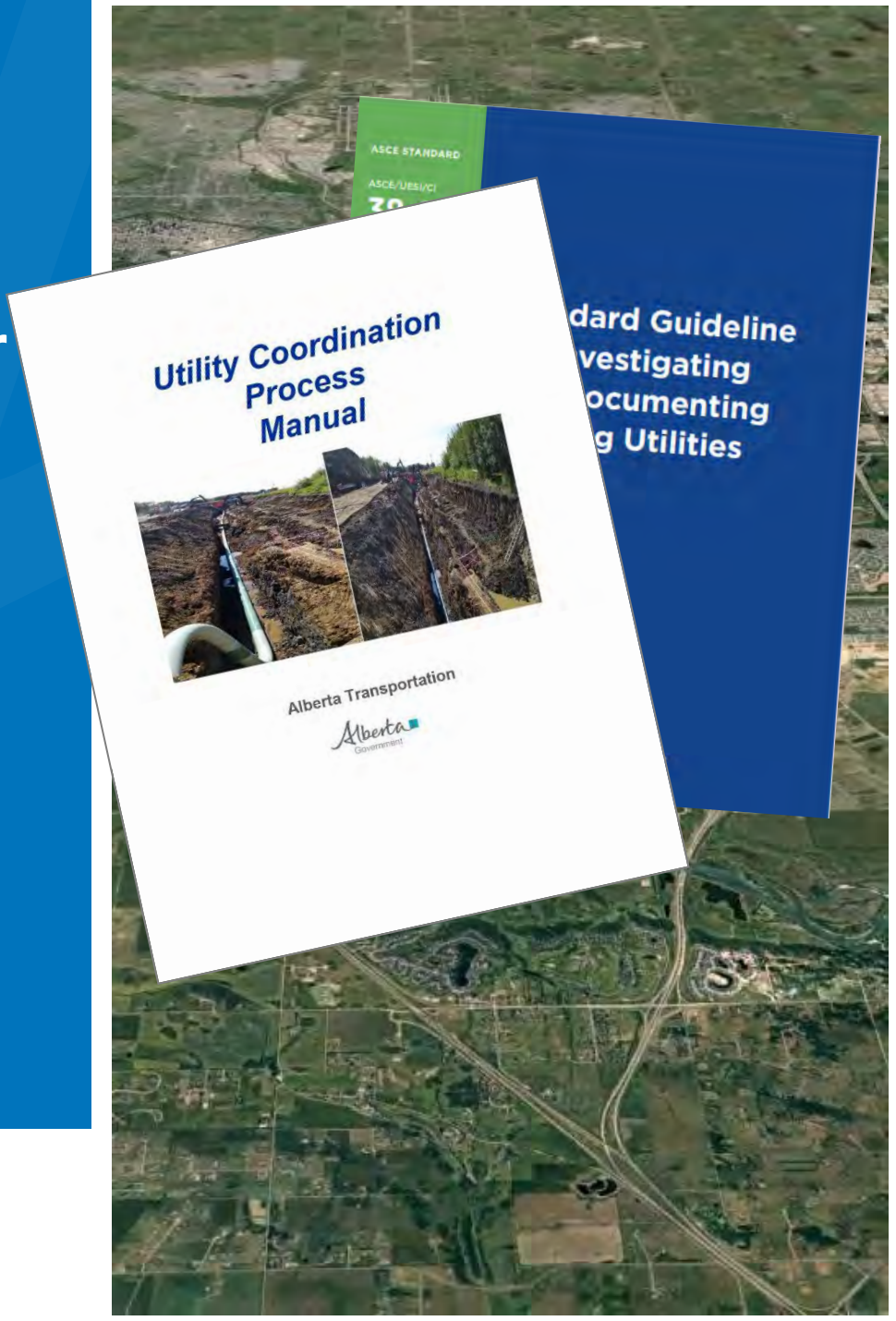
SUE Subsurface Utility Engineering E is for Engineering ASCE 38

Consulting Engineers of Alberta Transportation Connects Conference 2025

March 4, 2024



Abstract

This session will provide an in depth look at the applicable engineering guidelines for utility investigations including; Standard Guideline for Investigating and Documenting Existing Utilities, ASCE/UESI/CI 38-22, 2022. (ASCE-38) and Subsurface Utility Engineering for Municipalities, ASCE/UESI, 2019. Including a review of the roles and responsibilities of the professional engineer and the application on infrastructure sector projects and how it interacts with the Utility Coordination Manual released in 2019 by Alberta Transportation (AT). The ASCE 38 engineering guideline is the backbone of utility investigations and provides guidance for the professional engineer for the methodologies used to collect and depict existing utility data and application of engineering judgement. As the title states E is for Engineering in SUE. The session will discuss the differences between a SUE investigation and past practice including damage prevention locates, mapping or open databases so often relied upon in the absence of an engineering investigation. Objectives include the education in professional judgment for engineers using ASCE 38, understanding the application of ASCE 38 based on project scope and an introduction to the AT Utility Coordination Manual.

Key takeaways from this presentation will include:

- Discussing The ASCE 38-22 and its benefits to the project
- The Alberta Transportation Utility Coordination Process Manual from the perspective of a Utility Engineer.

T2 utility engineers

Meet the presenters

Blaine Hunt, P. Eng.

- Blaine is T2ue's Director of Engineering and Quality, responsible for reviewing, approving, and signing project deliverables for contracts, and has a successful background of multi-disciplinary projects. Blaine is a graduate of McGill University and a licensed Professional Engineer in the provinces of Nova Scotia, Ontario, Manitoba, Alberta and British Columbia with over 25 years of experience and a recognized subject matter expert involved in many professional associations. Blaine is currently co-chair for the ASCE-UESI Canada East Chapter, member of the Transportation Association of Canada Utility Management Subcommittee and involved with the CUIIC education and outreach committee working with the University of Alberta.

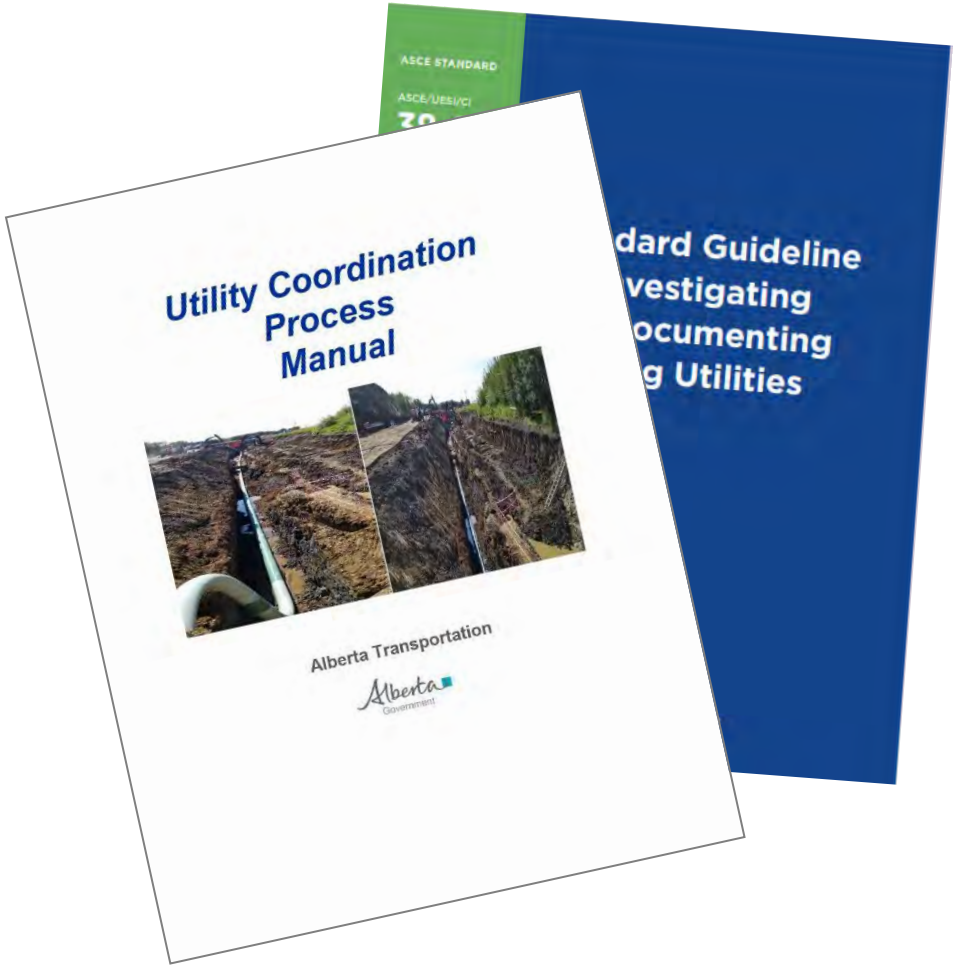
Ophir Wainer, M.CSCE.

- Ophir is a leader in the Utility Engineering and Surveying business, with more than 26 years of professional experience in project management, locating-designating, and Subsurface Utility Engineering (SUE). As the Director of Market Expansion and Education at T2 Utility Engineers Inc., he is responsible for the development management in new markets across Canada. Ophir is an experienced speaker on both Utility Engineering and Damage Prevention and has presented at a variety of conferences and training seminars. He is the Past Chair NASTT BC and Past Board member of (CATT) The Centre for Advancement of Trenchless Technologies out of the University of Waterloo now CUIIC out of the University of Alberta. He is the one of the Co-founders of the Ontario-East and AB-BC UESI chapters in Canada and is Executive director of UESI Canada. He as well currently holds the position of Vice Chair of the Transportation Association of Canada Utility Management Subcommittee.

T2 utility engineers

Agenda

- The ASCE 38-22 - Standard Guideline for Investigating and Documenting Existing Utilities
- The Alberta Transportation Utility Coordination Manual Process Manual
- Interactive Exercise



What is a Utility Engineering

Utility Engineering is a branch of Civil Engineering that focuses on the planning, position, design, construction, operation, maintenance, and asset management of any and all utility systems, as well as the interaction between utility infrastructure and other civil infrastructure.

T2 utility engineers

ASCE 38-22

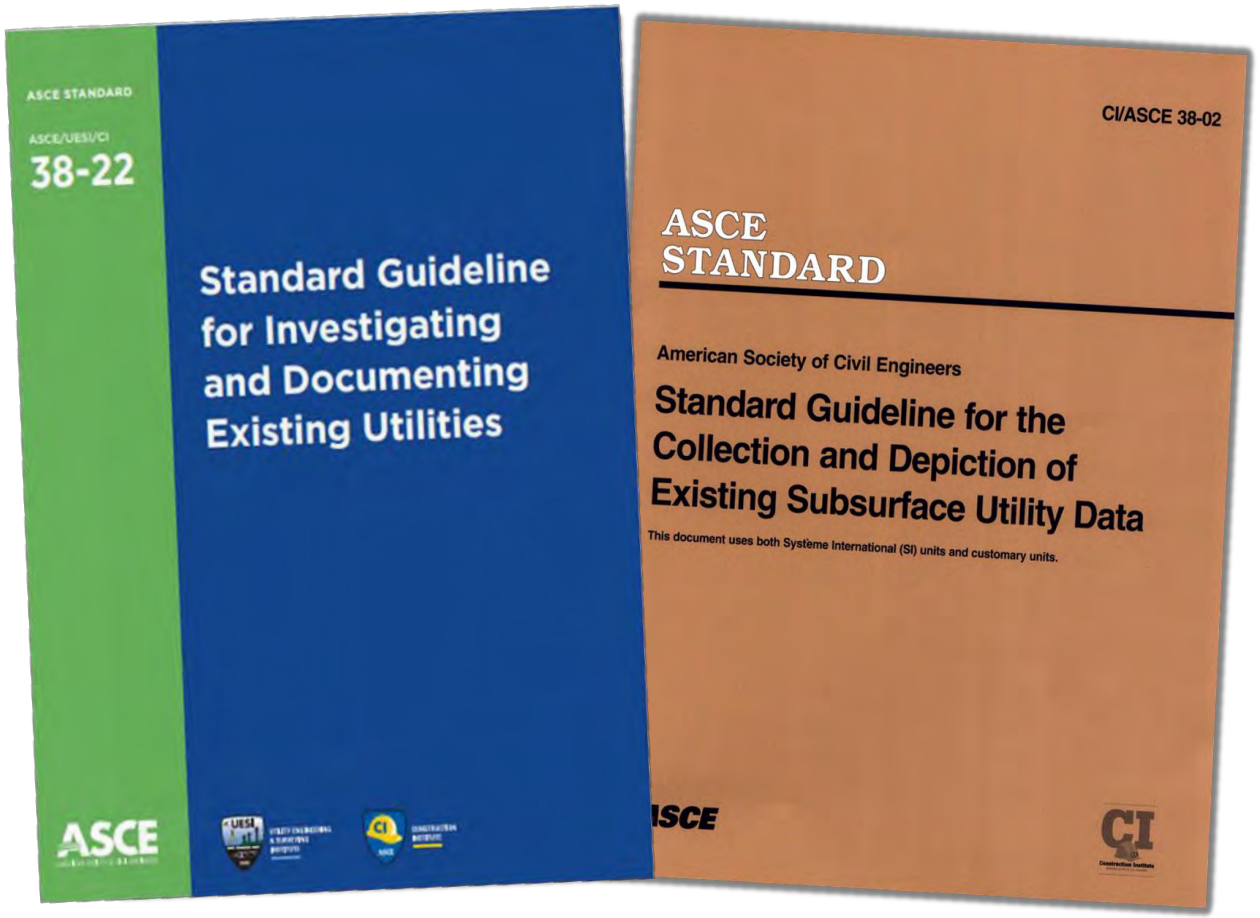
Application of Quality Level

T2 utility engineers

T2ue.com

History of the ASCE 38

- American Society of Civil Engineers Utility Engineering and Survey Institute (ASCE-UESI)
- ASCE 38-02 Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data
- ASCE 38-22 Standard Guideline for Investigating and Documenting Existing Utilities



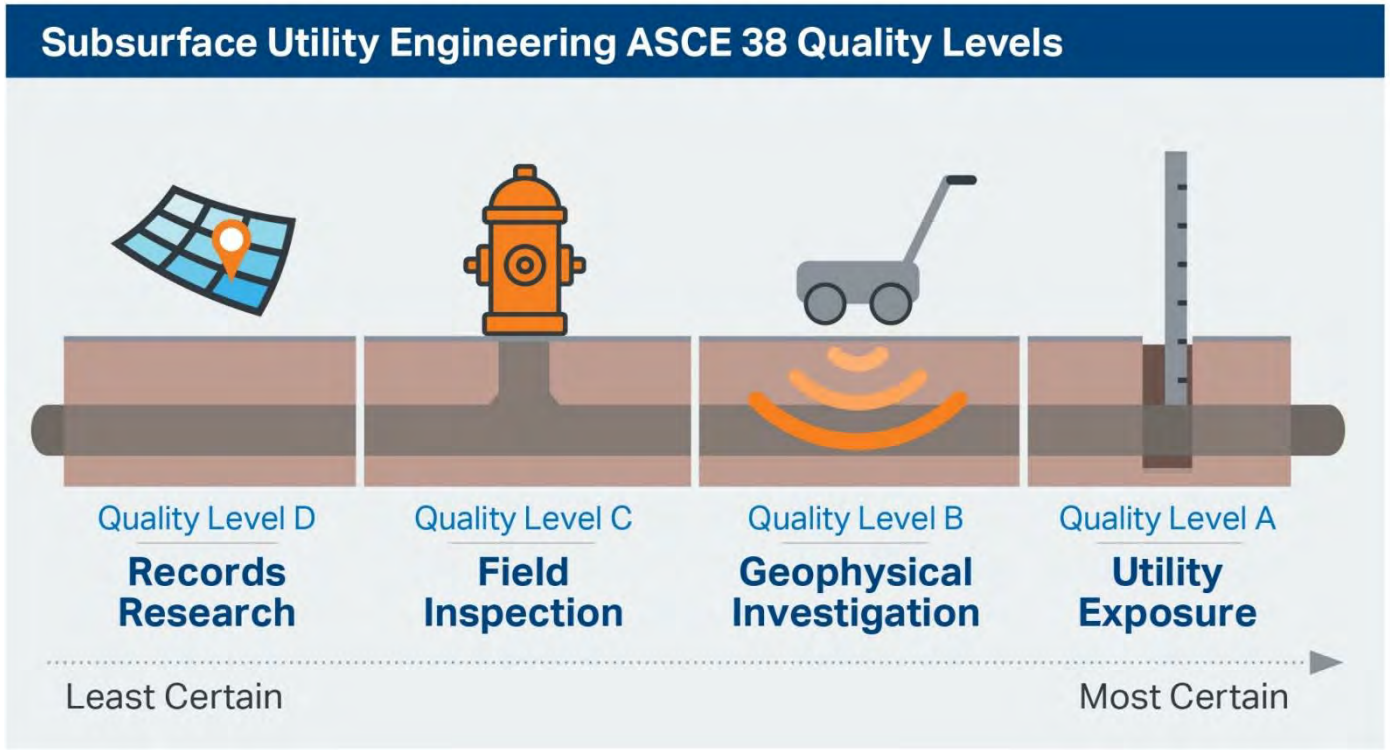
Competencies for a Utility Engineer

- Practices Risk Management & Planning
- Recognizes Industry standards and regulations
- Understands Policies for Procedures for collection of near surface geophysics
- Construction Methodology for buried infrastructure
- Familiar with professional practice guidelines
- Oversees quality reviews and verification
- Application of Engineering First Principles
- Protection of Public Health and Welfare

ASCE 38-22: Quality Levels

ASCE 38 is based on principles of Uncertainty

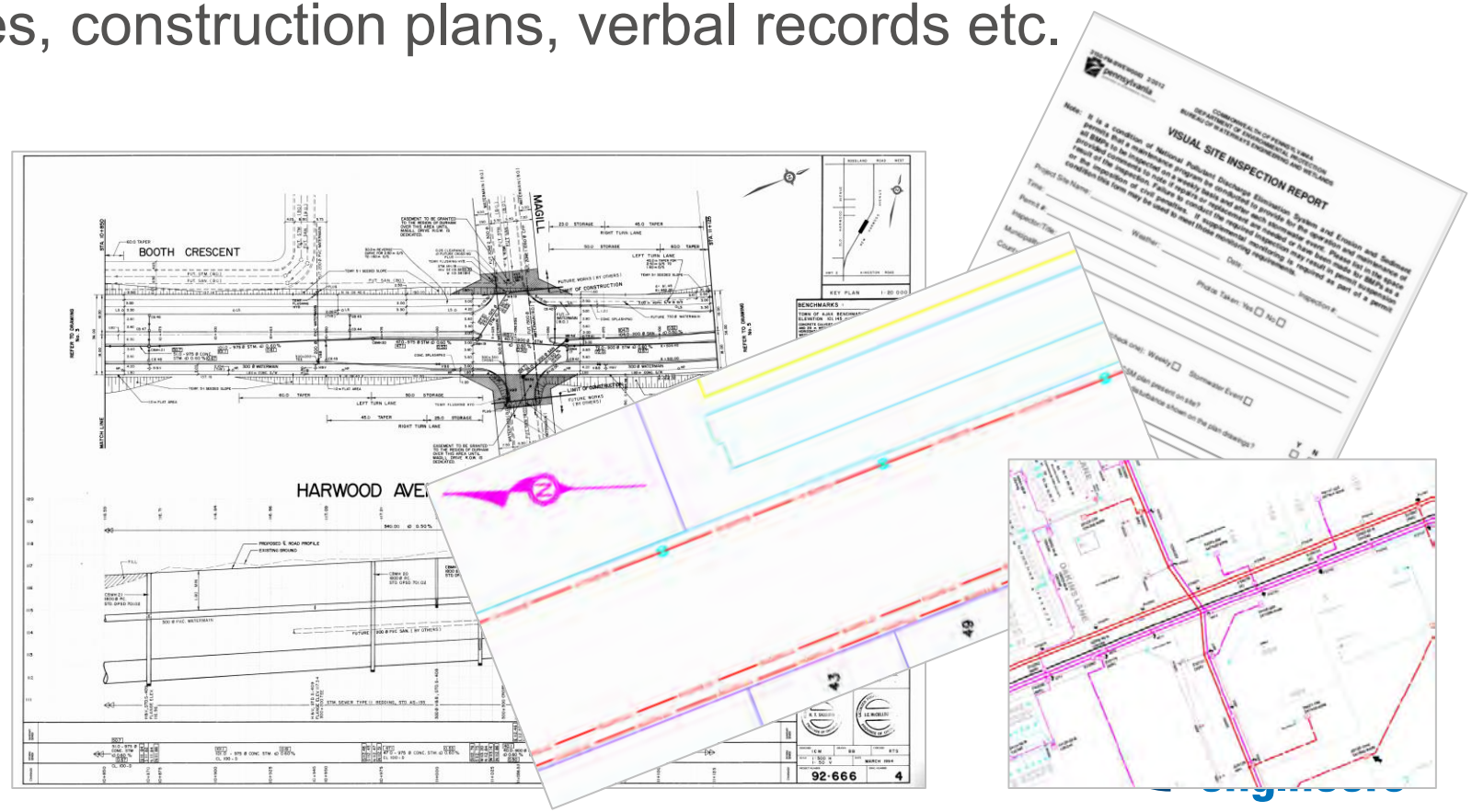
- Records are uncertain
- Visual indications are uncertain
- Geophysics are uncertain
- Point exposures are uncertain



Quality Level D

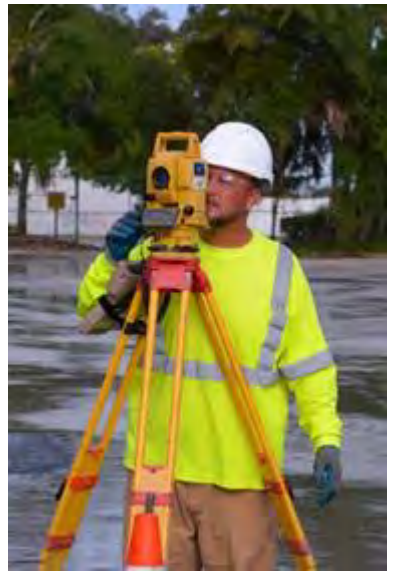
• Quality Level D provides the most basic level of information. It involves ***collecting and interpreting data*** from existing utility records . Records may include as-built, drawings, distribution and services maps, existing geographic information system databases, construction plans, verbal records etc.

A RECORD IS NOT QUALITY LEVEL D



Quality Level C

• Quality Level C involves surveying visible subsurface utility structures such as manholes, hand-holes, utility valves and meters, fire hydrants, pedestals and utility markers, and then correlating the information with existing utility records to create composite drawings. **Includes quality level D activities**.



A SURVEY OF UTILITY FEATURES IS NOT QUALITY LEVEL C

T2 utility engineers

Quality Level B

• Quality Level B involves designating the horizontal position of subsurface utilities through surface detection methods and collecting the information through a survey method**. Includes quality level C and D tasks**.

A LOCATE IS NOT QUALITY LEVEL B

12 utility engineers

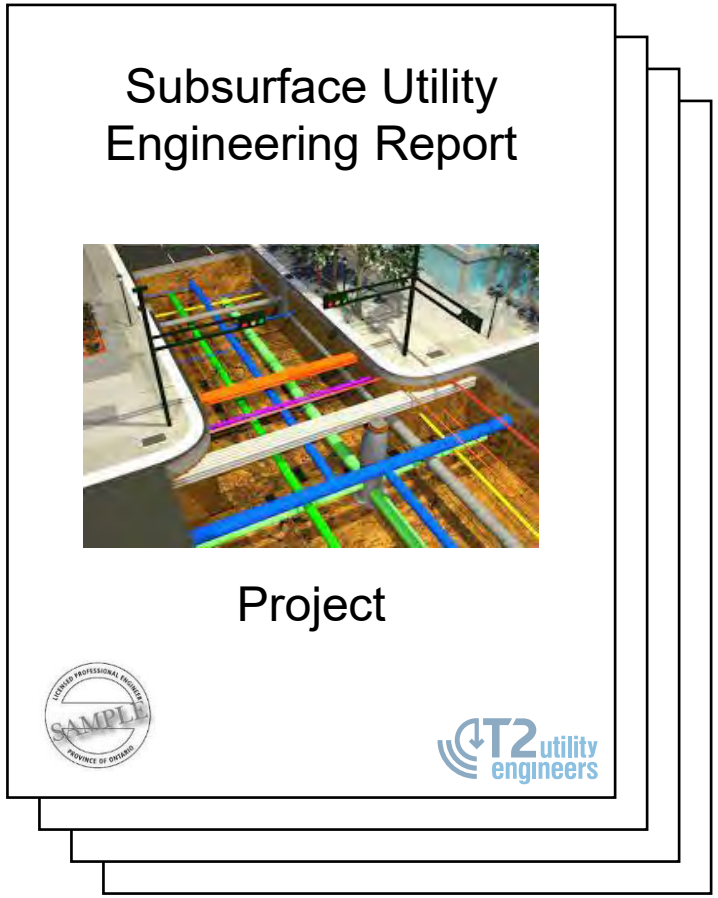
Quality Level A

• Quality Level A provides the highest level of accuracy. It involves locating or potholing utilities **as well as activities in quality levels B, C, and D**. The located facility information is surveyed and mapped and the data provides precise plan and profile information.

A POTHOLE IS NOT QUALITY LEVEL A

ASCE 38-22 Deliverables

- Engineering Report
  - Objective
  - Methodology
  - Analysis & Results
- Test Hole Data Sheets
  - Visually Verification
  - Horizontal & Vertical Alignment
  - Utility Material
  - Size
  - Comments
- Additional Investigations
  - Invert Depth Report, Chamber Investigations, Photos, CCTV

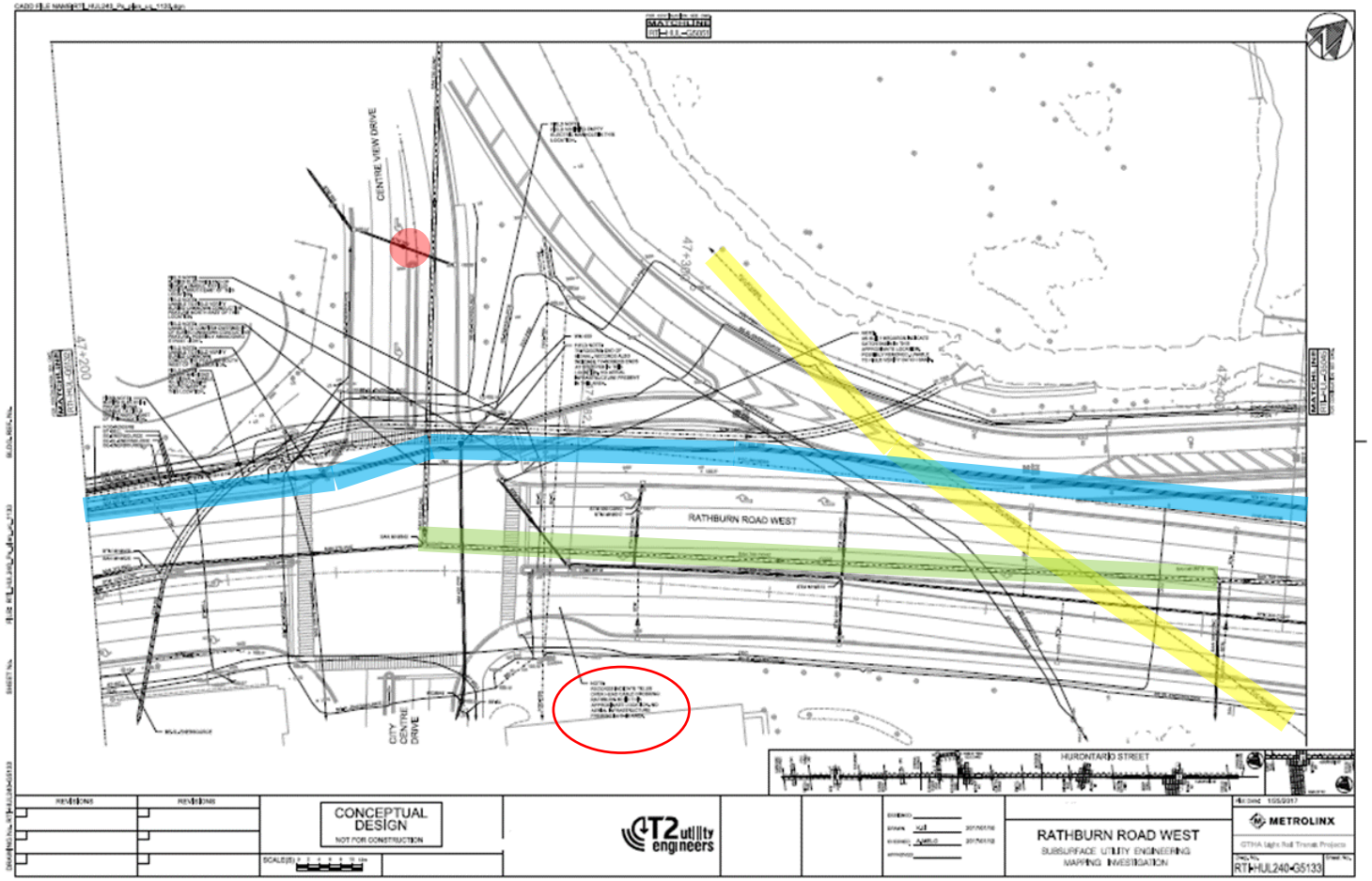


T2 utility engineers

ASCE 38-22 Deliverables: How to Read the Drawing

Quality Levels are typically depicted with linetype or text. ***ASCE-38 is not a drawing standard.***

- Quality Level D
- Quality Level C
- Quality Level B
- Quality Level A
- Notes/Comments



T2 utility engineers

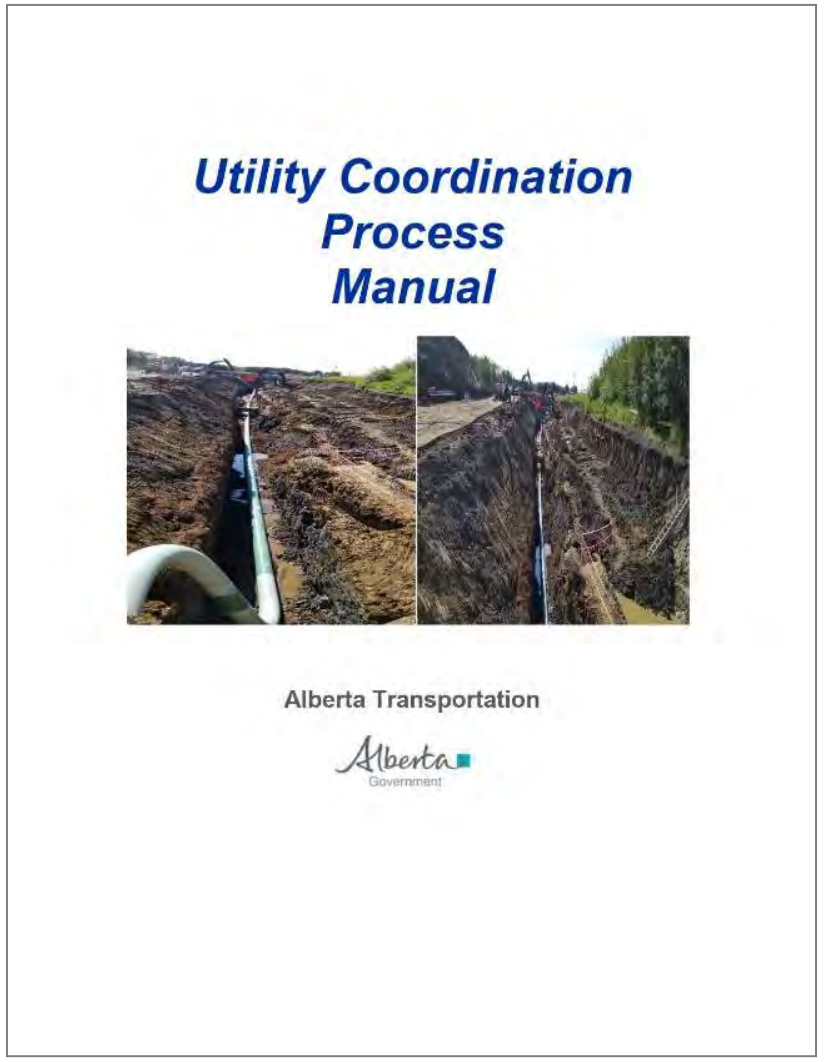
Alberta Transportation Utility Coordination Process Manual

T2 utility engineers

T2ue.com

Alberta Transportation Utility Coordination Process Manual

- Published in 2020
- Guides project teams through:
  - Early Planning
  - Scope Definition
  - Design Tender
  - Construction Phases



Alberta Transportation Utility Coordination Process Manual

EXISTING								Conflict Identification					RCD Conflicts and Test Holes				Conflict Resolution		
Conflict#	Utility Type	Section	Location Description	STA. (Start)	STA. (Finnish)	Size or Configuration (Size or mm)	Material	Conflict Type	URA	Conflict (Y/N)	SUE Quality Level	Comments	Conflicts with RCD	Test Hole Required (Y/N)	Test Hole#	Resolution	Design Received (Y/N)	Resolved (Y/N)	Last Updated
1	ENBRIDGE GAS	1	High St (south of project limit)	10+724	10+882	200 IP	SC	[]	-	Y	QLB	Gas found at 1.08m. No conflict with RCD.	Road Widening, Sub drain	Y	TH1	Cleared by TH	N	N	8-Aug-17
2	ALECTRA	1	Park St	10+760	10+800	UNK	-	[]	-	Y	QLB	Relocate	Pole zone	N	-	Abandon or Relocate	N	N	19-Mar-18
3	WM	1	High St (south of project limit)	10+765	-	300	PVC	[]	-	Y	QLB	TH21 not completed in the field.	Sub drain	Y	TH21	No Action	N	N	8-Aug-17
4	UNK	1	High St (south of project limit)	10+781	-	300	MET	[]	-	Y	QLB	Unknown utility found at 1.08m. No conflict with RCD	Road Widening, Sub drain	Y	TH2	To be abandoned or removed by ProjectCo	-	Y	8-Aug-17
5	ENBRIDGE GAS	1	Park St	10+802	-	200 IP	SC	[]	-	Y	QLB	Gas found at 0.69m. No conflict with RCD. No Road Cut in this area.	Road Widening, Sub drain	Y	TH4	Cleared by TH	N	N	8-Aug-17
6	ENBRIDGE GAS	1	Park St	10+806	-	200 IP	SC	[]	-	Y	QLB	Gas found at 0.97m. No conflict with RCD.	Sub drain, Future Sidewalk	Y	TH3	Cleared by TH	N	N	8-Aug-17
7	BELL	1	Park St	10+810	-	1 Duct	-	[]	-	Y	QLB	Bell found at 0.69m. No conflict with RCD	Road Widening, Sub drain, Future Sidewalk	Y	TH5	Bell Abandoning	Y	Y	4-Apr-18
8	ROGERS	1	Park St	10+811	-	FOC	Fiber	[]	-	Y	QLB	Rogers found at 0.50m. No Conflict with RCD.	Road Widening, Sub drain	Y	TH6	Cleared by TH	N	Y	8-Aug-17
9	WM	1	Park St	10+812	-	150	-	[]	-	Y	QLD	TH11 not complete. No signal found In field.		Y	TH11	-	N	N	8-Aug-17
10	WM	1	Park St	10+822	-	300	-	⊥	-	Y	QLB	WM found at 1.92m. No conflict with RCD		Y	TH10	Cleared by TH	N	Y	8-Aug-17
11	ENBRIDGE GAS	1	Park St	10+826	-	200 IP	SC	[]	-	Y	QLB	Utility found at 1.16m. No conflict with RCD	Road Widening, Sub drain, Future Sidewalk	Y	TH7	Cleared by TH	N	N	8-Aug-17

- Standardizes utility conflict identification and resolution on projects
- Guides the engagement with utility owners and other stakeholders early in the project lifecycle.

T2 utility engineers

Alberta Transportation Utility Coordination Process Manual

- Identifies a list of tools to assist in the Utility Coordination Process:
  - SUE Selection Criteria Form
  - Utility Base Plan
  - Utility Conflict Matrix
  - Composite Utility Plan
  - Utility Adjustment Matrix
  - Utility Coordination Plan
  - Utility Assessment Outline
  - Stakeholder Register and Communication Plan

Tool Type & Name	Description
Subsurface Utility Engineering (SUE) Selection Criteria Form (Excel Template)	The Subsurface Utility Engineering (SUE) Selection Criteria Form provides guidelines and asks a number of questions that direct the user in determining the Quality Level of SUE information that will be required during various phases of a project lifecycle. Using this form during each Phase, helps determine whether utilities may be a concern, and indicates what Quality Level should be attained to address those concerns. See Appendix B: SUE Quality Levels – Excerpt from ASCE 38-02 Standard Guidelines, for the Collection and Depiction of Existing Subsurface Utility Data. The SUE Selection Criteria Form is included in Appendix F.
Utility Base Plan	A plan prepared by the project Consultant showing the existing utility infrastructures (aboveground and underground) and locations in relation to the highway/bridge alignment (existing or proposed) within the project limit. A sample deliverable is included in Appendix F. The Utility Base Plan Checklist indicates the minimum requirements of what to include in the Utility Base Plan. However, the Consultant should contact the AT PM to establish and agree on the information that will be required for the conflict analysis. While preparing this plan, Consultants are to follow the latest version of the Utility Coordination Process Manual, American Society of Civil Engineers (ASCE) 38-02 Standard Guidelines and Alberta Transportation's Engineering Drafting Guidelines for Highway and Bridge Projects (EDGHBP). The EDGHBP can be found in the link below. (http://www.transportation.alberta.ca/Content/docType30/Production/CADDguidelines.pdf),

Example from the Manual

T2 utility engineers

Alberta Transportation Utility Coordination Process Manual

- Benefits:
  - Alberta Transportation's authority and interests
  - The Consultant's interests
  - The Utility Owners' interests
  - The public interest

T2 utility engineers

Interactive Exercise

T2ue.com

What is Available now at the AT website

- trans-subsurface-utility-engineering-selection-criteria-form.xlsx

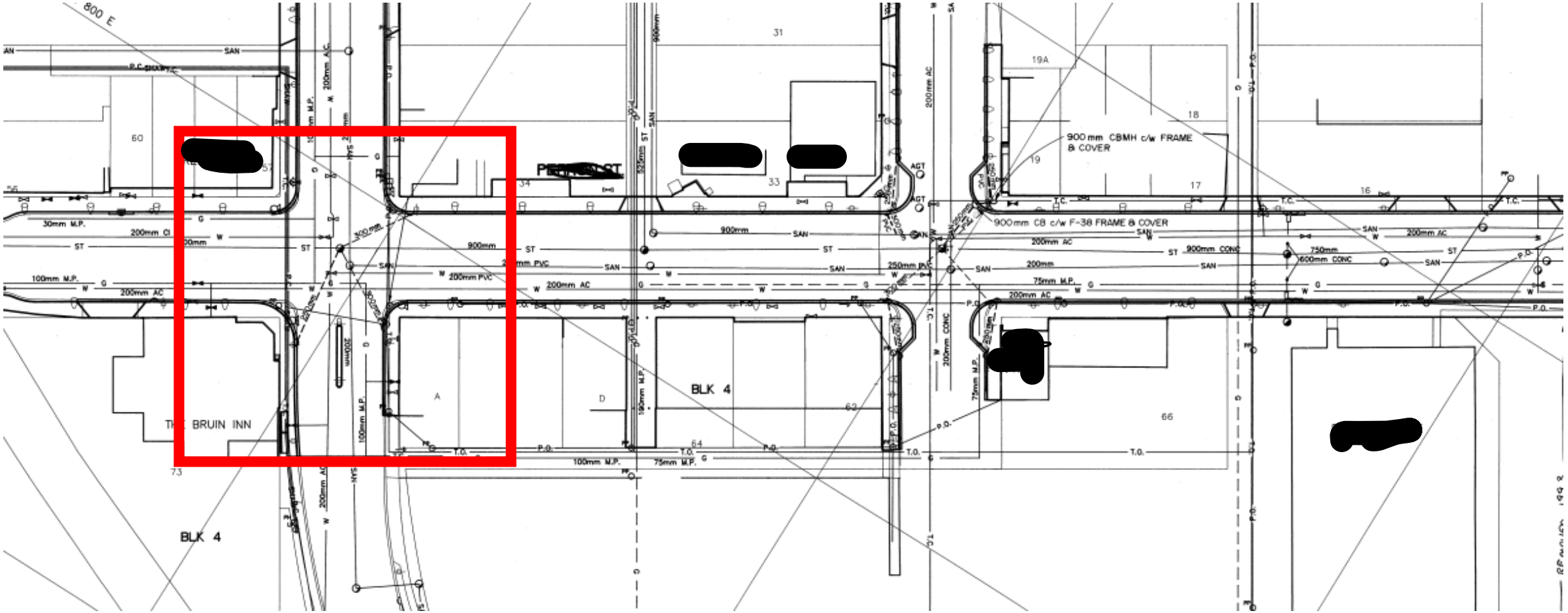
- Interactive Session

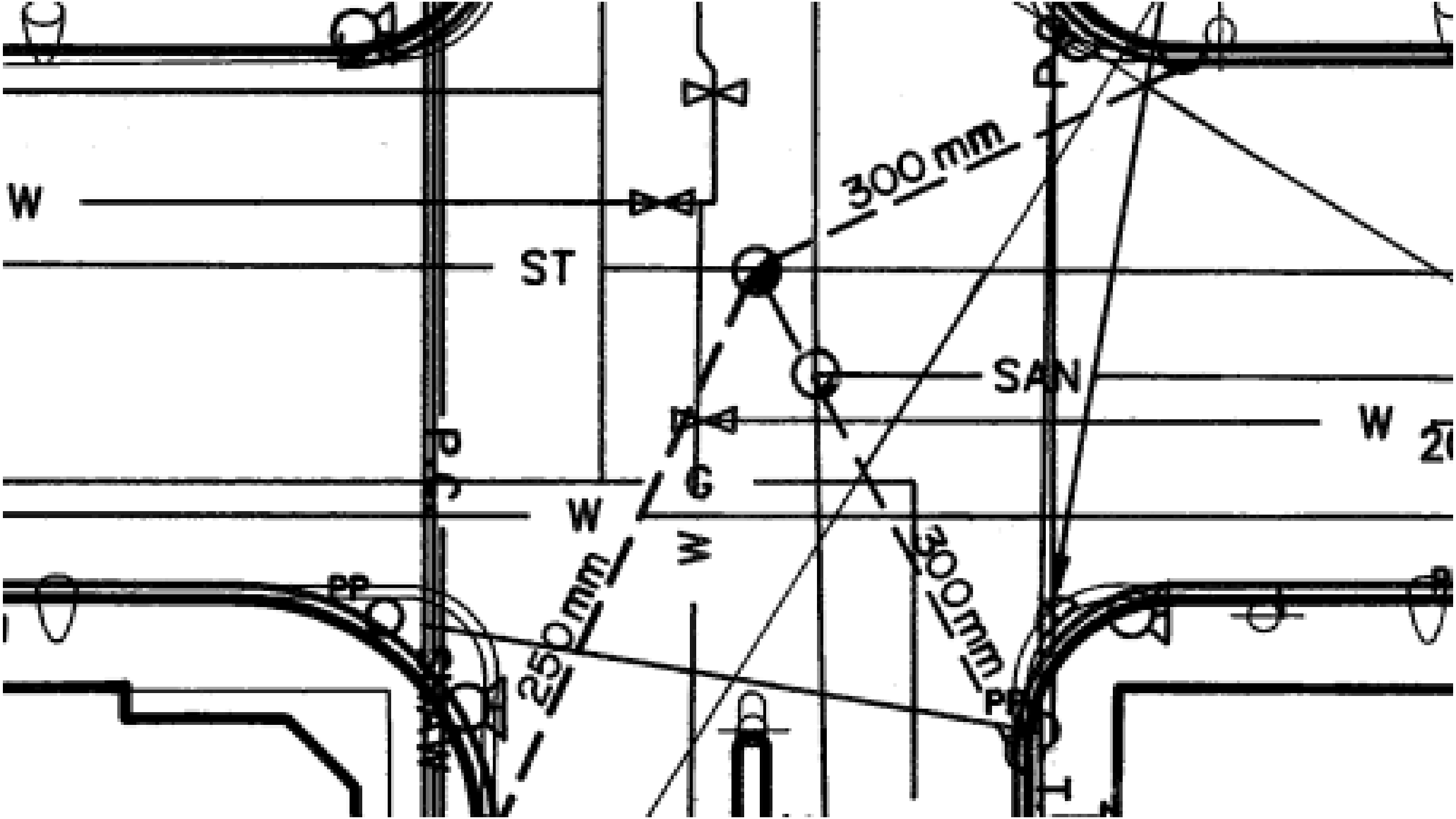
Interactive section Please look at the screen and follow along

- Look at the records provided and fill out the form in your imagination.
- Parameters
  - Intersection has 20-24thousand vehicles traverse daily
  - Utilities were installed in this intersection from 1906 – current
  - Multiple owners Telecom, Municipal (city owned and upper tier municipal infrastructure Trunk Sewer) Gas, & Electrical
  - 6 Traverse lanes and turning lanes
  - Excavation will be greater than 300mm
  - Extensive shopping and recreational facilities near by

T2 utility engineers

Sample for use with interactive session




W
ST
300 mm
SAN
W
G
W
W
250 mm
300 mm

SUE Utility Impact Form

Instructions

-Step 1 is a screening processes and determines whether SUE (quality levels A & B) should be utilized for a project.
-If Step 1 indicates further analysis is required, conduct Step 2.

Step 1

Project information such as title, cost, description (general summary), and scope (actual work scope) should be filled out before beginning Step 1. If the scope of the project is changed, the utility impact rating analysis should be performed again for that project. Step 1 determines whether SUE (Quality levels A & B) should be utilized for a project.

The questions in Step 1 can be answered with traditional utility information (Quality levels C & D) provided by a one-call system, utility companies, site visits, etc. If there are no boxes checked in Column 2, then it is generally not practical to perform a SUE Quality levels A & B investigation. If boxes in Column 2 for questions 2, 3 or 4 are checked, the utility impact rating analysis proceeds to Step 2 to calculate a utility impact score and determine the appropriate SUE quality levels.

Step 2

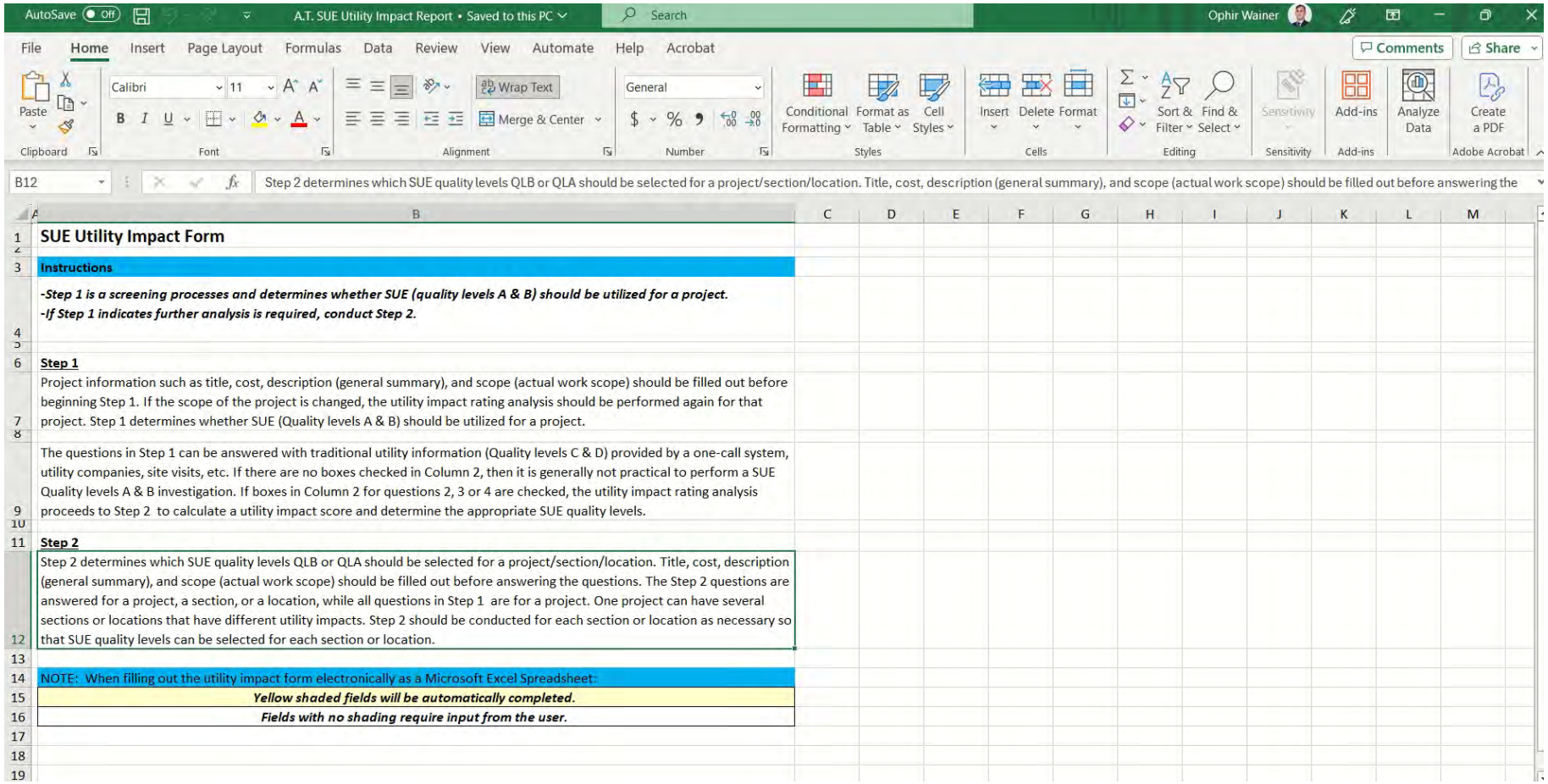
Step 2 determines which SUE quality levels QLB or QLA should be selected for a project/section/location. Title, cost, description (general summary), and scope (actual work scope) should be filled out before answering the questions. The Step 2 questions are answered for a project, a section, or a location, while all questions in Step 1 are for a project. One project can have several sections or locations that have different utility impacts. Step 2 should be conducted for each section or location as necessary so that SUE quality levels can be selected for each section or location.

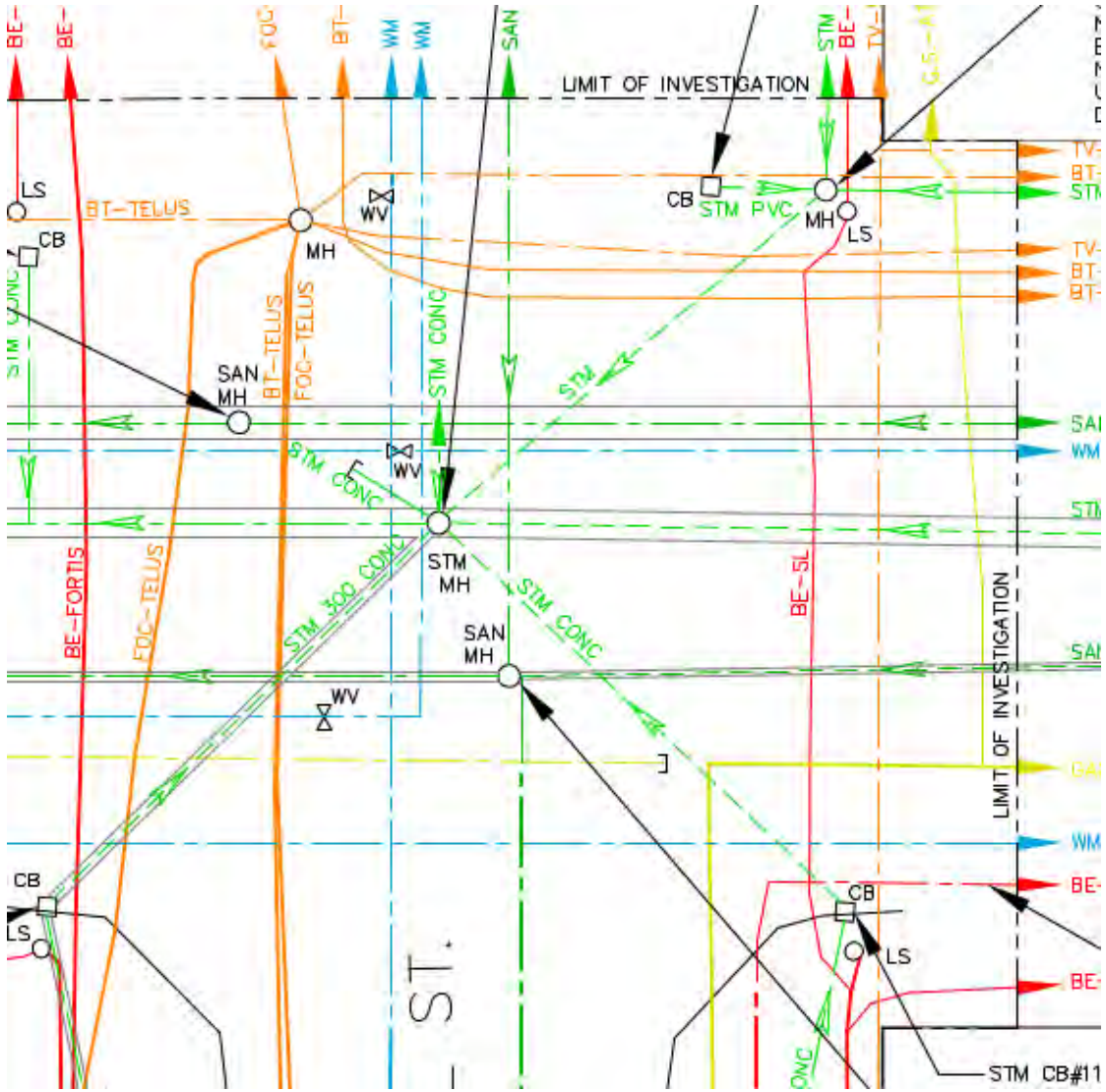
NOTE: When filling out the utility impact form electronically as a Microsoft Excel Spreadsheet:

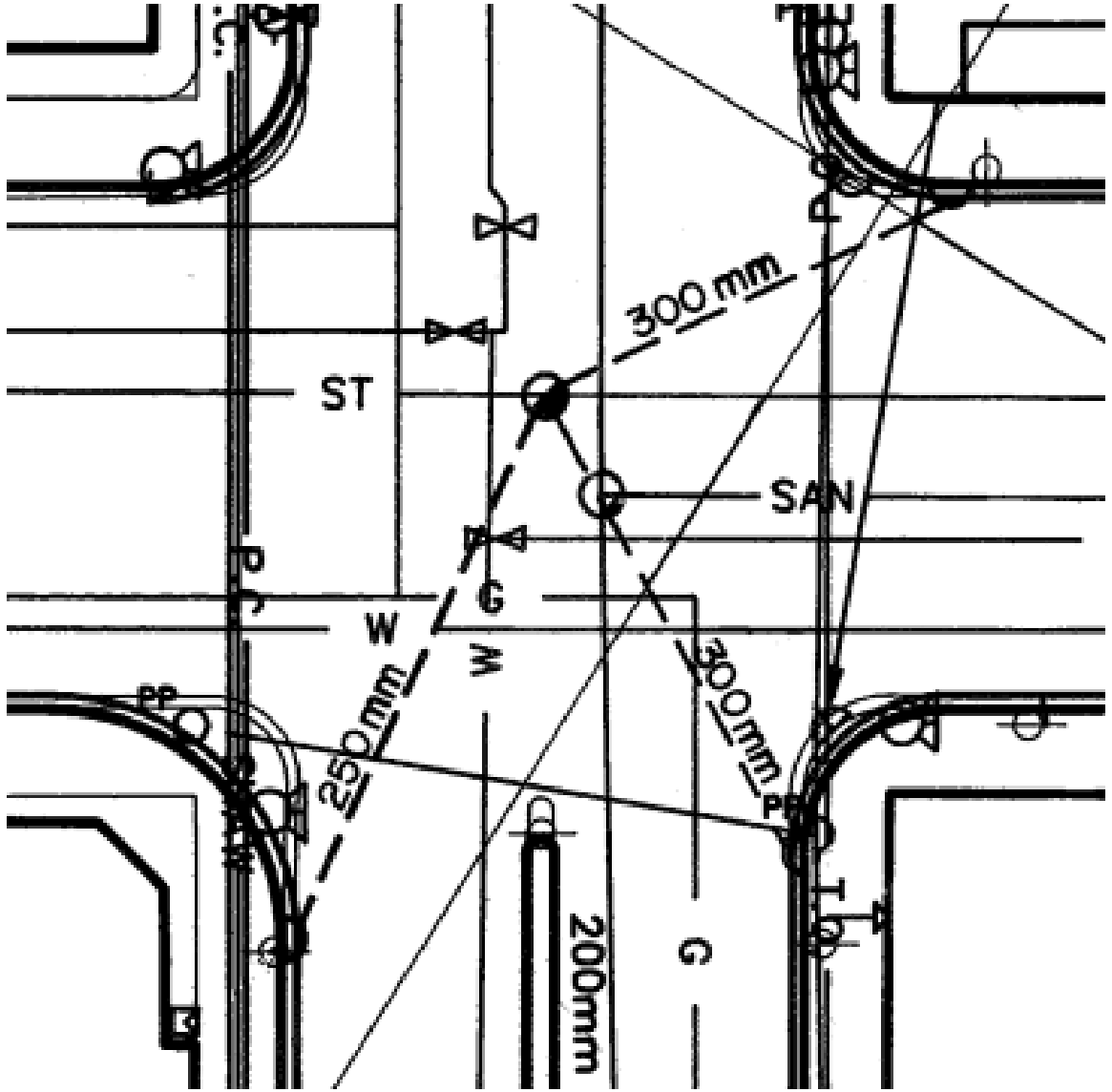
Yellow shaded fields will be automatically completed.

Fields with no shading require input from the user.

The Active guide to SUE from AT UCM tools Appendix F




LIMIT OF INVESTIGATION
BE-
BE-
FOC
BT-
WM
WM
SAN
STM
BE-
TV-
LS
BT-TELUS
CB
MH
WV
CB
STM PVC
MH
LS
SAN
MH
BT-TELUS
FOC-TELUS
STM CONC
STM
STM CONC
WV
STM
MH
STM 300 CONC
STM CONC
BE-FORTIS
FOC-TELUS
BE-5L
SAN
MH
WV
LIMIT OF INVESTIGATION
CB
LS
CB
LS
ST.
STM CB#11


300 mm
ST
SAN
250mm
300mm
200mm

Interactive section Please look at the screen and follow along

- From what you recall-
- Do you agree with our assessment?
- Let us discuss as a group the results

T2 utility engineers

Scan for vCard

Scan for vCard

Ophir Wainer, M.CSCE

Director of Market Expansion & Education, Canada

4600-99 St NW Unit 4700
Edmonton AB
Direct: +1 438 788 2966 | Cell: +1 514 210 9300

Ophir.Wainer@T2ue.com

Blaine Hunt, P. Eng.

Director of Engineering and Quality Canada

4600-99 St NW Unit 4700
Edmonton AB
Direct: +1 289 638 2206 | Cell: +1 905 767 3956
Blaine.Hunt.@T2ue.com

T2 utility engineers
a kiwa company