrastructure and engineering surveying.

Managing Utility Risks on Projects



Utility Management “Tool Box”





Guideline for the Coordination of Utility Relocations



Project was initiated
in Spring 2013.

All content
developed by the
subcommittee.

Goal for final
publication 2016.



Objective of the Guideline

The purpose of the guideline is to assist various ROW owners and Utility agencies to develop or **enhance their utility coordination processes**. A great efficiency can be realized by **standardizing these processes across all areas of the country**. For Utilities with infrastructure in a variety of areas it gives them a **consistent process** they can follow when working with any ROW owner. For ROW owners it allows them to learn from the best practices and procedures of different parties and implement a process that will be readily accepted and adopted by utility agencies.



Objective of the Guideline

The Coordination guideline does not constitute policy, a standard, a specification or a regulation. It is a **best practices guideline** developed from a review of current practices across North America. Each ROW owner and utility agency is encouraged to follow it as the basis for their processes and enhance it with details specific to their area, situation or other unique criteria.

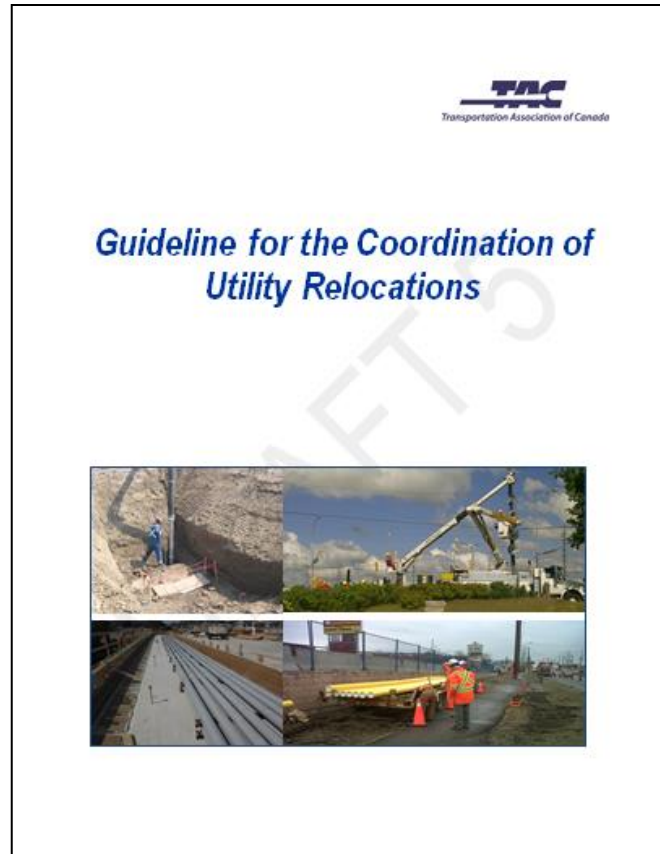


Intended Audience

These guidelines have been written for both the public land road authorities, consultants and the **utility agencies**, with a specific focus on projects initiated by the Road Authority.

Although this guideline is directed towards the **Road Authorities** it can be used by other agencies such as **transit, land development** and others with applicable projects. It is specifically designed with the Design – Bid – Build process in mind. It is acknowledged, that using a Design-Build, PPP or other procurement process will introduce unique parameters however the general fundamental principles will still apply.

Guideline Format



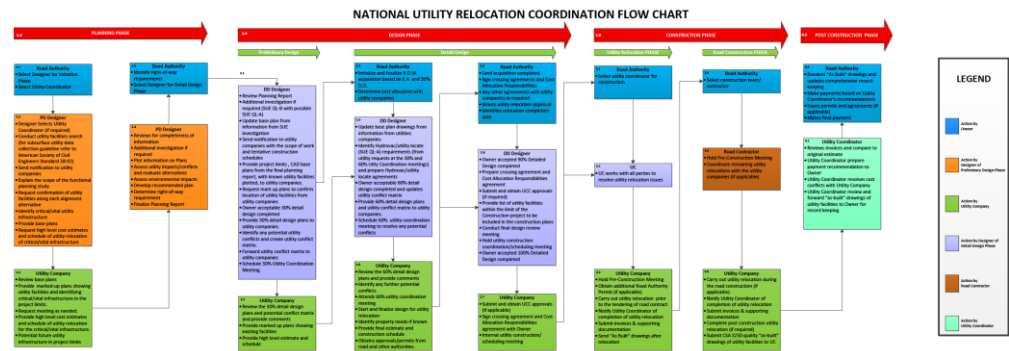
Guideline Format



Guideline for the Coordination of Utility Relocations

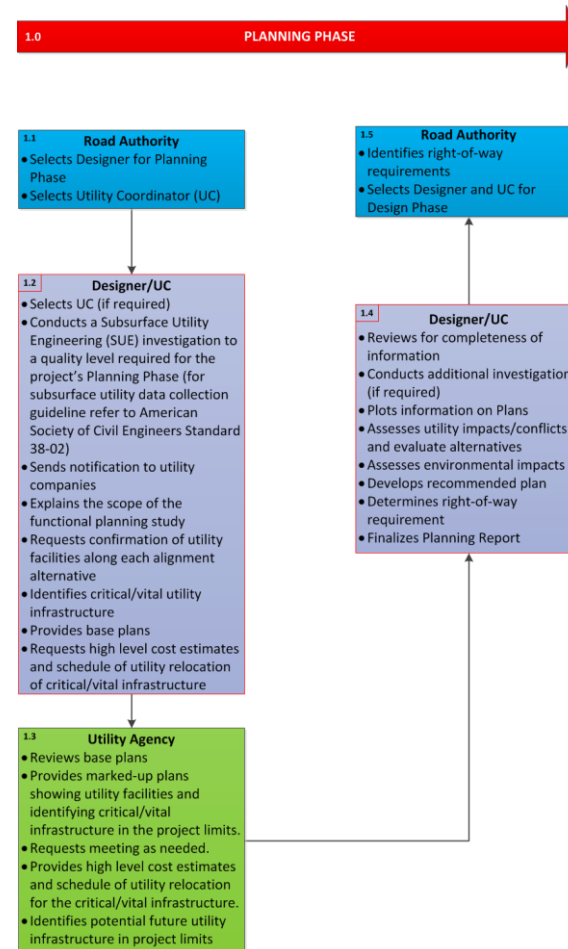


Document



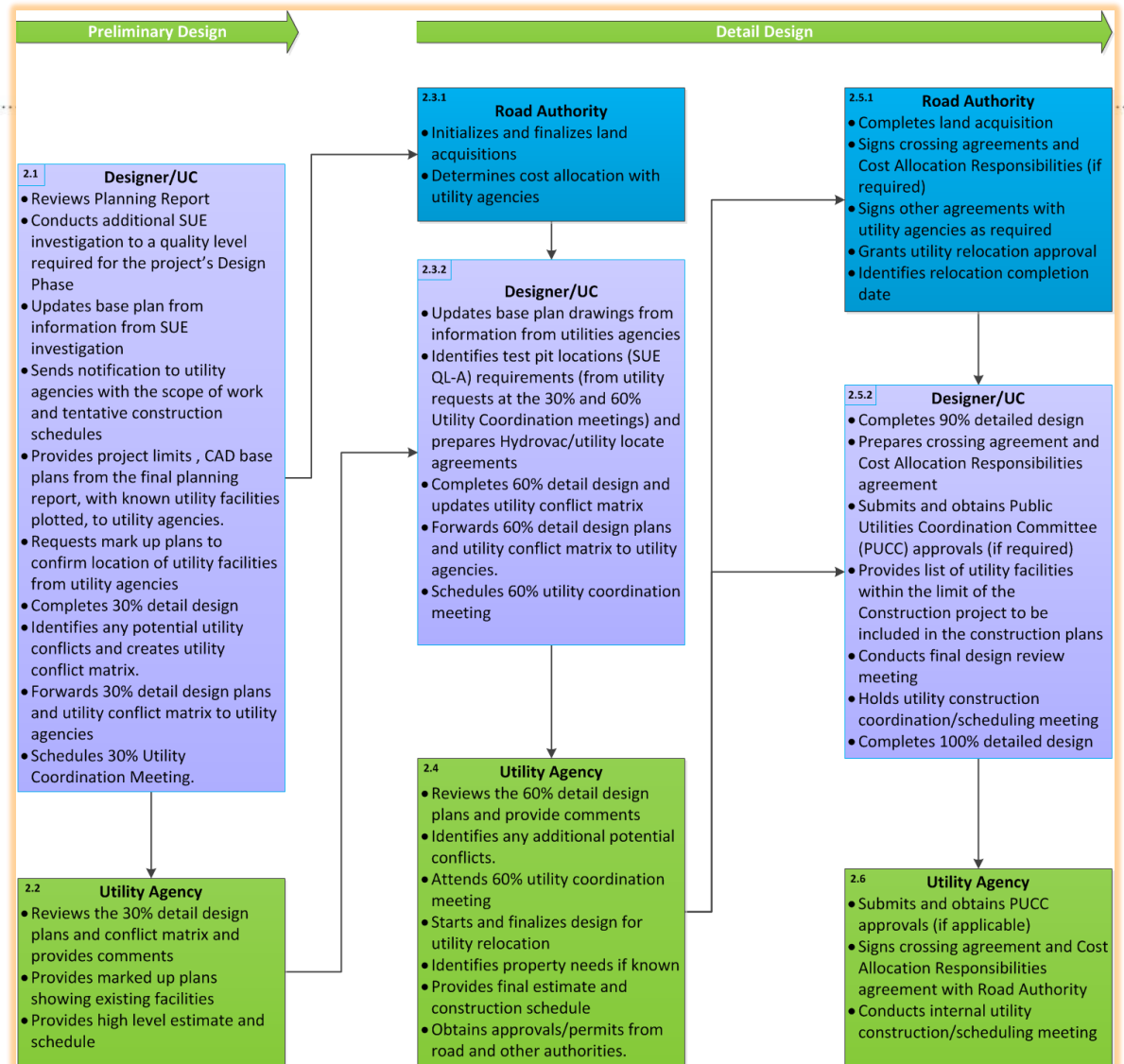
Flow Chart

Planning Stage

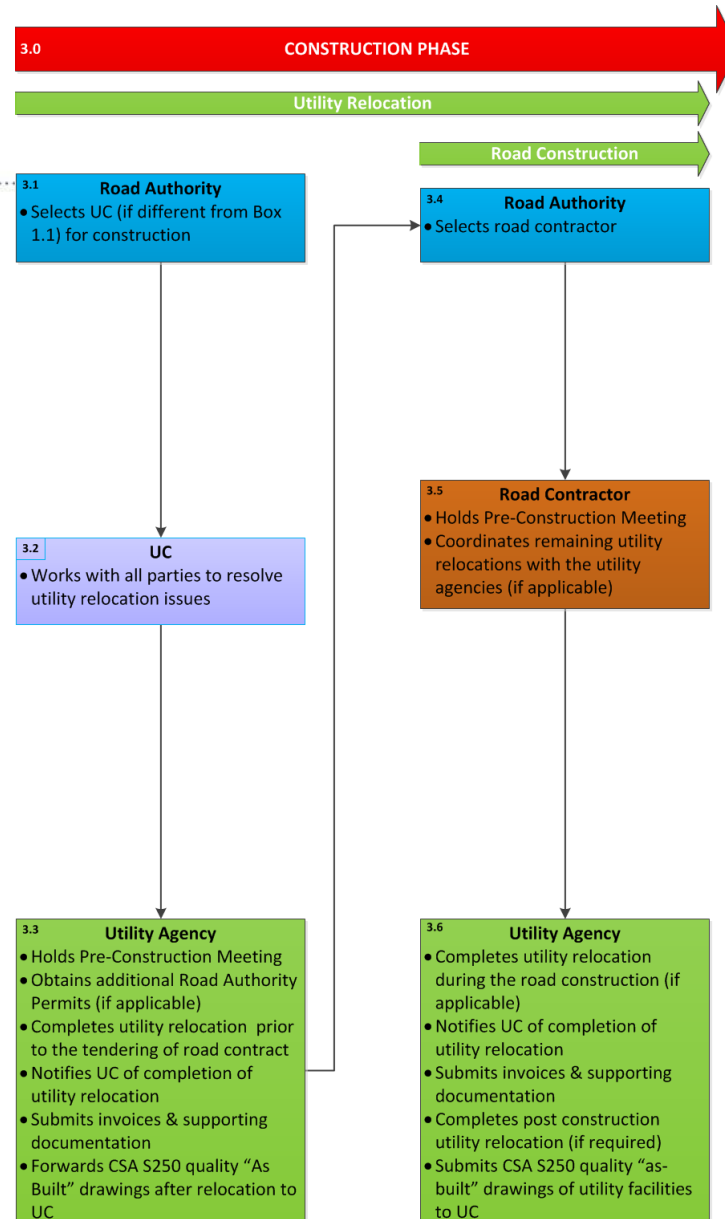


- Prelim Design

- Detailed Design



Construction Phase



Guideline Format

TAB			7	10.	10.16 FLOW CHART TASK BOXES
	10.4				
	10.5				
1.	EX	10.6	7.1	10.1	The following section is to be read in conjunction with the flow chart found in Appendix A. It provides further valuable commentary and description about the tasks at each stage of the Utility Coordination Process. Each section is aligned with the corresponding numbered box on the flow chart.
2.	AC	10.7			2.1 Designer
3.	FO	10.8			The following tasks are to be completed for Box 2.1 of the Utility Relocation Guideline Flow Chart:
4.	OB	10.9			
5.	INT	10.10			
6.	INT	10.11	7.2	10.2	
7.	RO	10.12			
7.1		10.13			
7.2		10.14			
7.3		10.15			
7.4		10.16			
7.5	11. CO	11.1			
7.6		11.2	7.3	10.3	
8.	LA	11.3			
8.1		11.4			
8.2		11.5			
8.3		11.6			
8.4		11.7			
9.	PL	11.8	7.4		
9.1		12. PO			
9.2		12.1			
9.3		12.2			
9.4		12.3			
9.5		12.4			
9.6		12.5			
10.	DE	12.6			
10.1	APPEN		7.5	10.4	
10.2	APPEN				
10.3	APPEN				

Utility Coordination

- Utility Coordination is a fundamental aspect of all capital projects.
- Utility Coordinators manage one of the highest risk elements on projects.
- Experience is key!

Role of the Utility Coordinator

Coordinate between Designer and Utilities

Review impact of design on utilities

Analyze conflicts and recommend revisions to design
OR utility relocation, protection

Prepare preferred utility design – factor in
constructability, scheduling, cost

Provide Utilities with preferred design or D&B for
them

UC Conflict Matrix

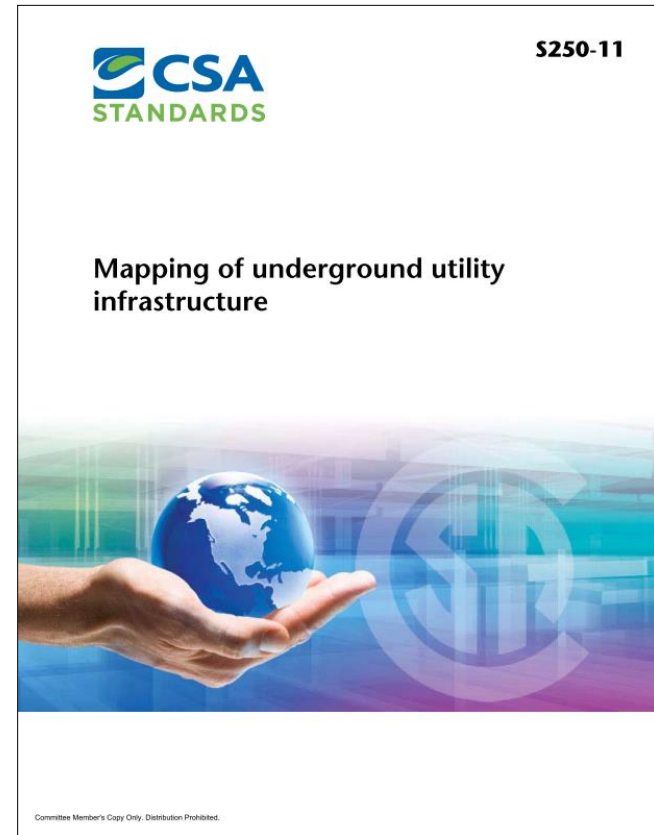
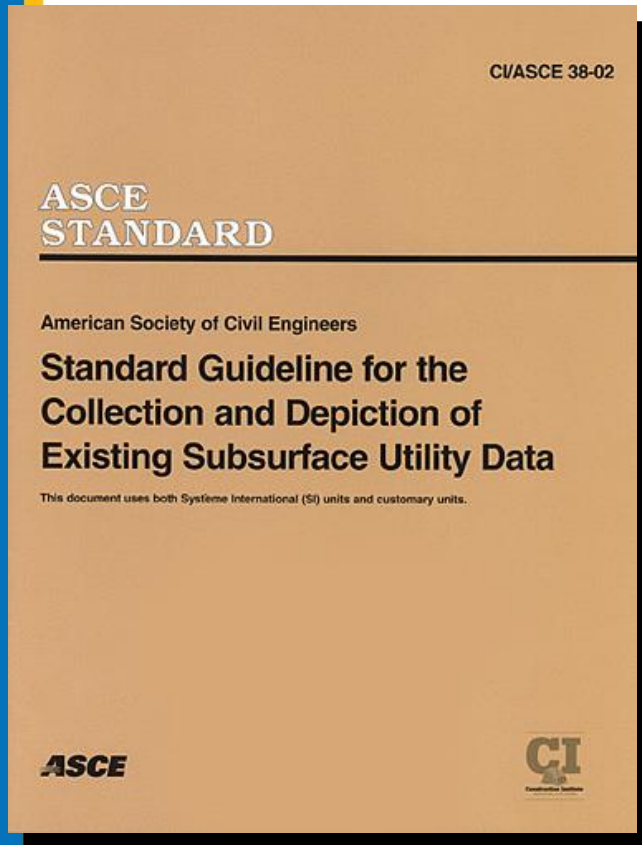
The use of a detailed utility conflict matrix to track Utility issues on projects.

Conflict #	Utility	~ Existing Location (Station)	Utility Information	Assessment of Effects	Utility She
35	Rogers	E-W on Nash Road (North and south sides)	Aerial Cables on Bell and Hydro One Poles - 1 FOC, 1 Coax	To be placed into U/G structure crossing EDL - potential for Joint build with Hydro One or Bell Canada	59
36	Bell Canada	E-W on Nash Road (North and south sides)	Aerial Cable on Bell Poles	407 crossing required. Relocate cables into new U/G Bell (1D) or potential for joint trench with Hydro One.	59
37	Hydro One Distribution	E-W on Nash Road (North and south sides)	Aerial Line - 3 phase	407 crossing required. Place new u/g structure and transfer cables.	59
39	Hydro One Distribution	N-S on Solina Road (east side)	Aerial Line - 3 phase	407 crossing required. Place new u/g structure and transfer cables.	60
40	Bell Canada	N-S on Solina Road (west side)	Aerial Cable on Bell poles	407 crossing required. Relocate cables into new U/G Bell or potential for joint trench with Hydro One.	60
41	Trans-Northern Pipeline	E-W across the proposed 407	273.1mm HP Petroleum Pipeline	Existing grades not changing - EDL will span across Enbridge Corridor via Bridge structures. MRC advised that overhead clearance will likely be from 2-3m. No Pipeline relocation required. TNPL to place a 16" pipeline parallel to existing pipeline for future use and cap either side of MTO right of way. TNPL also requested that	61
42	Hydro One Distribution	E-W across the proposed 407	Aerial Line - 2x44kV, 3 phase	407 crossing required. Place new U/G structure beneath proposed overpass and transfer cables. No vertical clearance required from OG to bridge.	61
43	Hydro One Distribution	N-S on Rundle Road (West side)	Aerial Line - 3 phase	Rundle Road to be re-aligned, relocate to new alignment	62
44	Bell Canada	N-S on Rundle Road (West side)	Buried conduit & cable	Rundle Road to be re-aligned, relocate to new alignment	62
45	Hydro One Distribution	E-W on Taunton Road (South side)	Aerial Line - 2x44kV, 3 phase	407 crossing required. Place new u/g structure and transfer cables.	62
46	Bell Canada	E-W on Taunton Road (South side)	Aerial Cable on Hydro One Poles	Cut and cap on north side of the EDL once customers have been removed.	62, 63
47	Bell Canada	E-W on Taunton Road (North side)	Buried conduit & cable	Cut and cap on north side of the EDL once customers have been removed.	62, 63
48	Enbridge Gas Distribution	E-W on Taunton Road (South side)	NPS 12 ST XHP	Gas main will be located beneath slopes of overpass under approx. 8m of fill and in conflict with future bridge abutments. Relocate approx. 700m of gas main.	62, 63
49	Hydro One Distribution	N-S on Rundle Road (East side)	Aerial Line - 1 phase	Rundle Road to be removed, remove service once customers vacate.	62
50	Bell Canada	N-S on Rundle Road (West side)	Buried conduit & cable	Rundle Road to be removed, remove service once customers vacate.	63

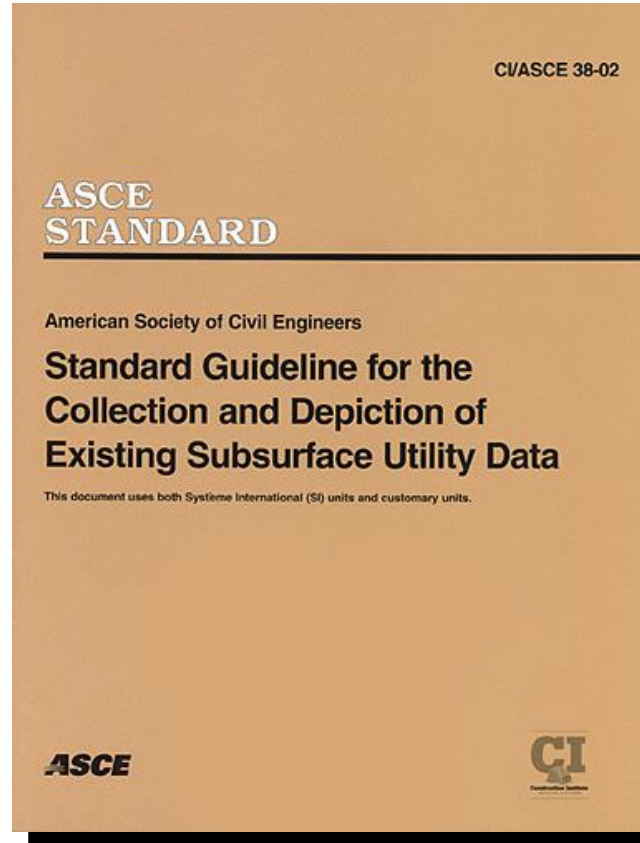
Sample – TTC Union Station Expansion



Associated Standards



Standards- ASCE 38-02



SUE Quality Levels

NOTES

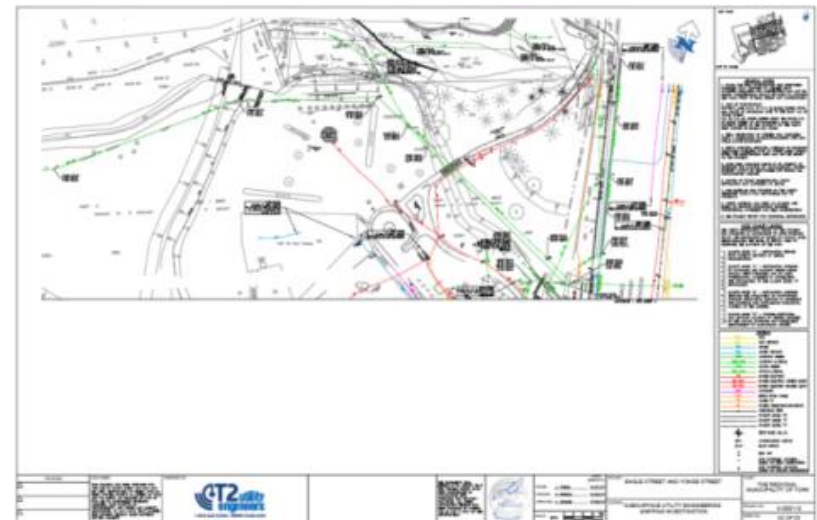
THE UTILITY INFORMATION SHOWN ON THIS DRAWING WAS COLLECTED IN ACCORDANCE TO ASCE STANDARD 38-02. THE INFORMATION IS SHOWN BY QUALITY LEVEL WHICH INDICATES THE LEVEL OF EFFORT USED TO DETERMINE THE LOCATION OF THE DATA.

- I
N
C
R
E
A
S
E
D
Q
U
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Y
- QUALITY LEVEL "D" – INFORMATION DERIVED FROM EXISTING RECORDS OR VERBAL RECOLLECTIONS.
 - QUALITY LEVEL "C" – INFORMATION OBTAINED BY SURVEYING AND PLOTTING VISIBLE ABOVE GROUND UTILITY FEATURES AND BY USING PROFESSIONAL JUDGEMENT IN CORRELATING THIS INFORMATION TO THE QUALITY LEVEL "D" INFORMATION.
 - QUALITY LEVEL "B" – INFORMATION OBTAINED THROUGH THE APPLICATION OF APPROPRIATE SURFACE GEOPHYSICAL METHODS TO DETERMINE THE EXISTENCE AND APPROXIMATE HORIZONTAL POSITION OF THE UTILITIES.
 - QUALITY LEVEL "A" – PRECISE HORIZONTAL AND VERTICAL LOCATION OF UTILITIES OBTAINED BY THE ACTUAL EXPOSURE AND SUBSEQUENT MEASUREMENT OF SUBSURFACE UTILITIES.





















A, B, C, D

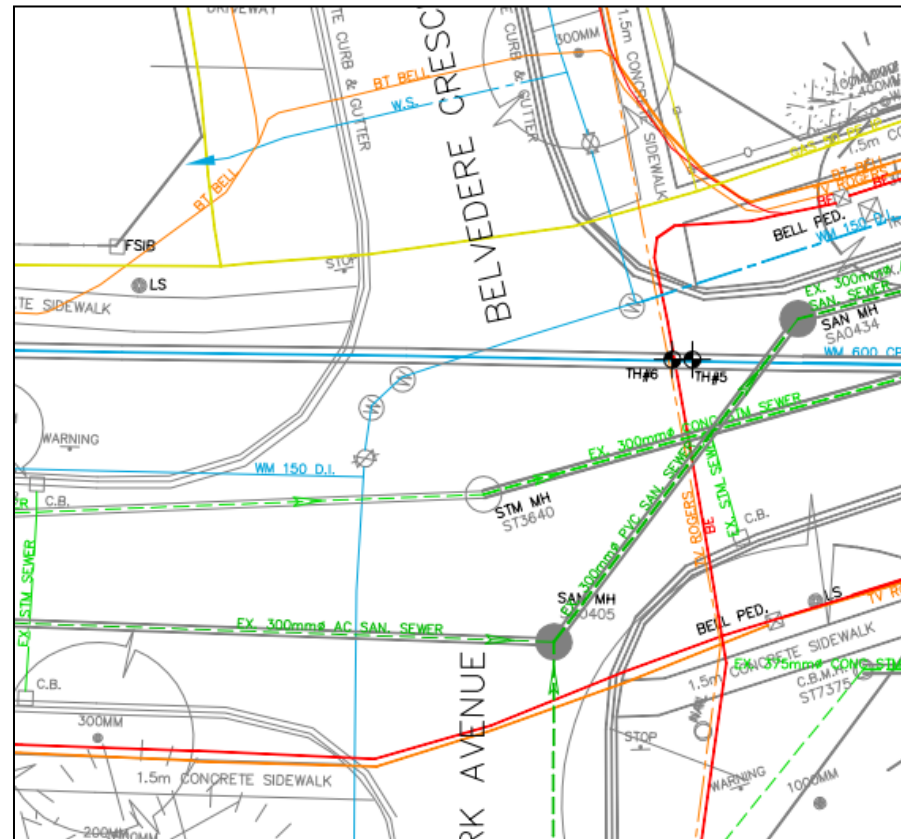


Most Accurate ← Least Accurate



Quality Levels on Drawings

LEGEND	
	GAS
	GAS SERVICE
	WATER
	WATER SERVICE
	SANITARY SEWER
	SANITARY LATERAL
	STORM SEWER
	STORM LATERAL
	BURIED ELECTRIC
	BURIED ELECTRIC STREET LIGHT
	UNKNOWN
	FIBRE OPTIC CABLE
	CABLE TV
	BURIED TELECOMMUNICATIONS
	QUALITY LEVEL "B"
	QUALITY LEVEL "C"
	QUALITY LEVEL "D"
	TEST HOLE (QL-A)
	BRACKETS INDICATE INFORMATION OBTAINED FROM RECORDS
	NOT SURVEYED, BASED ON FIELD OBSERVATION



Standards – CSA S250



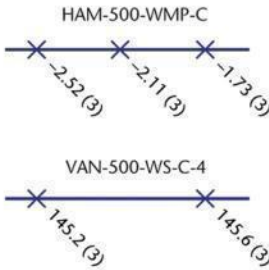
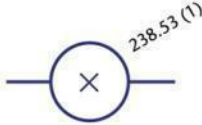
S250-11

Mapping of underground utility infrastructure



Committee Member's Copy Only. Distribution Prohibited.

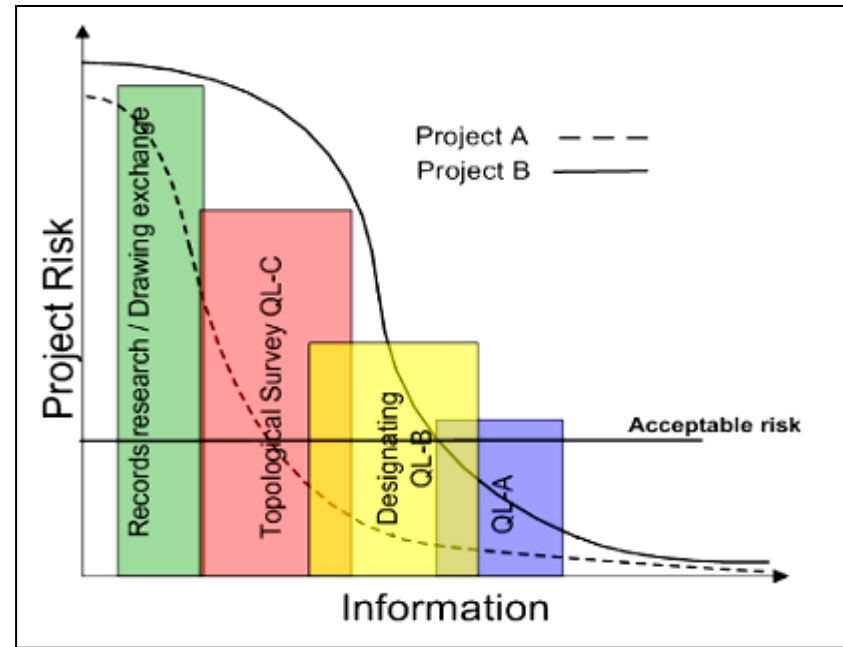
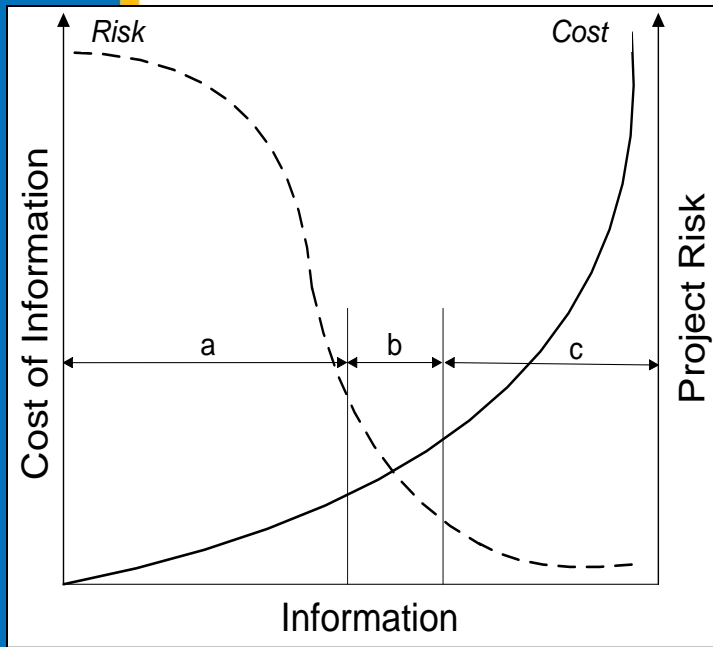
Standards – CSA S250

Feature	Type	Feature Attribution (bold is min for paper plans)	Graphic and Line text per Feature Note: Map insertion point shown in black could be a call out <ul style="list-style-type: none"> multiple or single cable = 0 as place holder in size means it takes up the width of trench If owner's name is large use abbreviation and note owner full name in map legend; if unknown use "unkn" 	Field Measurement Point
Watermain Potable = WMP Watermain Non-potable = WMNP Water Service = WS	Linear feature	Owner Feature dimension (dia, W×H×D) Feature type abbreviation Material Spatial X, Y, Z Accuracy level (for point or line segment) Additional optional data: <ul style="list-style-type: none"> – company feature ID – year placed or revised – quality level – lifecycle status (existing or abandoned) – depth of cover 		<ul style="list-style-type: none"> • top of feature • X,Y,Z – Points along top of feature
Hydrants = HYD	Point feature	Owner Feature dimension (hydrant lead size) Utility feature Type abbreviation Material Spatial X, Y, Z Accuracy level (for point or line segment) Additional optional data: <ul style="list-style-type: none"> – company feature ID – year placed or revised – quality level – lifecycle status (existing or abandoned) – horizontal perpendicular swing tie to face of curb or to legal property limit 		<ul style="list-style-type: none"> • top – nut

Standards – CSA S250

Accuracy level	Description	Reference
1	Accurate to within +/- 25 mm in the x, y, and z coordinates, and referenced to an accepted geodetic datum with a 95% confidence level.	Absolute
2	Accurate to within +/- 100 mm in the x, y, and z coordinates, and referenced to an accepted geodetic datum with a 95% confidence level.	Absolute
3	Accurate to within +/- 300 mm in the x, y, and z coordinates, and referenced to an acceptable geodetic datum or topographical and cadastral features with a 95% confidence level.	Absolute or relative
4	Accurate to within +/- 1000 mm in the x, y, and z coordinates, and referenced to an acceptable geodetic datum or topographical and cadastral features with a 95% confidence level.	Absolute or relative
5	Accurate to within +/- 1000 mm in the x and y coordinates, and referenced to an acceptable geodetic datum or topographical and cadastral features with a 95% confidence level.	Absolute or relative
0	No information available related to spatial accuracy.	

SUE and Risk Management



UofT Study - ROI = \$4.62

Guideline's Process - Standards

Planning

Identify Corridor

- Subsurface Utility Engineering Investigation,

ASCE 38-02

Design

Complete Design

- Capital Project
- Utility Conflict Matrix
- Utility Relocation

Construction

Relocate Utilities

- Early works
- During construction

Post Construction

Utility Close Out

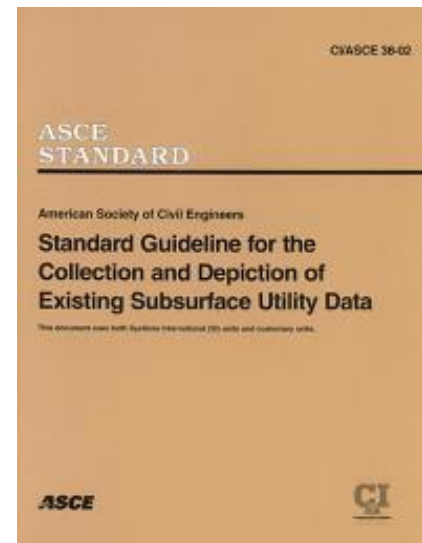
- Invoicing/Payment
- Claim Resolution
- As Built Drawings,

CSA S250

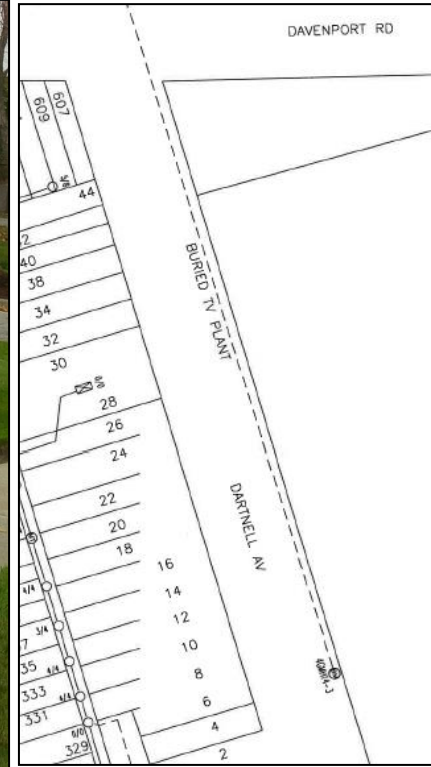
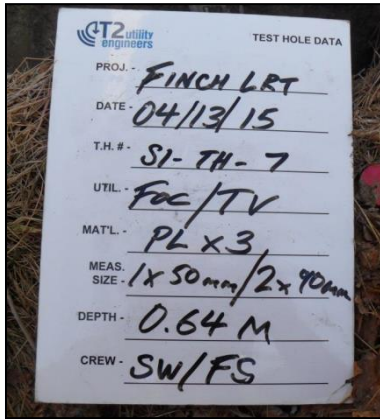
What is SUE

A branch of engineering practice that involves managing certain risks associated with utility mapping at appropriate quality levels, utility coordination, utility relocation design and coordination, utility condition assessment, communication of utility data to concerned parties, utility relocation cost estimates, implementation of utility accommodation policies and utility design.

Definition from CI/ASCE 38-02



SUE Quality Levels



A

B





















C

D

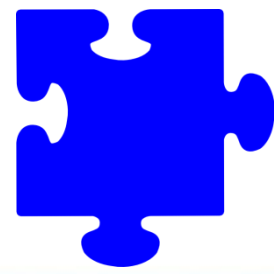
Most Accurate

Least Accurate

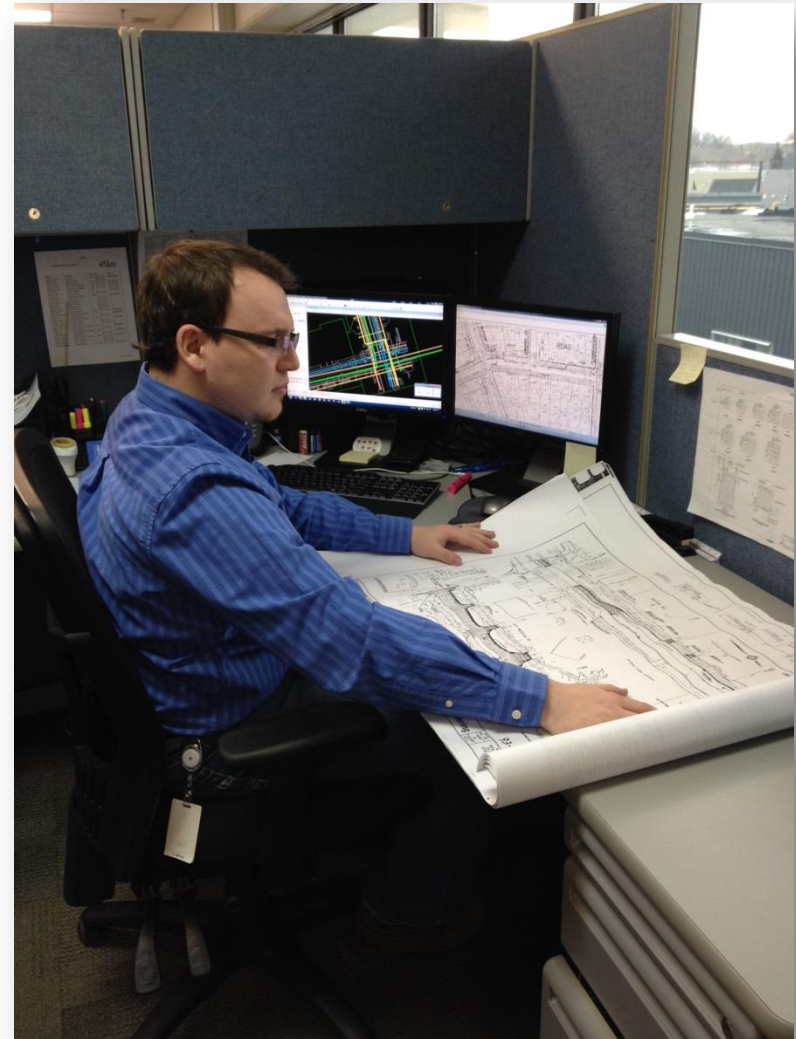
Drawing

<u>LEGEND</u>	
 GAS	GAS
 G.S.	GAS SERVICE
 WM	WATER
 W.S.	WATER SERVICE
 SAN	SANITARY SEWER
 SAN LAT.	SANITARY LATERAL
 STM	STORM SEWER
 STM LAT.	STORM LATERAL
 BE	BURIED ELECTRIC
 BE (SL)	BURIED ELECTRIC STREET LIGHT
 UNK	UNKNOWN
 FOC	FIBRE OPTIC CABLE
 TV	CABLE TV
 BT	BURIED TELECOMMUNICATIONS
	QUALITY LEVEL "B"
	QUALITY LEVEL "C"
	QUALITY LEVEL "D"
	TEST HOLE (QL-A)
	BRACKETS INDICATE INFORMATION OBTAINED FROM RECORDS
	NOT SURVEYED, BASED ON FIELD OBSERVATION

Quality Level “D”



- Records Research
Quality Level ‘D’:
Information derived
from existing records or
verbal recollections.



QLD – Request Utility Information



T2 Utility Engineers Inc.
1815 Dundas St. E
4th Floor, Lang Tower
Whitby, Ontario L1N 2L1
T: (905) 668-8822
www.T2ue.com

September 12th, 2014

To Whom It May Concern:

Re: Utility Record Information Request – 2346 - Rouse - Toronto - 82 Carnforth Rd

T2ue is undertaking a utility investigation on 82 Carnforth Rd. Toronto, ON. The limits of the investigations are shown below.

The limits of investigation



We request that you forward any data on your proposed, existing, as constructed, and/or abandoned plant located in the investigation area. The information will be used for planning purposes. Information can be returned in the form of hard copy redline drawings, as-built records, utility maps, or electronic mark-ups. If you would like a hard copy of the drawings please let us know, and they will be sent to you.

If you have any questions please feel free to contact me.

Kevin Goring
C.A.D./Project Coordinator
T: 905-668-8822 x2537
E: kevin.goring@t2ue.com



QLD – Document Information Received

Utility Contact Sheet: CITY OF TORONTO

Project Name: 02 Cawthra Rd
 Project Number: 01000414
 Client: ROUSE



Compiled by: E. OGBINO
 Checked by: E. OGBINO
 Updated (dd/mm/yy): 17-Sep-14

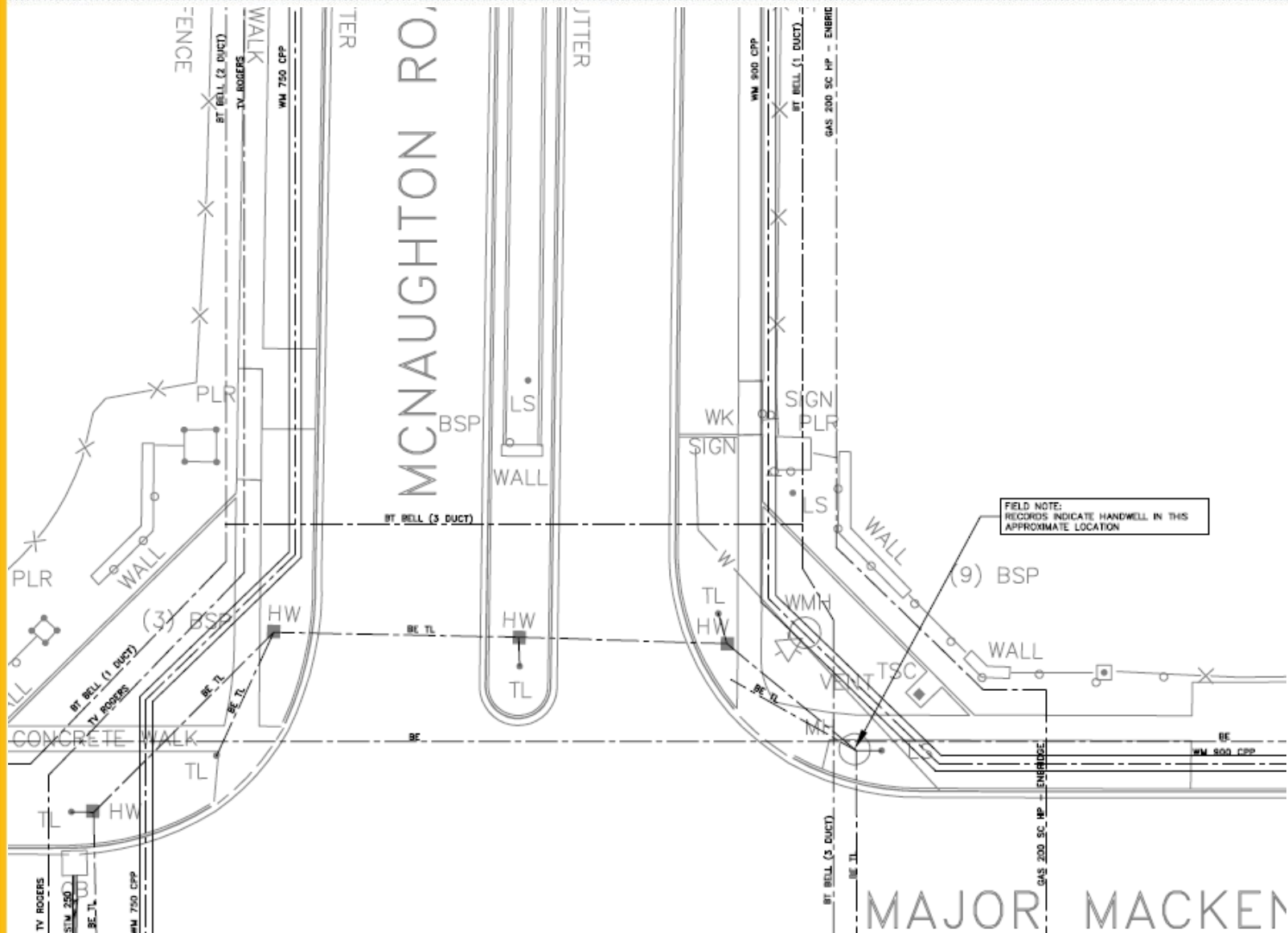
Job Links:

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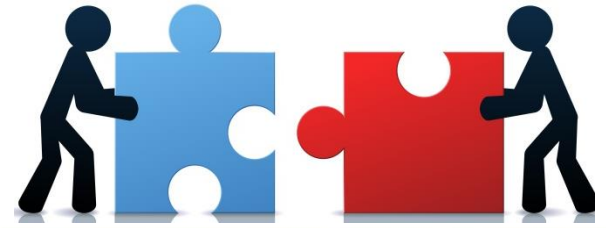
Utility	Email Address	Contact Name	Contact Information	Info Requested (MM/DD/YY)	Info Received (MM/DD/YY)	MATERIAL RECEIVED	Notes
Bearfield Metroconnect	tyuoc@bearfield.com	Daniel A. Choe	77 Mowat Ave., Suite 506 Toronto ON M5K 3E3 Canada tel: (416) 512-1555 Ext. 2020	09/12/14			District 1 and 3 only. See coverage map here: Y:\OPERATIONS\Project Management\Appendix II - Utility Contacts, Permits, Records/Contacts, Coverage & Circ. Requirements
Bell Canada	rocebell@bell.ca bell.mso@bellsouth.com	Elaine Oakley (Toronto) Chris O'Brien (Ottawa)	100 Brough Drive, Floor 75 Toronto, ON M1P 4R2 tel: 416-296-6587	09/12/14	09/16/14	CAD FILES	For records request see bell.mso@bellsouth.com. For more detailed information contact Elaine Oakley and she will put you in touch with the local "Outside Implementation Manager"
Cogeco Data Services Inc.	jelly.circul@cojecogdata.com	Ramin Patel	Cogeco Data Services Inc. 413 Bloor Ave Toronto, ON M5W 4W5 Tel: 416-840-8755 Fax: 416-426-7774	09/12/14			
Enbridge Gas Distribution	mark.sami@enbridge.com	Joe Marzoni	500 Consumers Road 4th Floor - Post A2 - VFC North York, ON M2J 1P8 tel: (416) 758-7656 Ext: (416) 758-4074	09/12/14	09/17/14	NO CONTACT	
Eversource Energy Corporation	tyuoc@eversource.com		181 University Ave, Ste 1710, PO Box 105, Toronto, ON, M5H 3M7	09/12/14			District 1 (Downtown core only)
Group Telecom	GJ.moo@waketown.com	Indira Sharma	Phirage Telecom 208 Town Centre Blvd., Suite 206, Markham, ON, L3R 9Z9 Tel: 905-470-2112 ext. 40265	09/12/14	09/16/14	NO CONTACT	
Hydro One	tyuoc@hydroone.com	Mark Hasilton	49 Sequest Dr. Brampton, ON L6N 4V9 tel: 705-797-4142 fax: 705-792-3116	09/12/14			Mark provides mark-up for buried Hydro One High-voltage cables. Additional Contact for Hydro One: Tom Perlestin Email: tom.perlestin@hydroone.com
Hydro One	CeriniZowSchwartz@hydroone.com		tel: 905-427-4020 fax: 905-427-4029	09/12/14			Mark-up for Aerial Hydro One High Voltage facilities
MTS-Altium	jelly.circul@mtsaltium.com	Conny Knight	50 Wilmot Rd Burlington, ON M9W 5Y2 tel: 416-649-7509	09/12/14	09/15/14	NO CONTACT	Additional contact for MTS Altium: Ian Fleming Email: ian.fleming@mtsaltium.com
Rogers Cable Communications Inc.	OTA.McIntyre@rci.rogers.com	Manel De Silva	MarkUp Coordinator, OPE GTAC Tel: 416 446-6794	09/12/14			Manel De Silva's Email: manel.deSilva@rci.rogers.com



QLD – As Shown on drawing



Quality Level “C”



- Visible Features

Quality Level ‘C’:
Information obtained by surveying and plotting visible above ground utility features and by using professional judgement in correlating this information to the quality level ‘D’ information.



in combination with measuring depth and visually verifying alignments.



Job # 6100422
Type: SAN No.: 12 Date: Dec 8, 14
Crew: SW/AW

<input checked="" type="checkbox"/> P.M.	<input type="checkbox"/> M.T.	<input type="checkbox"/> R.R.
<input type="checkbox"/> P.M. 45	<input type="checkbox"/> R.T.	<input type="checkbox"/> Picture's
<input type="checkbox"/> P.M. 45/ext		

↑

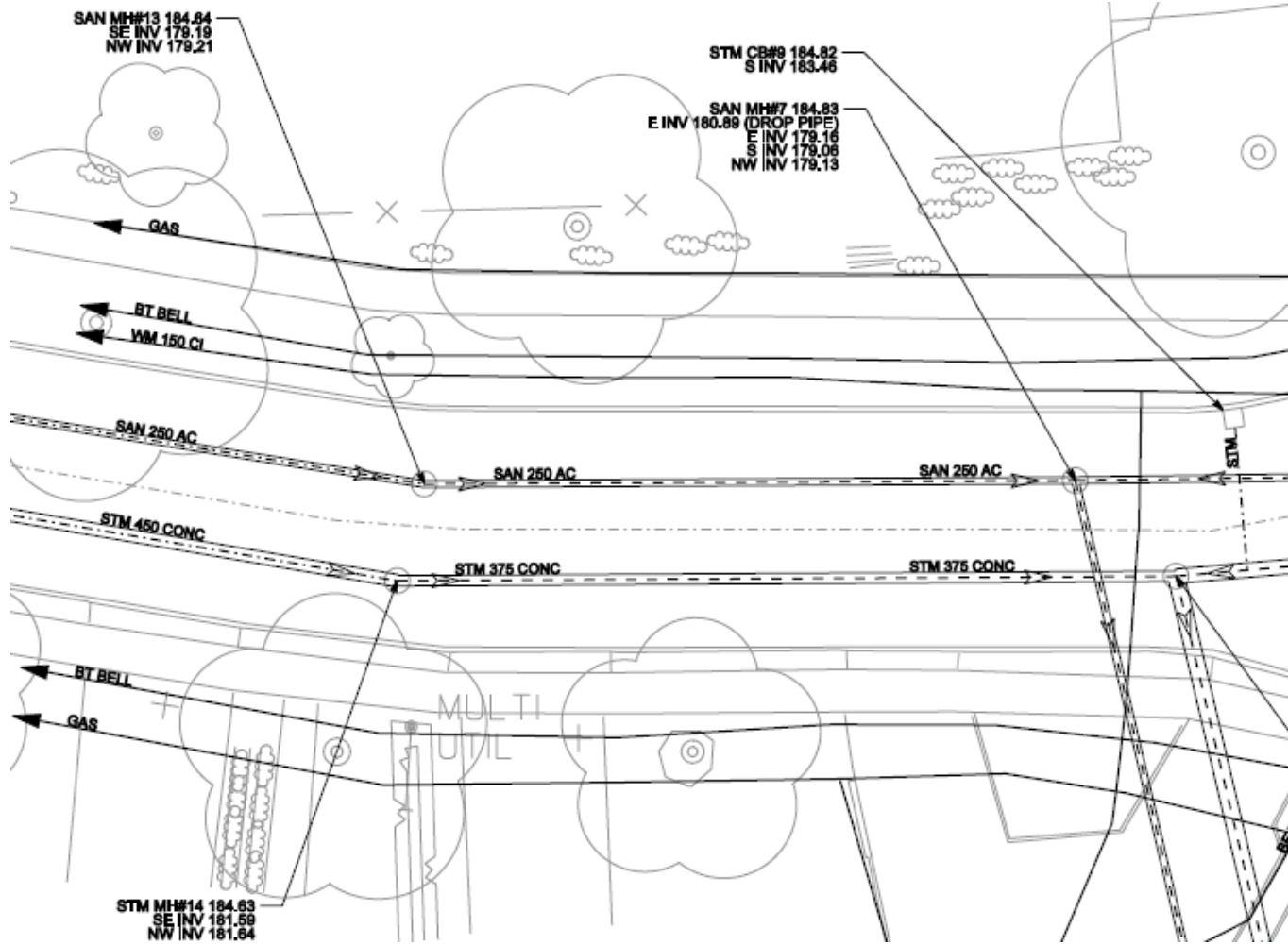
T - 4.02m
B - 4.12m
|
mt - ?

→ ○ →

T - 4.05m
B - 4.20m



QLC - As shown on drawing



Quality Level “B”

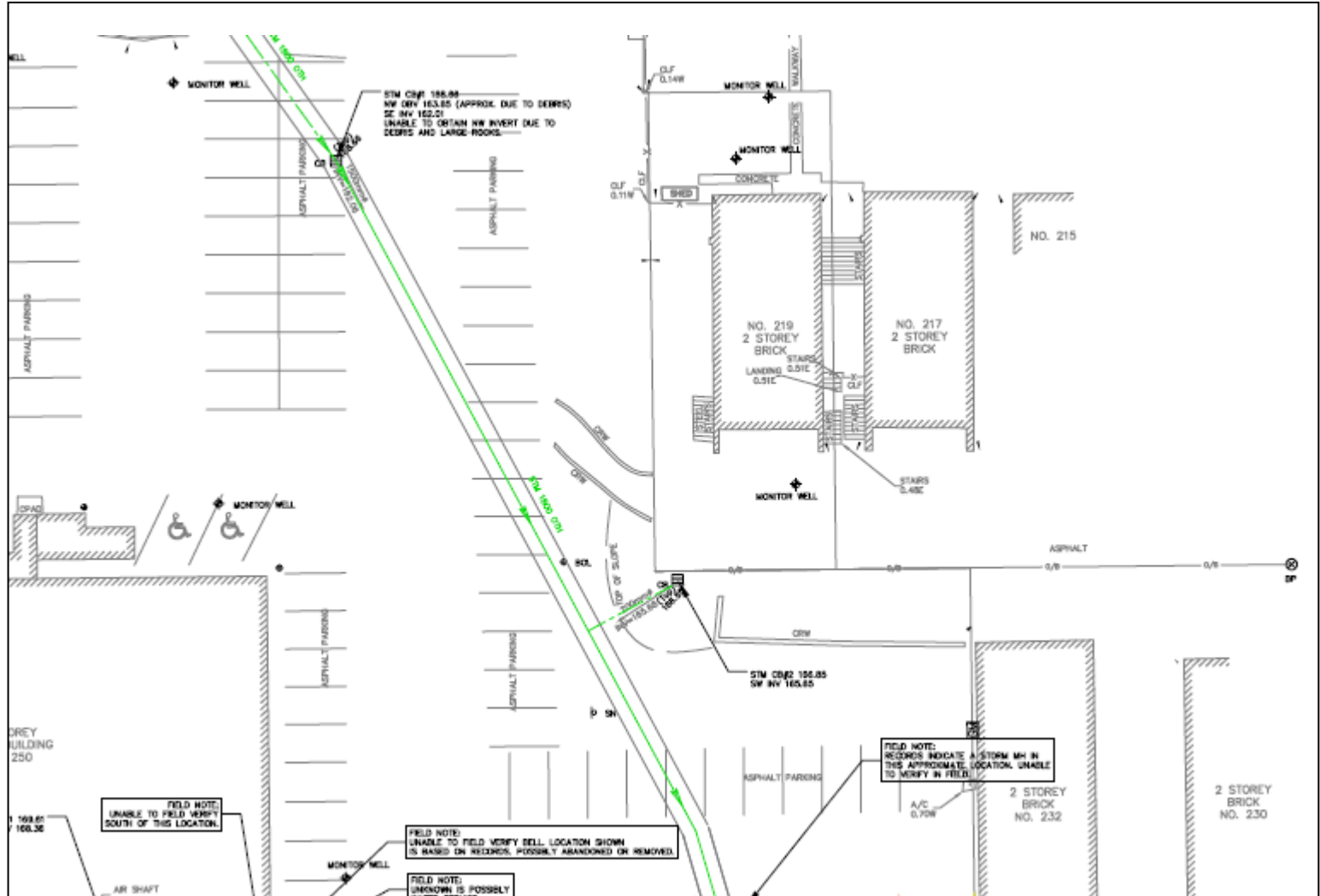


- Designating
(Horizontal Position)

Quality Level ‘B’:
Information obtained through the application of appropriate surface geophysical methods to determine the existence and approximate horizontal position of the utilities.



QLB - As shown on drawing



QLB – Using the required equipment to obtain the horizontal alignment..

- **Electromagnetic Methods**
 - Cable Locate Equipment
 - Sonde
 - CCTV Camera with sonde
 - Ground Penetrating Radar

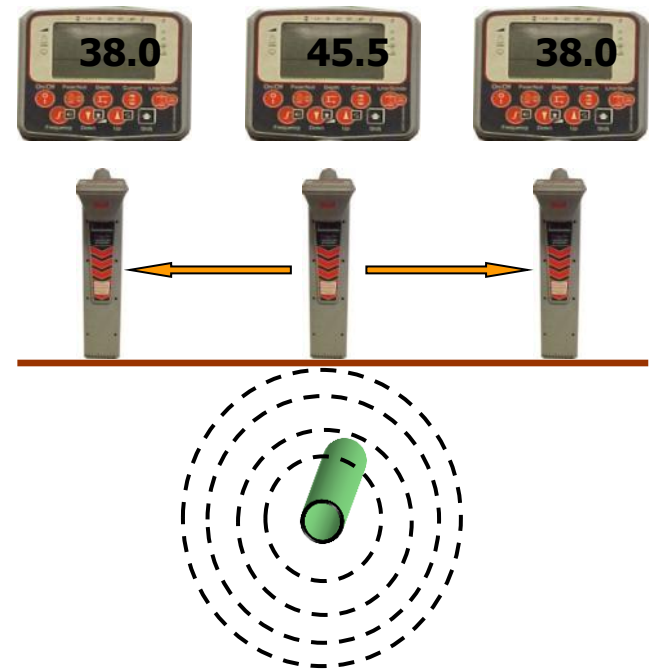
Cable Locate Equipment

Principle

- Alternating current through a conductor induces a magnetic field

Methods

- Direct connect
- Inductive coupling
- Induction



Some cable locate equipment used by T2



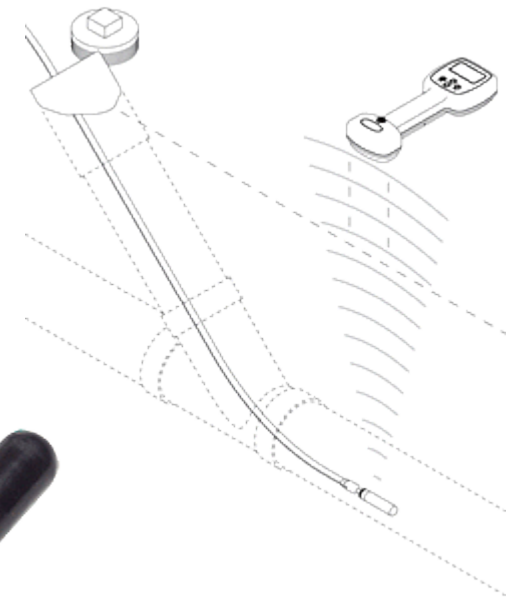
Sonde

Principle

- Transmitter is transported through open conduit for detection on the surface

Methods

- Fiberglass reel
- Tethered float
- Diver



CCTV Mapping

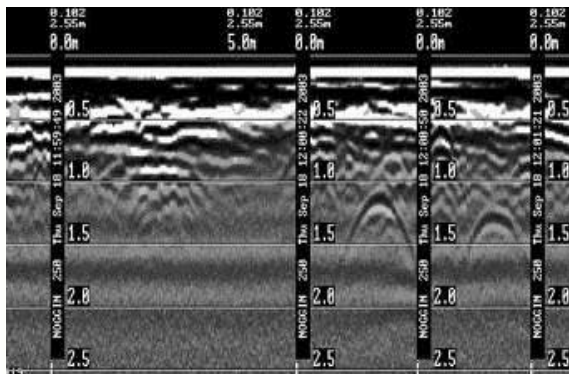


CCTV – The Pro's



Ground Penetrating Radar

GPR detects metallic and non-metallic, natural and man-made underground features, including utilities, storage tanks, rebar, sinkholes, voids, water table, buried artifacts, grave sites and more.



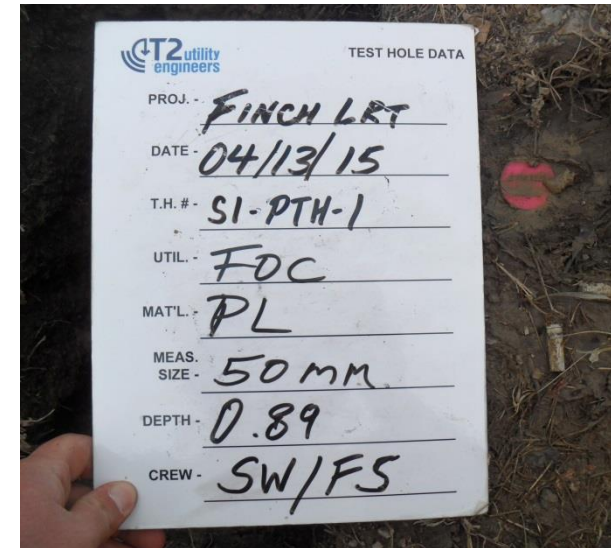
Quality Level “A”



- Test Holes (Precise vertical & horizontal alignment)

Quality Level ‘A’:

Precise horizontal & vertical location of a utility by the actual exposure & subsequent measurement of the utility.



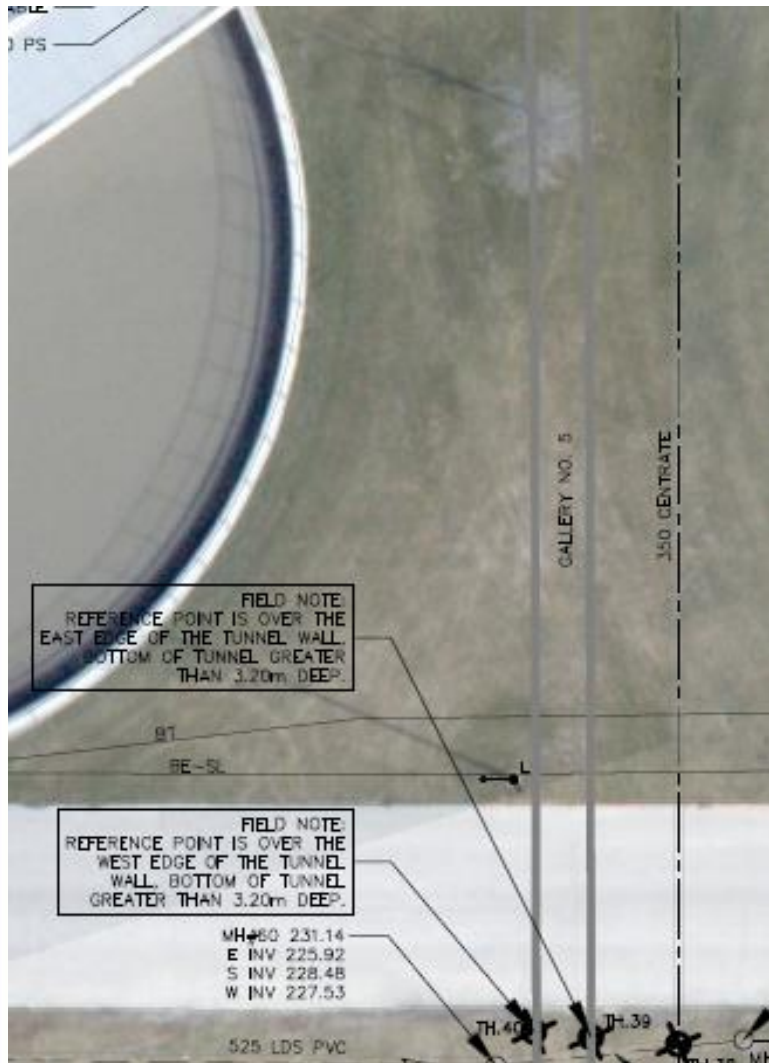
T2ue Air Vac Unit



Hydro Vac Unit



QLA - As shown on drawing



Project Name: Winnipeg NEPC				Location:											
Project No.: 61000277															
Client Project No.: 1-0101A-00002															
City/Prov.: Winnipeg															
TEST HOLE DATA															
Utility Type BE Buried Electric CATV Cable Television G Gas FM Force Main BT Buried Telecom RW Reclaimed Water FOC Fibre Optic Cable SL Street Light W Water TS Traffic Signal SAN Sanitary EXP Exploratory STM Storm UNK Unknown				Utility Material DBC Direct Buried Cable CNP Concrete Pipe UNK Unknown CMP Corrugated Metal Pipe MET Metallic CC Concrete/Clay Cap CP Clay Pipe PL Plastic AC Asbestos Cement (Transite) CD Concrete Duct CP Copper Pipe											
Surface Type															
Th #	Th Date (m/d/y)	Drawing #	Utility Type	Utility Material	Interlock		Manual Depth From Grade		Cross Sectional View	NG	IDM By	Surface Type	Pavement Thickness (mm)		
					Ref Point Elev. (m)	Bottom of Utility Elev. (m)	Top of Utility Elev. (m)	Bottom (m)						Top (m)	
1	6/24/14	18	W	PL	200	231.47	-	229.20	-	2.27	○	↕	Rod & Cap	NG	-
2	6/24/14	18	W	PL	200	231.36	-	229.12	-	2.24	○	↕	Rod & Cap	NG	-
3	6/24/14	18	FM	MET	300	231.50	-	227.70	-	3.80	○	↗	Rod & Cap	NG	-
4	6/24/14	18	FM	MET	300	231.00	-	227.51	-	3.49	○	↔	Rod & Cap	NG	-
5	6/24/14	18	FOC	PL	50	230.91	-	230.06	-	0.85	○	↕	Rod & Cap	NG	-
6	6/24/14	17	FM	MET	300	231.32	-	227.56	-	3.76	○	↔	Rod & Cap	NG	-

AECOM
Winnipeg NEPC
Report for Subsurface Utility Engineering Services



TH#56



TH#56A

Additional Services

- There are many other field tasks that assist with SUE investigations:

A quality level will be assigned to utilities based on the results of the following investigations.



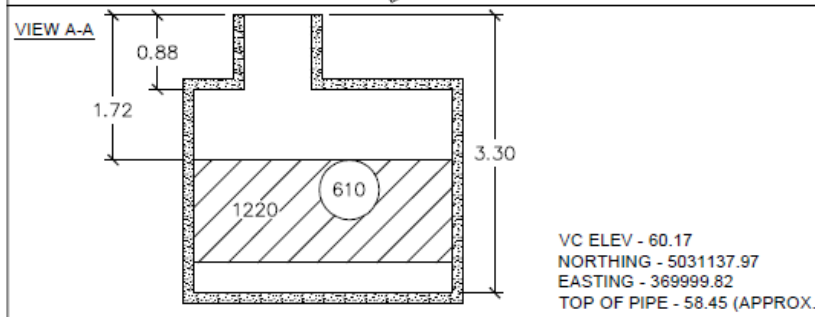
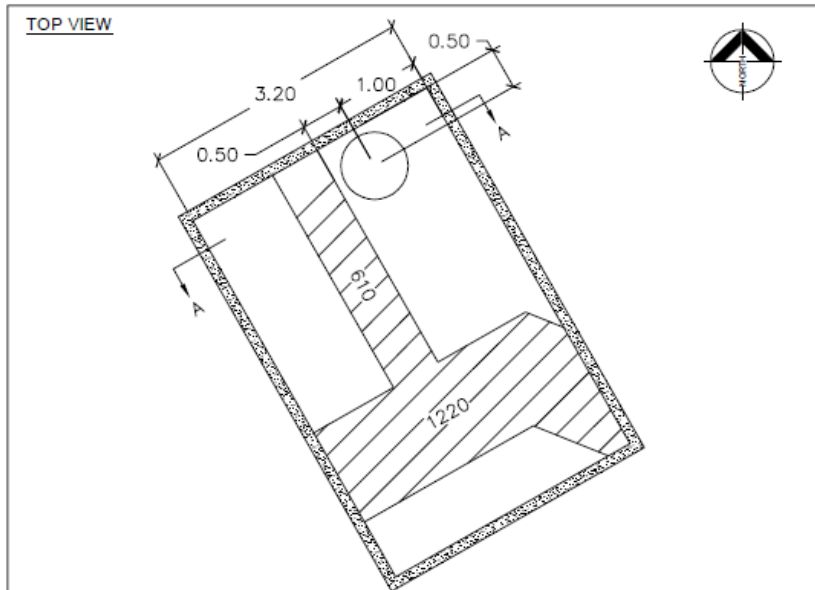
Chamber Investigations – Zoom Camera




Confined Space Entries



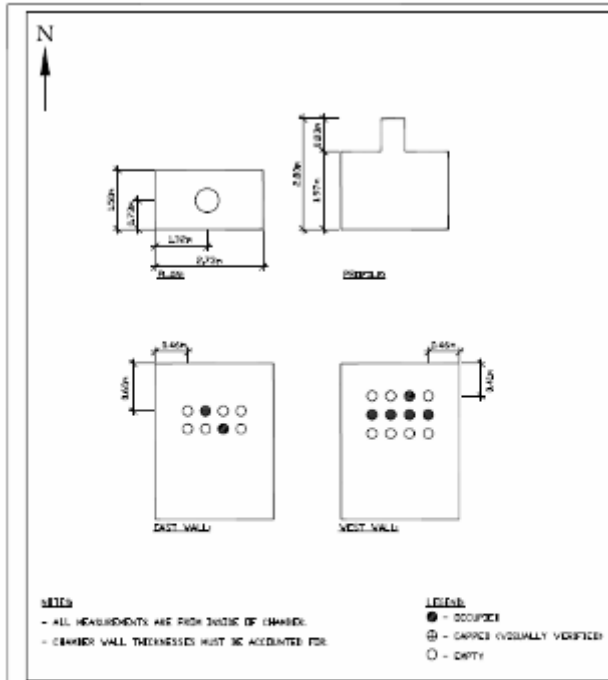
Water Chamber Investigations



PROJECT: HIGHWAY 417 LEES AVE TO CYRVILLE ROAD WATER CHAMBER INVESTIGATION		No.		DATE		BY		ISSUES / REVISIONS	
 SUBSURFACE UTILITY ENGINEERING INVESTIGATION		DRAWN BY:		CHECKED BY:		PROJECT No.:		60190582	
		DESIGNED BY:		APPROVED BY:		DRAWING No.		VC9	
		SCALE:		DATE:					
		N.T.S.		AUG-12-11					



Telecom MH Investigations



Ottawa Light Rail Project
 Rogers Chamber Investigations
 Report for Subsurface Utility Engineering Services

Classic Photos



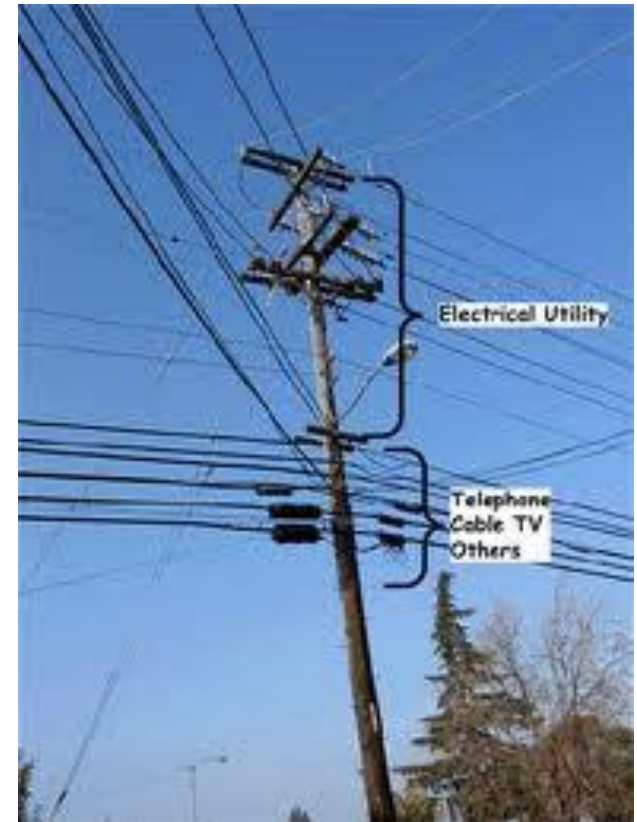
EAST WALL

SLATER – APPROX. 18m EAST OF BANK

PROJECT		DATE		BY		APPROVED	
OTTAWA LIGHT RAIL PROJECT ROGERS MANHOLES							
DRAWN		DATE		BY		APPROVED	
SLATER - APPROX 18m EAST OF BANK STREET						7200850132	
SCALE		DATE		BY		APPROVED	
						1-11	

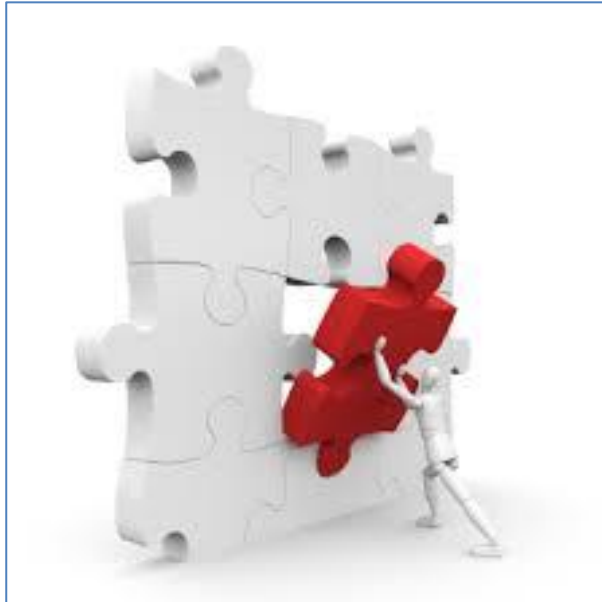


Aerial Inventory



Final Deliverables

Compiling all available information with professionally signed & sealed deliverables.



<u>NOTES</u>	
THE UTILITY INFORMATION SHOWN ON THIS DRAWING WAS COLLECTED IN ACCORDANCE TO ASCE STANDARD 38-02. THE INFORMATION IS SHOWN BY QUALITY LEVEL WHICH INDICATES THE LEVEL OF EFFORT USED TO DETERMINE THE LOCATION OF THE DATA	
I N C R E A S E D Q U A L I T Y	<p>QUALITY LEVEL "D" - INFORMATION DERIVED FROM EXISTING RECORDS OR VERBAL RECOLLECTIONS.</p> <p>QUALITY LEVEL "C" - INFORMATION OBTAINED BY SURVEYING AND PLOTTING VISIBLE ABOVE GROUND UTILITY FEATURES AND BY USING PROFESSIONAL JUDGEMENT IN CORRELATING THIS INFORMATION TO THE QUALITY LEVEL "D" INFORMATION.</p> <p>QUALITY LEVEL "B" - INFORMATION OBTAINED THROUGH THE APPLICATION OF APPROPRIATE SURFACE GEOPHYSICAL METHODS TO DETERMINE THE EXISTENCE AND APPROXIMATE HORIZONTAL POSITION OF THE UTILITIES.</p> <p>QUALITY LEVEL "A" - PRECISE HORIZONTAL AND VERTICAL LOCATION OF UTILITIES OBTAINED BY THE ACTUAL EXPOSURE AND SUBSEQUENT MEASUREMENT OF SUBSURFACE UTILITIES.</p>

 						THE CITY OF WINNIPEG WATER AND WASTE DEPARTMENT	
DESIGNED BY	CHECKED BY	RG, JR		WINNIPEG NORTH END WATER POLLUTION CONTROL CENTRE AREA SITE PLAN - SHEET 12 OF 20		SHEET	
DRAWN BY	APPROVED BY	LEA				CITY DRAWING NUMBER	
HOR. SCALE	1:250	RELEASED FOR CONSTRUCTION		1-0101A-G0002-012			
VERT. SCALE		DATE	26-OCT-14				

SUE Summary



