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TRB Webinar: Implementing Subsurface Utility Engineering at State DOTs

February 14, 2022

2:30 – 4:00 PM



NOVEMBER 2022 UPDATE

PDH Certification Information

1.5 Professional Development Hours (PDH) – see follow-up email

You must attend the entire webinar.

Questions? Contact Beth Ewoldsen at Bewoldsen@nas.edu

The Transportation Research Board has met the standards and requirements of the Registered Continuing Education Providers Program. Credit earned on completion of this program will be reported to RCEP. A certificate of completion will be issued to participants that have registered and attended the entire session. As such, it does not include content that may be deemed or construed to be an approval or endorsement by RCEP.



REGISTERED CONTINUING EDUCATION PROGRAM

AICP Credit Information

1.5 American Institute of Certified Planners Certification Maintenance Credits

You must attend the entire webinar

Log into the American Planning Association website to claim your credits

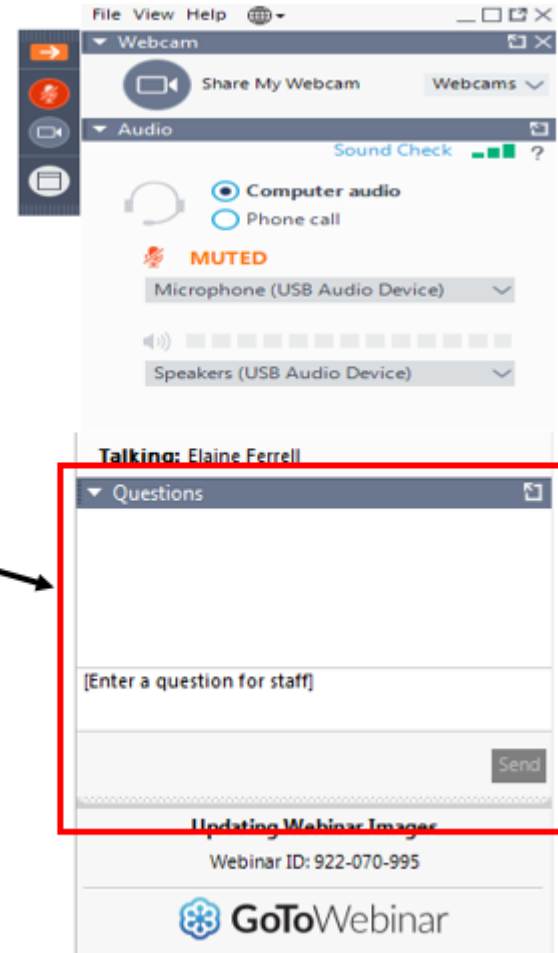
Contact AICP, not TRB, with questions

Learning Objectives

- Identify current practices regarding the implementation of SUE
- Implement the newly revised ASCE 38 standard for SUE

Questions and Answers

- Please type your questions into your webinar control panel
- We will read your questions out loud, and answer as many as time allows



Today's presenters



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IOWA STATE UNIVERSITY
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**NATIONAL
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NCHRP Project 20-05
Synthesis Topic 52-05

NCHRP Synthesis Report 583

**Implementation of Subsurface Utility
Engineering for Highway Design and
Construction**
Summary Presentation

Authors: Roy Sturgill, Katherine Madson, James Anspach, and
Matthew Decker

Objective of the Synthesis

- Document state DOT use and practices of Subsurface Utility Engineering (SUE)
- Examine how and when SUE is implemented during project design and delivery

What is SUE?

- Standardized process according to ASCE 38-02:
“Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data”
- Professional and programmatic approach to utility investigations
- Provides a collection and depiction of utility information
- A professional practice requiring a stamp (engineer and/or surveyor)

What is SUE?

- SUE includes:
 - Utility mapping with appropriate quality levels
 - Utility coordination and communication
 - Understanding of appropriately applying technologies (description in report)
 - Subsurface, surface and aerial utilities
 - Professional guidance and recommendations
- It is a professional service...

What are the SUE Quality levels?

SUE
QL- D

Review of existing utility records, permits, and plans for an approximate horizontal location.



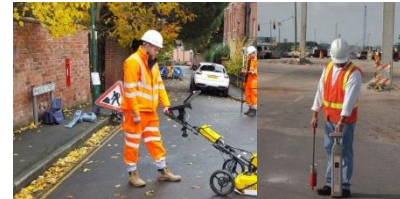
SUE
QL- C

Survey visible above ground facilities to facilitate better approximation of horizontal location.



SUE
QL- B

Use geophysical tools to determine the existence and horizontal position of underground utilities.



SUE
QL- A

Use equipment at critical points to determine precise horizontal AND vertical position (also type, size,



What is SUE not?

- It is not simply “potholing” or daylighting
 - Historical confusion
- It is not only the assignment of quality levels
- It is not surveying of One Call marks
- It is not a ladder approach to using the quality levels

FHWA Support for Using SUE

- Cost of SUE services is an eligible expense for federal-aid (Program Guide)
- Providers should be selected through quality-based approaches
- Federal funds should not participate in unnecessary utility-related costs resulting from non-use or improper use of SUE

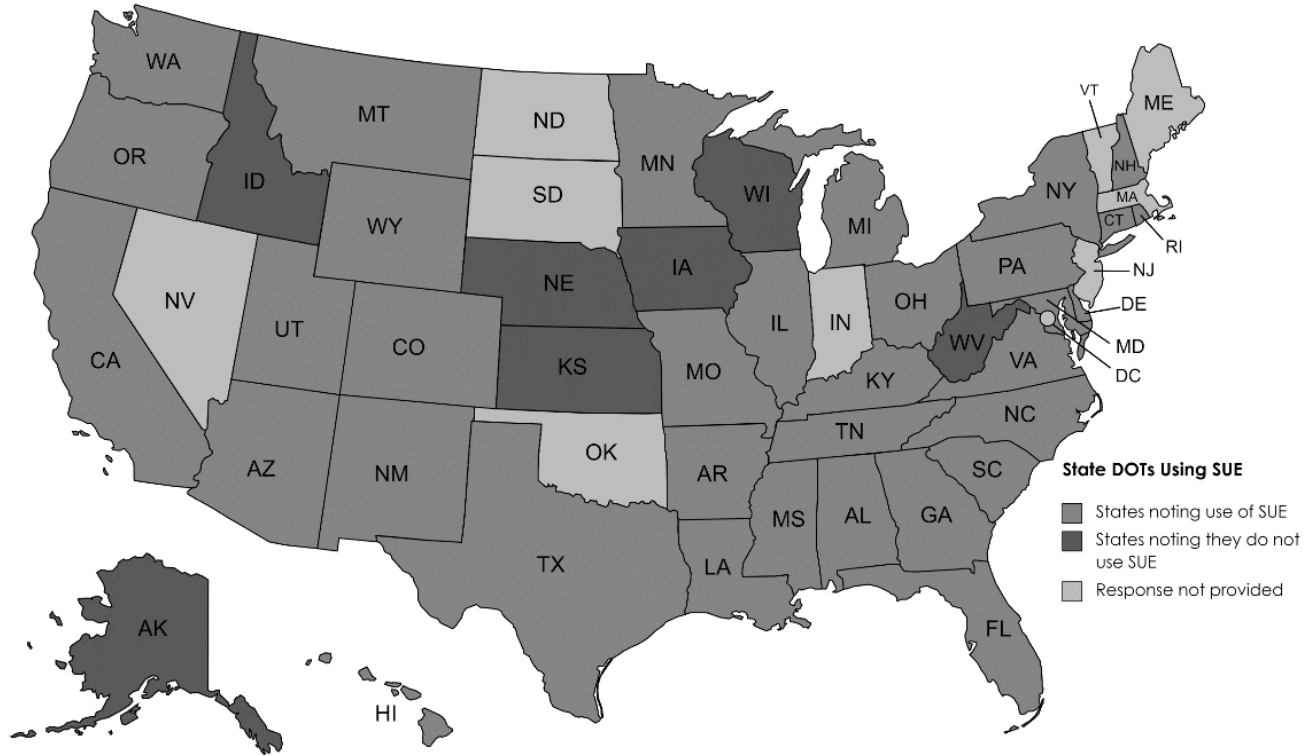
FHWA Support for Using SUE

- Federal Program Review
 - Recommends a programmatic risk-based application of SUE
- A majority of state DOTs were found to not be performing SUE adequately or methodically

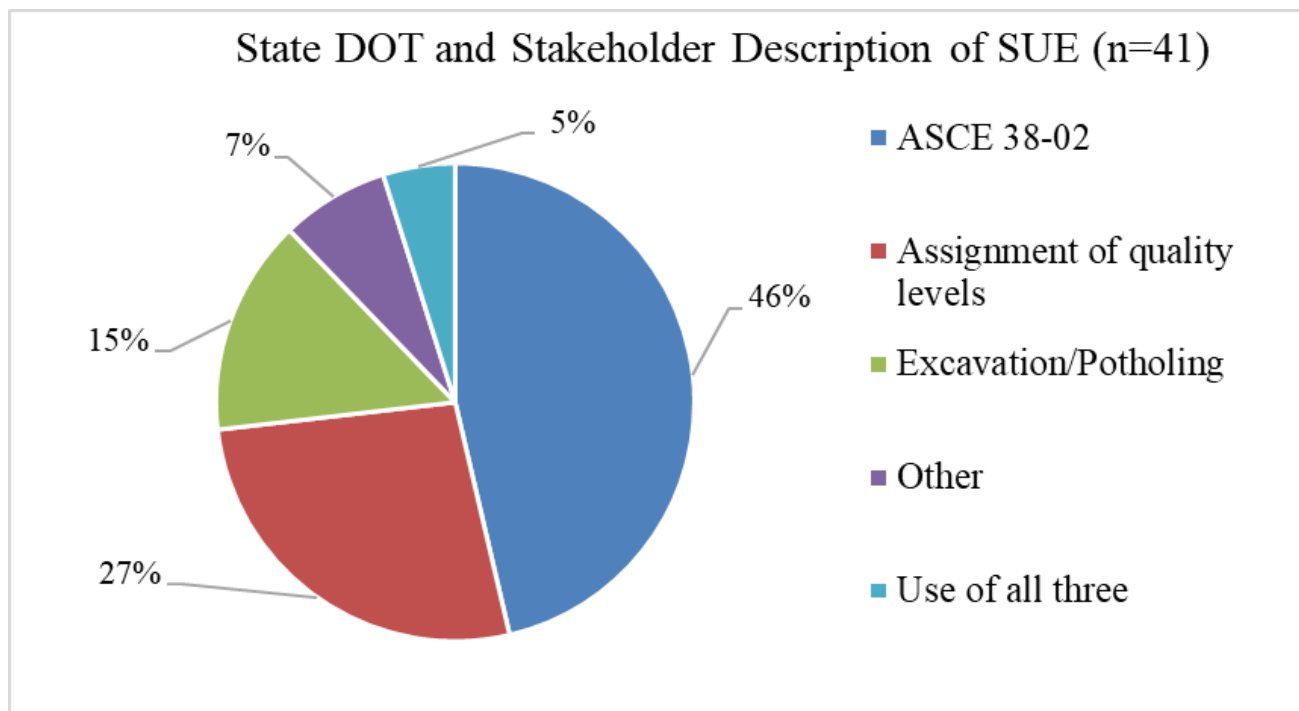
Business Case for Using SUE

- Cost savings per dollar spent
 - \$4.62, \$22.21, \$2.73
- Risk reduction
- Informed decisions
- Reduced delays
- Damage prevention and reduced outages
- Growth: 40% use-rate (early 2000's) to 83%
 - Not necessarily programmatic use

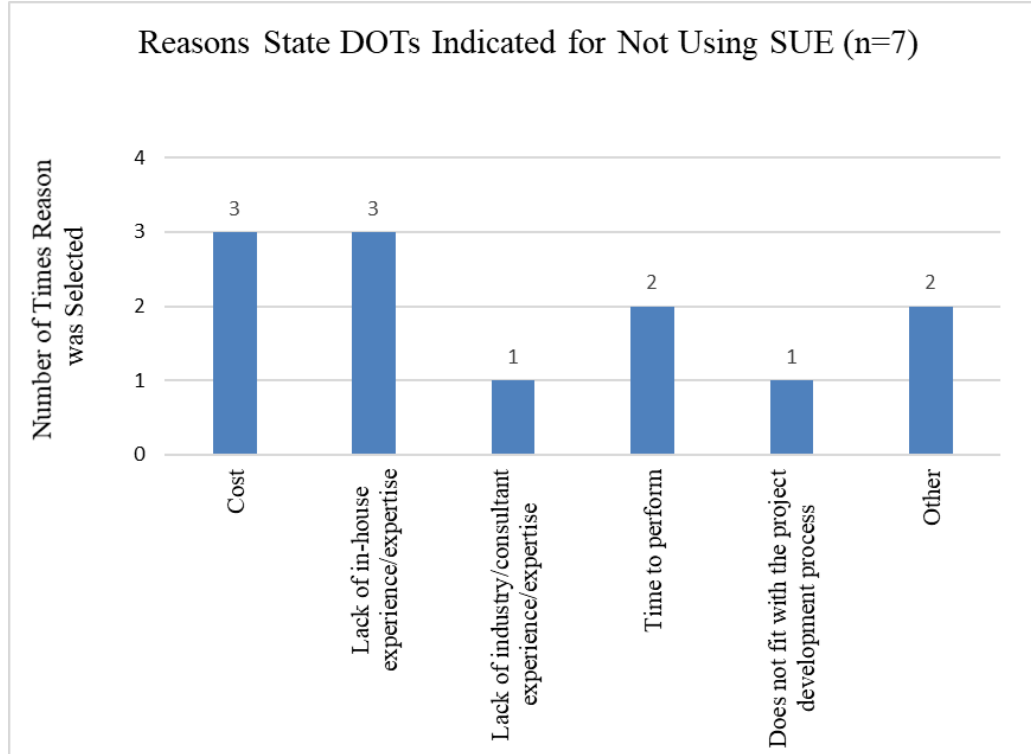
Use of SUE (41 Survey Responses)



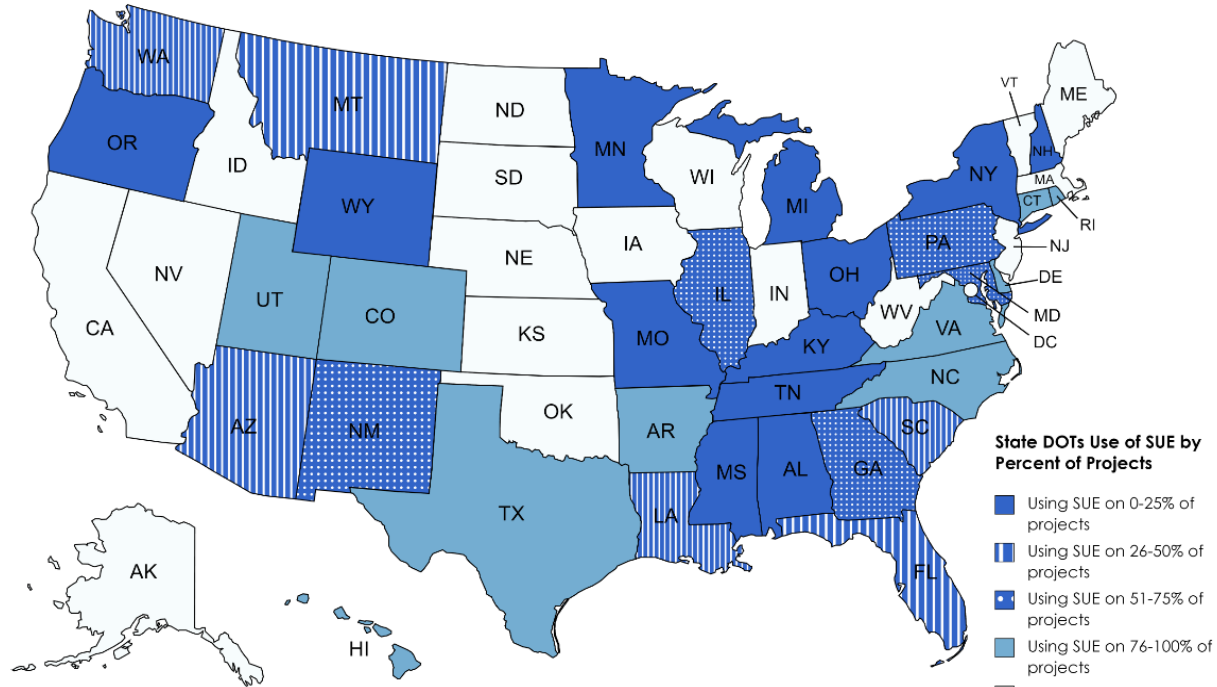
Survey Results



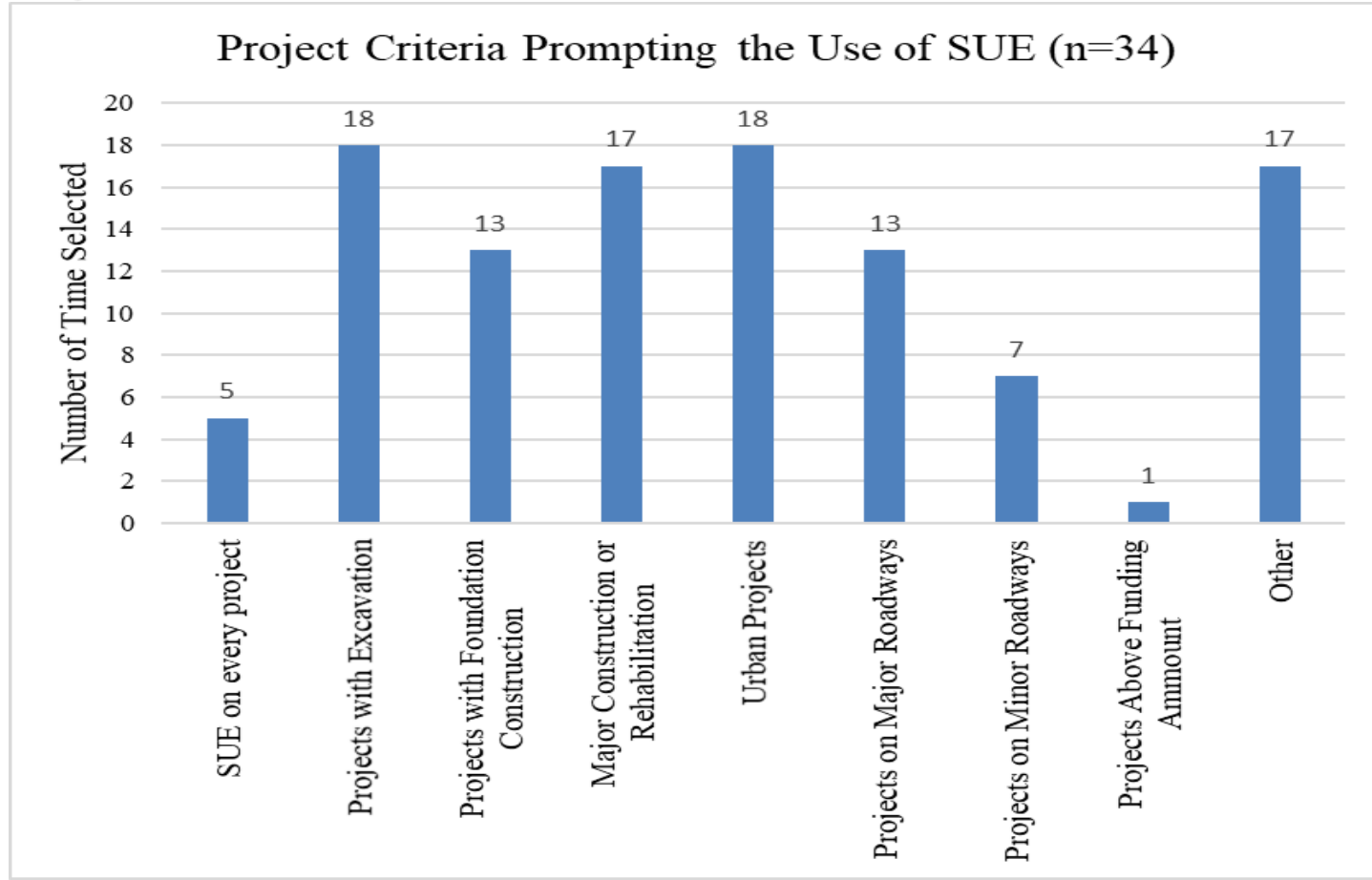
Survey Results



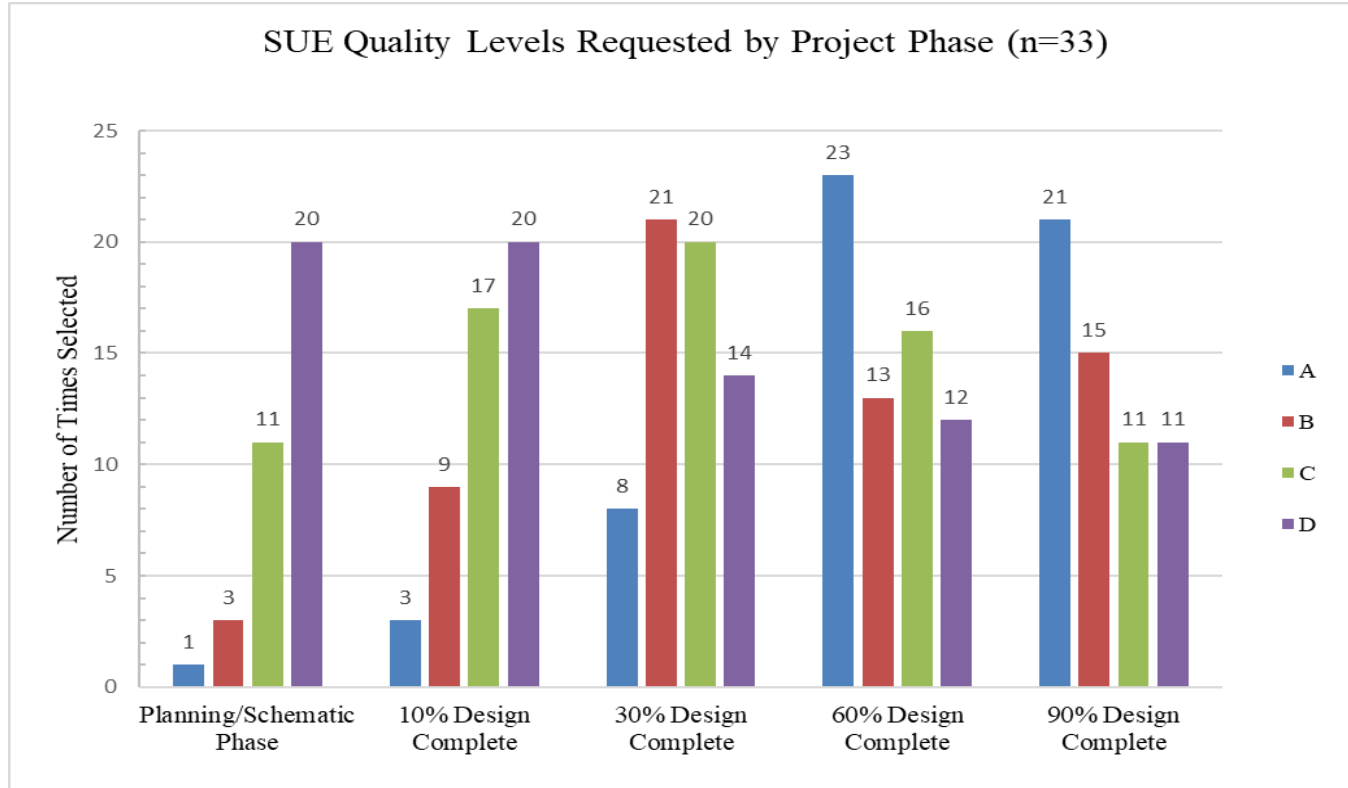
Survey Results



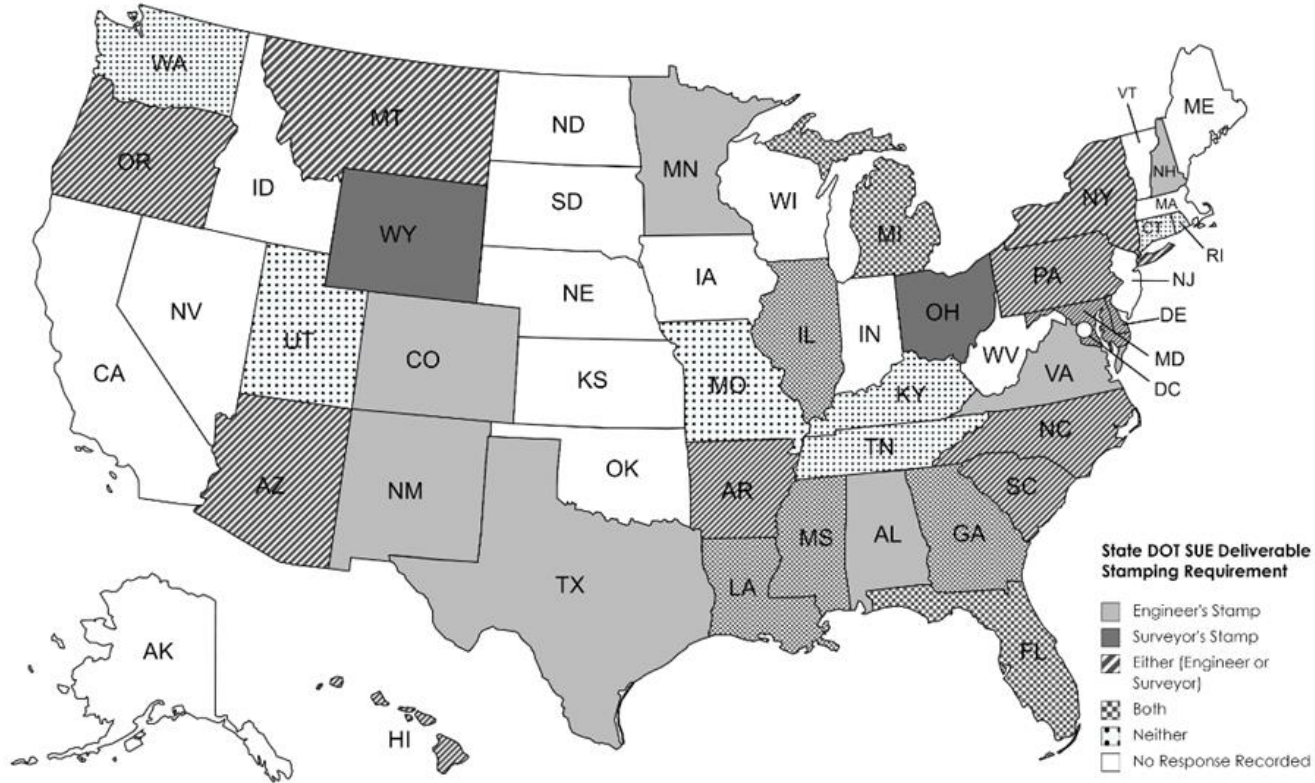
Survey Results



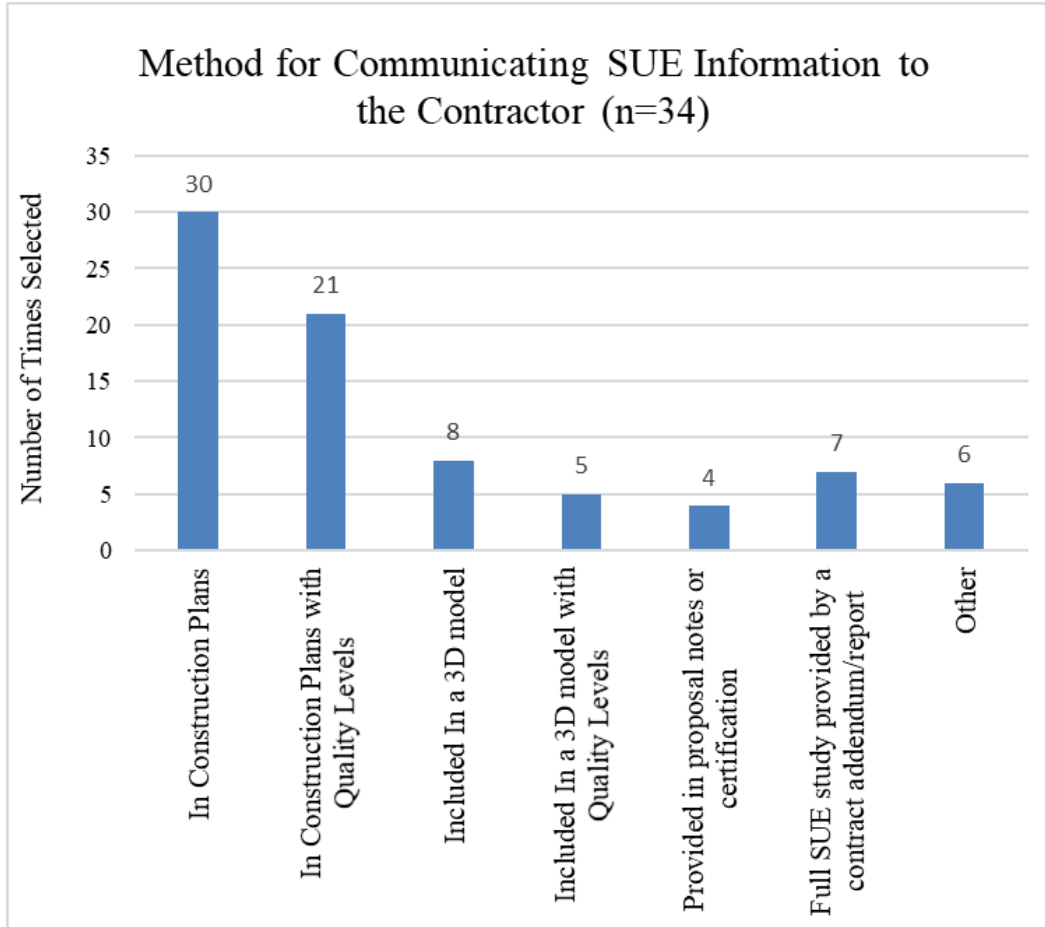
Survey Results ~ Timeliness



Survey Results ~ Stamping



Survey Results



Case Examples

- Selected Cases
 - Colorado, Georgia, Maryland, Minnesota, Pennsylvania, and Texas

Lessons Learned

- Costs and Savings
 - Costs are not a factor to those with advanced SUE programs
 - Texas DOT seeing 3% benefit/construction cost savings plus time

Lessons Learned

- Time is of the Essence
 - Collect the information to use the information

Lessons Learned

- Staffing and Organizational Approach
 - Ownership of the SUE contracts
 - Staffing provides opportunities

Lessons Learned

- SUE Services Procurement
 - Have prequalifications and consider the ASCE standard
 - Spend time on the scope of services
 - See ASCE's SUE for Municipalities Guide
<https://ascelibrary.org/doi/book/10.1061/9780784415368>

Lessons Learned

- SUE Services Procurement (Continued)
 - Have consultant feedback and evaluation
 - Statewide versus project specific
 - May have multiple providers on the same project (preliminary and final stages)
 - Can be a source of frustration: extra cost/work/liability to correct previous errors

Lessons Learned

- SUE Services Procurement (Continued)
 - Stand-alone versus subconsultant or subconsultant to the consultant utility coordination
 - Improved outcomes were noted when there was good coordination with the design team
 - Beginning SUE programs...it takes time for the consultant community to develop their expertise

Lessons Learned

- SUE Services Procurement (Continued)
 - Quality control and assurance for SUE deliverables...stamping is not really a substitute

Lessons Learned

- SUE versus As-Built Information and Storage for Future Use
- SUE as Part of a Larger Initiative

ASCE STANDARD

ASCE/UESI/CI

38-22

Standard Guideline for Investigating and Documenting Existing Utilities



Prepared by the Standard Guideline for Investigating and Documenting Existing Utilities Committee of the Utility Engineering and Surveying Institute and the Construction Institute of ASCE

Standard Guideline for Investigating and Documenting Existing Utilities, ASCE/UESI/CI 38-22, endeavors to safeguard public welfare by providing guidance on performing utility investigations and documenting results in a standardized fashion. It serves as both a prescriptive standard and a performance standard. As a prescriptive standard, it provides a series of minimum actions necessary to achieve utility quality level documentation. As a performance standard, it describes the professional judgment necessary to determine the appropriate timing, sequencing, location, and scope of a utility investigative effort.

The standard presents a credible system for classifying the quality of utility location information that is placed in design plans. It is predicated on the original subsurface utility engineering (SUE) practice that most projects will benefit from the concurrent and integrated use of geophysics, records research, and a utility feature survey as early as possible in project development.

ASCE 38-22 replaces the previous standard, CI/ASCE 38-02. This revision adds new information on utility attributes and guidance on collecting and recording depths of utility features and utility segments. It also includes appendixes on geophysical techniques, academic and organizational studies on costs and benefits of projects that have used utility quality levels, and guidance on the development of three-dimensional utility models, a relatively new practice.

This valuable resource will assist subsurface utility engineers, design engineers, and other professionals proficient in engineering, surveying, and geological and geophysical sciences, those who directly oversee and execute utility investigations and develop the resulting documentation, as well as those responsible for management of the risks associated with development and construction that may affect or be affected by existing utilities.

Introduction

This standard addresses the following:

- The Utility investigative practices, equipment, and data-processing technologies available for the effective collection and Documentation of Utility systems;
- How to convey Utility data to users through an uncertainty-based classification system; and
- The respective roles of the professionals and project owners in obtaining, communicating, and effectively deciding on the Scope of Work of investigative effort.

PERFORMANCE GOALS

- How can a project be designed so as to have minimal utility issues during the project development process;
- How can engineers (and others) be protected against utility-related claims during the project development process?

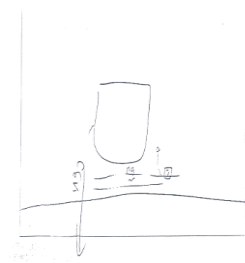
Utilities present Risks to Infrastructure Projects of all Kinds

- Utility Owners are rarely a party to the Project contracts
- There may be anywhere from 1-50 different utility owners within a project
- Utility Owners do not have good records on where they are that are accurate enough for good planning and design basis decisions by the Project Development Team
- Re-Design, Design Delays, ROW / Easement Delays, Construction Delays, Differing Site Condition Claims, Change Orders, Inflated Contractor Bid Prices and more are the result.
- What if a Utility gets damaged during construction and there's a death?
- Engineers are supposed to hold paramount the Health, Safety, and Welfare of the Public
- Pointing the Finger at various Parties does not solve the Problem
- Documentation of Existing Conditions is a necessary Design function
- Disclaimers on plans that utilities are the contractors problem may not hold up in a claim – SCOTUS *Spearin Doctrine, et.al.*

Utility Quality Levels – Judging Uncertainty

The result of using this standard is the assignment of a value to buried Utility Segments and buried Utility Features that judges the relative (nonquantifiable) uncertainty of a Utility Segment's or Utility Feature's existence, Attributes, and depicted location to that of its actual location so that sound engineering decisions throughout the Project Delivery process can mitigate and manage those project risks owing to the presence of existing utilities.

How can we know what's buried out of sight?



RECORDS

VISUAL CLUES

GEOPHYSICS

DIG IT UP



Each Method has some amount of Uncertainty

- **Records are uncertain**

- Do they exist? Are they spatially correct? Are they complete? Do they have recoverable references? Are they available?

- **Visual indications are uncertain**

- Is that a fire hydrant or a dog urinal? Does that wire entering the ground go anywhere? Is that a repair patch? How big is that underground vault? Are there even any objects to see? Does the utility between objects run straight?

- **Geophysics are uncertain**

- Is the signal I am receiving centered over a utility? Can this type of geophysics see that kind of utility? How do these scrap pieces of metal in the ground affect my signal?

- **Point exposures are uncertain**

- Is the utility I am looking for the one I exposed?

ASCE 38 is about the Professional Judgment and Subsequent Depiction of Utility Segments' Uncertainty in the Design Deliverables

- Synthesis of all information received and actively gathered iterated throughout Project Development
- There are 4 categories of Uncertainty
 - Utility Quality Level D (QLD)
 - Utility Quality Level C (QLC)
 - Utility Quality Level B (QLB)
 - Utility Quality Level A (QLA)

**A QL requires a PE seal in order to exist –
the PE is in responsible charge of the utility investigation**

ASCE and the practice of Subsurface Utility Engineering is:

- 1/3 Geophysics
- 1/3 Engineering Survey
- 100% Professional Engineering
 - Utility System Design and Construction Knowledge
 - Utility Conflict Identification
 - Utility and Material Recognition and Identification
 - Professional Judgment on Uncertainty
 - Impacts of that uncertainty value on design decisions

Knowing the relative Uncertainty,
the Design Engineer can:

- Know that additional information is prudent
- Modify / Adapt their design to avoid a potential conflict
- Accelerate the Project Delivery Process
- Design a project that is Constructable
- Develop realistic solutions to problems before they occur
- Develop realistic Estimates of Probable Cost
- Communicate Risk to the Stakeholders
- Better Allocate Risks between Contractual Parties

AVOID MIMIMIZE ACCOMMODATE RELOCATE

How do you do that?

- Know where all the utilities are positioned and each segment's uncertainty
- Know their characteristics
- Know this information early enough in the project development process to make good design decisions
- Keep the utility data up-to-date as new utilities are added or as old utilities are relocated

A Utility Quality Level Investigation:

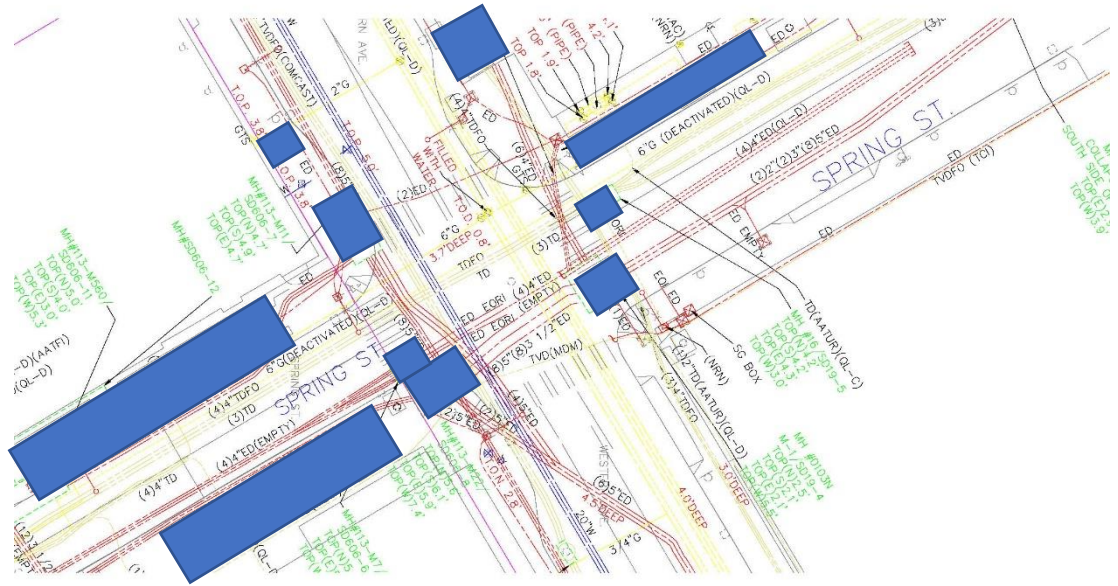
- Is a competent thorough search for any and all utilities within the scope of work within a particular project boundary
- Conforms to the minimum actions required to attempt to achieve a particular Utility Quality Level (Prescriptive)
- Documents Utility Segments and Utility Features at their actual achieved Utility Quality Level
- Also conveys information that a utility is likely not occupying space where none are depicted (i.e. a search for unknown/non-recorded utilities has been competently performed)

ENGINEER AND OWNER TASKS .

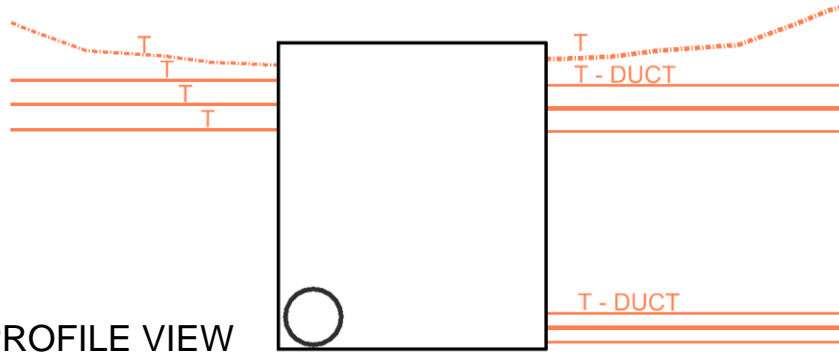
- C4.1.1 Project Details and Goals
- C4.1.3 Explanation of Utility Quality Levels
- C4.1.4 Development of Scope of Work
- C4.1.5 Use of Historical Data
- C4.1.6 Quality Assurance and Third Parties
- C4.1.7 Formatting
- C4.1.8 Investigation Phases
- C4.1.9 Overhead Utilities Investigation
- C4.1.11 Judgment to Assign Utility Quality Levels
- C4.1.12 3D Deliverables
- C4.1.14 Isolated Utility Features
- C4.1.16 Preparing the Utility Report
- C4.1.17 Iterative Impact Analysis

VAULTS

Many times the symbol for a vault or manhole cover does not reflect the true dimensions, shape, position and orientation of underground space that is being used and/or may not be centered directly over a symmetrical space.



PLAN VIEW



PROFILE VIEW

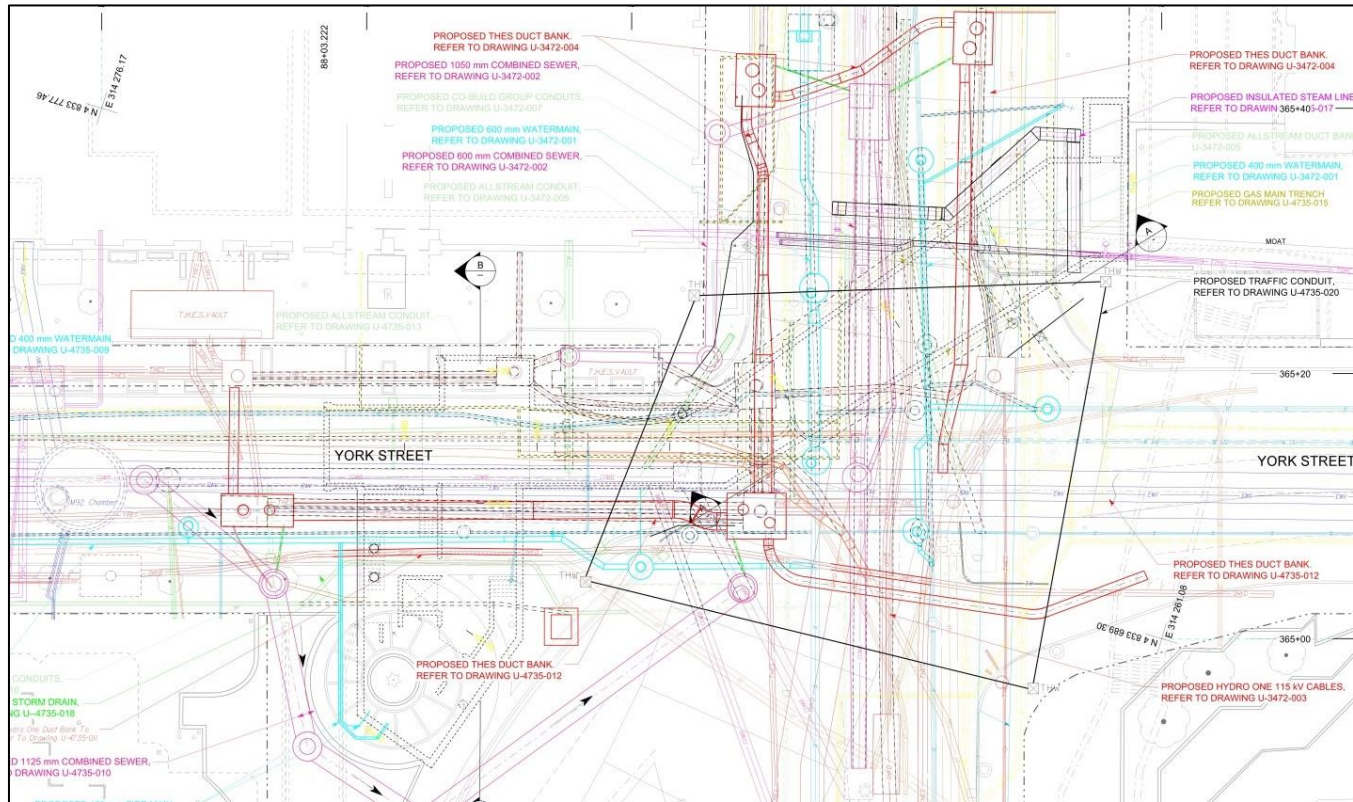


Figure 36. A communication vault showing the actual surveyed location of the vault covers and the vault dimensions, with details of the interior of the vault contents via a picture. Typically the plan view is contained in the Utility Drawings, and the supporting picture referenced in the Utility Report.

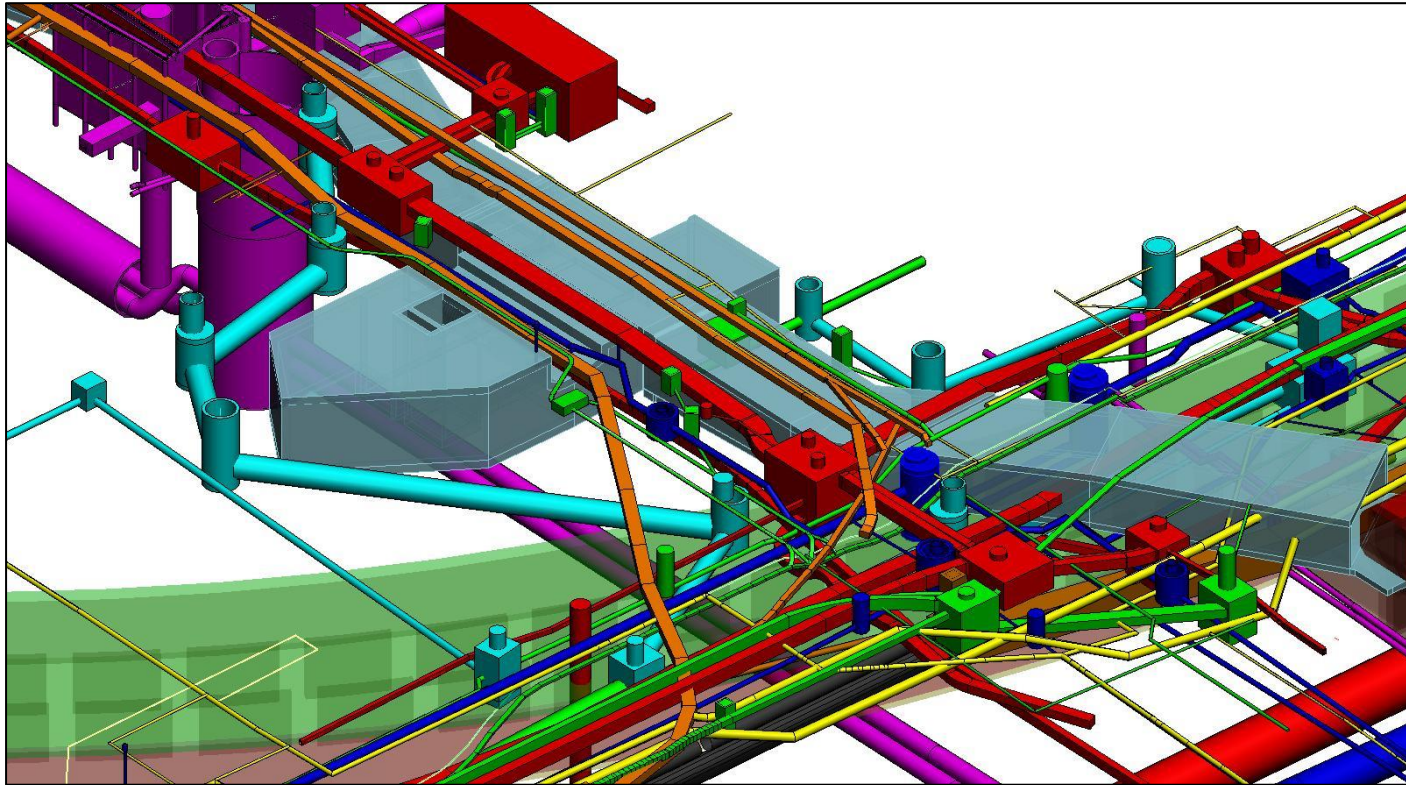
Limitations of One-Call

- No search for unknowns
- No coordination between all the locators on site
- No structure investigation
- Only Pipe and Cable locators without all their capabilities
- Might be only marking from available records
- Minimum Wage / no training
- No responsible charge
- No responsibility for errors in “design tickets”

Traditional 2D Plan View



3D Model Including Utilities







Implementing Subsurface Utility Engineering at State DOTs

February 14, 2023



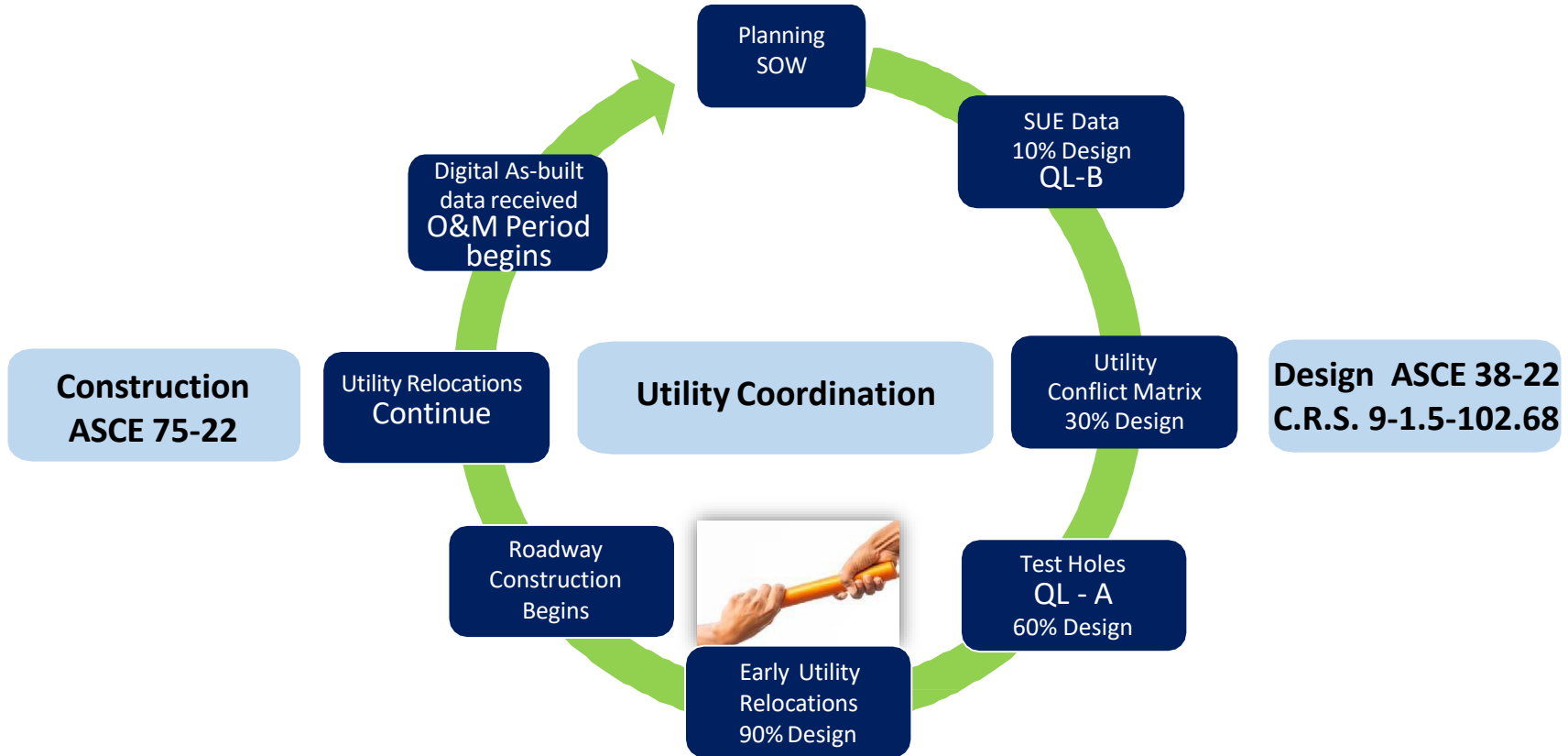
COLORADO

Department of Transportation

Presented
by

Rob Martindale, PLS

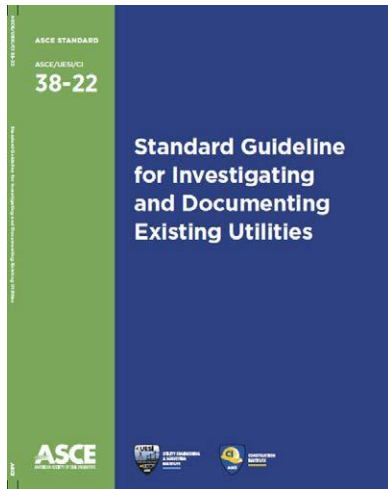
CDOT Utility Engineering Project Lifecycle



≡ SUE follows ASCE 38 Standard Guidelines

Addresses:

- How utility information can be obtained
- What technologies are available to obtain that information
- How that information can be conveyed to the end users



Intent:

- Present a **system of classifying the quality** of data associated with existing subsurface utilities
- **Reduce risk** by improving the reliability of information on existing subsurface utilities in a defined manner
- Serve as a **reference** or part of a specification; to assist engineers, project and utility owners, and contractors in understanding the classification of the quality of utility data

Quality Level – D:

- Most basic; existing records and verbal recollections
- An 811 locate, OneCall, Diggers Hotline

Quality Level – C:

- Surveying visible above or below-ground utility features to estimate approximate underground location

Quality Level – B:

- Designating - Use of appropriate and comprehensive geophysical methods to determine the existence and reproducible horizontal position of virtually all subsurface utilities

Quality Level - A:

- Precise mapping through exposure of utility; provides type, size, condition, and material and is:
 - Called 'locating'
 - X, Y, and Z coordinates
 - Test Holes

CDOT SUE Tools

- Best Practice – Subsurface Utility Engineering (SUE)
- CDOT Master SUE Scope
- CDOT SUE Request Form
- Contracting for services
- CADD Workspace – Quality level line styles

Best Practice - Subsurface Utility Engineering

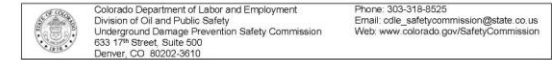
Is the project a SUE-required project?

There are four criteria that determine if Subsurface Utility Engineering will be required per C.R.S 9-1.5-102.68:

1. Involves a construction contract with a public entity
2. Involves horizontal construction (not buildings)
3. Exceeds two feet in depth and is a contiguous 1,000 square feet OR involves any utility boring.
4. Designed by a Professional Engineer.

Link to document:

<https://ops.colorado.gov/sites/ops/files/documents/BestPracticeSubsurfaceUtilityEngineering.pdf>



Best Practice – Subsurface Utility Engineering (SUE)

(Approved April 9, 2020)

Scope

This Best Practice is meant to help industry stakeholders and the public understand the concept of **Subsurface Utility Engineering (SUE)** by defining it, citing relevant sources and portions of the Excavation Requirements Statute and discussing practical application/intention of the Law.

Best Practices are recommendations of the Underground Damage Prevention Safety Commission (Safety Commission).

SUE: Background

SUE is considered an effective practice by many organizations, including the American Society of Civil Engineers (ASCE), American Council of Engineering Companies of Colorado (ACEC), American Public Works Association (APWA), Federal Aviation Administration (FAA) and Department of Transportation (DOT). SUE is used to better understand underground infrastructure during the planning and designing phases of projects to:

- Allow better execution during the construction phase
- Reduce risks of underground utilities
- Observe significant cost savings on projects

Without SUE, some projects may experience delays and extra costs resulting from:

- Unnecessary utility locations based on incorrect location information
- Unexpected utilities found during construction
- Redesign of utility or structural project components
- Utilities located at unexpected depths
- Utility damage
- Unanticipated utility relocation construction

The intent is to design around utilities in the interest of public safety. The recommendation is to include SUE in the design phase. SUE combines civil engineering, surveying and geophysics to meet damage prevention goals.

The Safety Commission interprets the intent of the language in the Law to be a "floor" not a ceiling – meaning at a minimum, certain projects (those that meet the criteria as a SUE-required project per the Law) require SUE. More stringent requirements may be required by the project owner. Furthermore, other projects that do not meet SUE requirements per the Law may involve interaction with underground utilities, and performing a SUE investigation still serves as a damage prevention tool. If a SUE investigation is not required or performed, engineers should include utility information in design plans.

SUE Defined

"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."

Project limits and SUE Scope of Work



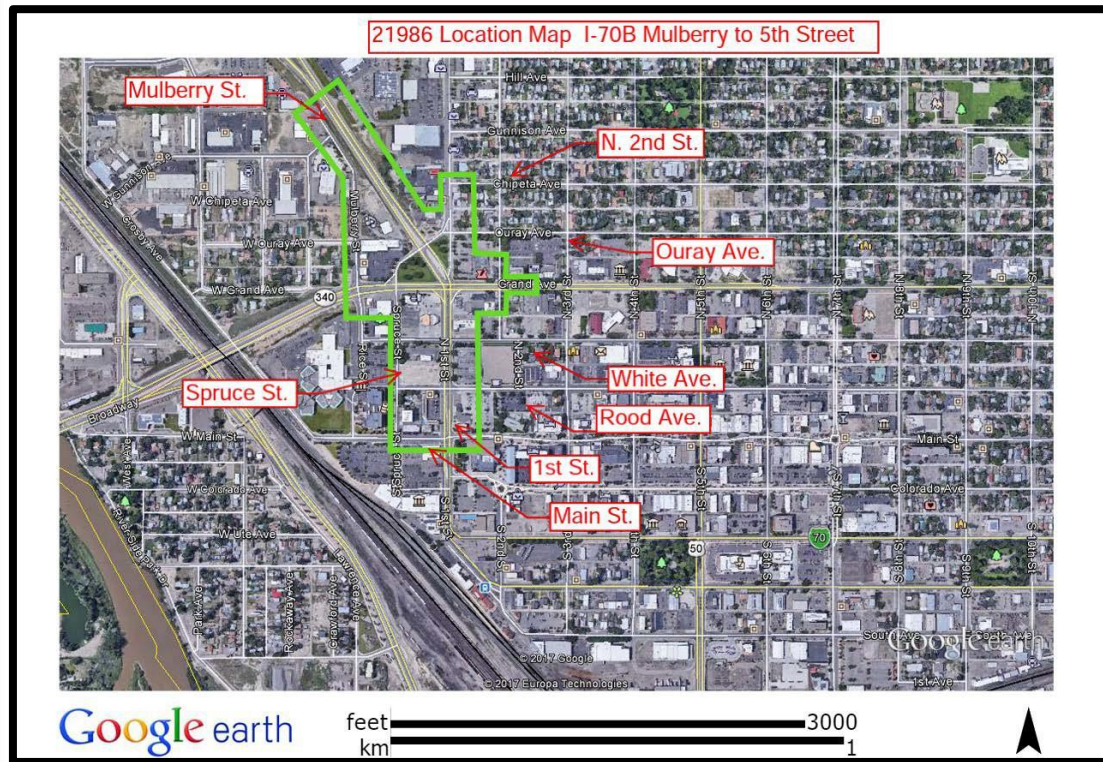
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Subsurface Utility Engineering (SUE) Scope of Work

Type of work may include all or parts of the following activities:

Utility Investigation Activities - the scope of work for utility investigation may include:

- a. The Consultant shall conduct and document an investigation of the project area to determine existing utility conditions within the project limits. As part of the investigation the Consultant will meet with all utility providers and collect utility key maps for all utilities in the project area, identify all known utilities: including lighting, irrigation, ITS, storm sewer, ownership, type, size and special conditions should utility relocation be required, and research and obtain copies of utility easements (public and private) and utility franchise agreements to determine conditions under which the utility was established in its present location (e.g. by revocable permit or by a privately owned easement). The utility investigation requirements are to meet Quality Levels A and/or B as required under C/ASCE 39 or explain why QLAB could not be achieved. The Consultant shall employ Professional Engineers who are able to stamp plans.
- b. **Project Goals**
 - 1) Quality Level B involves the use of Quality Level D and C methods of utility investigation plus the use of surface geophysical techniques to determine the existence and horizontal position of underground utilities. This activity is called "designating." The information obtained in this manner is surveyed to project control. Two-dimensional mapping information is obtained. This information is usually sufficient to accomplish preliminary engineering goals.
 - 2) Quality Level A involves the use of Quality Level D, C and B methods of investigation plus the use of minimally intrusive excavation methods at critical points to determine the precise horizontal and vertical position of underground utilities, as well as the type, size, condition, material, and other characteristics. This activity uses test holes (sometimes called Locating). It is the highest level presently available. When surveyed and mapped, precise plan and profile information is available for making final design decisions. Records research shall include but be limited to the following sources:
 - 811 Notification
 - Contacts List
 - Public Agencies
 - Utility Owner
 - Colorado 811
 - County Clerk's Office
 - Landowner
 - Internet Search
 - Visual Site Inspection
 - Irrigation Companies



Utility Coordination

Is the project a SUE-required project?

CDOT has four criteria that determines if Subsurface Utility Engineering will be required:

- Involves a construction contract with a public entity
- Involves horizontal construction (not buildings)
- Exceeds two feet in depth and is a contiguous 1,000 square feet OR involves any utility boring
- Designed by a Professional Engineer

COLORADO DEPARTMENT OF TRANSPORTATION
Subsurface Utility Engineering (SUE) Requirements Checklist

Project Name: _____

Project Number: _____

Design Scoping Review (DSR)
First, determine whether C.R.S. 9-1.5-102(6.8) applies. If this law applies, initiate SUE Notification. Establish the estimate and project specific SUE Scope of Work for inclusion into the Design Phase.

SUE is required when all four of the below conditions are applicable:

- The project involves a construction contract with a **public entity**.
- The project involves primarily **horizontal construction**, not construction of buildings.
- The project has an anticipated excavation footprint **exceeding 2 feet in depth AND is a contiguous 1000 square feet (excluding fencing, and signing projects)**, OR involves **utility boring**.
- The project requires the design services of a licensed **Professional Engineer (PE)**.

According to the above checklist, is this a "Subsurface Utility Engineering-required project?"

- Yes, *SUE-required project. (*refer to C.R.S. 9-1.5-103(2.4)).
- No, not a SUE-required project.

CDOT Project Manager Name _____ CDOT Project Manager Signature _____ Date _____

Technology and Data Collection



Figure 5-5. Details of the interior of the vault contents within a picture.

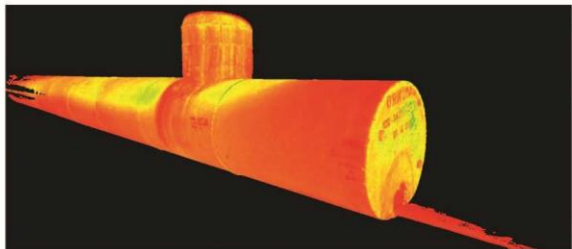


Figure 5-8. LiDAR image of the inside dimensions of an underground storm chamber.

Source ASCE 38-22

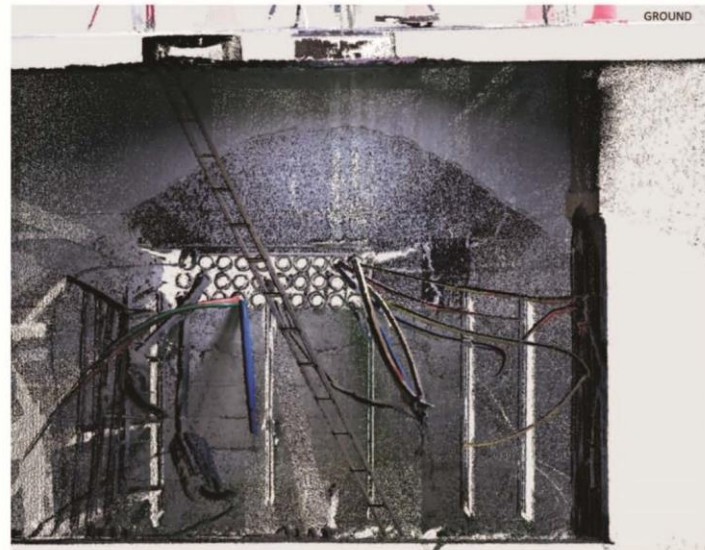
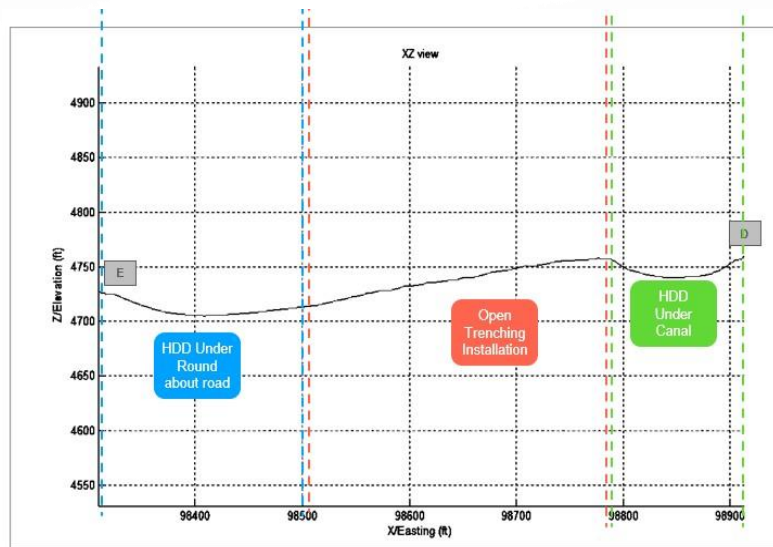
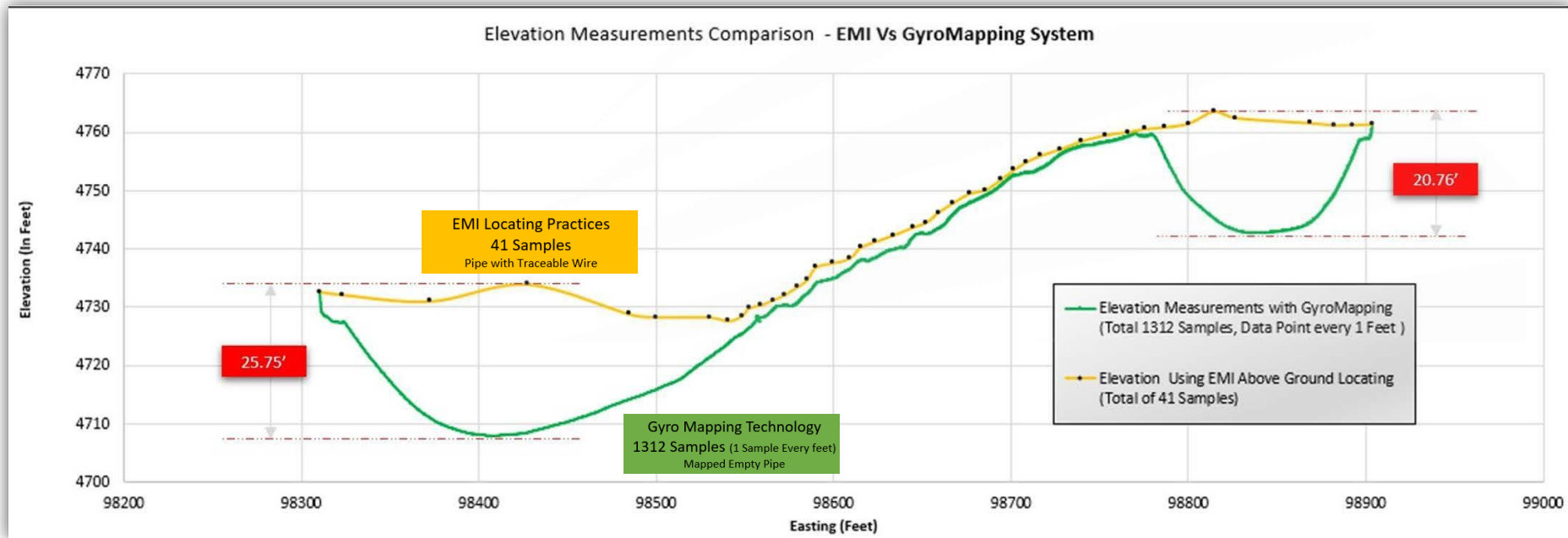


Figure 5-7. Details of the interior of the vault contents using LiDAR.

Geophysical Options for QL-B Data



Geophysical Options for QL-BData





As-Constructed Data ASCE 75-22

POLE #2 LOOKING WEST 12" DIA WOOD OVERHEAD ELECTRIC OVERHEAD TELECOM OVERHEAD FIBERTELE	POLE #3 LOOKING WEST 12" DIA WOOD OVERHEAD ELECTRIC OVERHEAD TELECOM OVERHEAD FIBERTELE	POLE #4 LOOKING NORTHWEST 12" DIA WOOD OVERHEAD ELECTRIC TRANSFORMER	POLE #7 LOOKING EAST 12" DIA WOOD OVERHEAD ELECTRIC TRANSFORMER	POLE #8 LOOKING WEST 10" DIA WOOD OVERHEAD ELECTRIC METER	POLE #9 LOOKING NORTH 12" DIA WOOD OVERHEAD ELECTRIC OVERHEAD TELECOM
POLE #10 LOOKING NORTH 12" DIA WOOD OVERHEAD ELECTRIC ELECTRIC TRANSFORMER	POLE #11 LOOKING NORTH 12" DIA WOOD OVERHEAD ELECTRIC	POLE #13 LOOKING NORTH 12" DIA WOOD OVERHEAD ELECTRIC OVERHEAD TELECOM	POLE #15 LOOKING SOUTH 12" DIA WOOD OVERHEAD ELECTRIC OVERHEAD TELECOM	POLE #18 LOOKING EAST 30" DIA METAL TRANSMISSION ELECTRIC	

ENGINEER'S NOTE

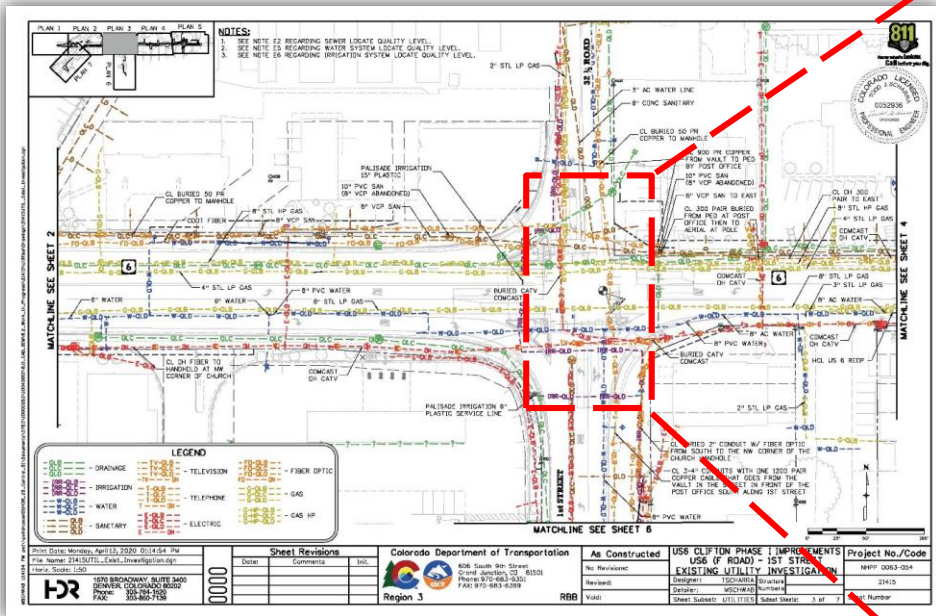
UTILITIES ARE SHOWN ON THESE PLANS IN ACCORDANCE WITH THEIR AGREED-UPON QUALITY LEVEL AS DEFINED IN THE AMERICAN SOCIETY OF CIVIL ENGINEERS' STANDARD AND IN STANDARD SPECIFICATIONS FOR THE COLLECTION AND VERIFICATION OF EXISTING SURFACE UTILITY DATA. RELIANCE UPON THIS DATA FOR DESIGN PURPOSES IS AT THE USER'S RISK. THE ENGINEER HAS CONDUCTED VISUAL SURVEYS AND/OR PROCEDURES (AS NOTED) TO VERIFY THE LOCATION, DEPTH, SIZE, AND/OR PROPERTIES OF UTILITIES SHOWN HEREON. IT IS THE USER'S RESPONSIBILITY TO OBTAIN NECESSARY PERMITS AND UNDERSTAND THE SCOPE OF WORK RELATIVE TO THE PROJECT OWNER AND THEIR ENGINEER REGARDING THE SCOPE AND LIMITS OF THE UTILITY INVESTIGATION SHOWN ON THESE SPECIFICATIONS.

NOTE: DURING THE COURSE OF THE INVESTIGATION, UTILITY POLES 1, 4, 5, 12, 14, 16, AND 17 WERE DETERMINED TO BE OUTSIDE OF THE SCOPE PROJECT LIMITS AND ARE NOT SHOWN OR INCLUDED AS PART OF THIS PROJECT'S SUE INVESTIGATION.

Print Date: 2/17/2020	Sheet Revisions	Colorado Department of Transportation	As Constructed	US 50 & 20 ROAD FRUITA UTILITY POLE DETAILS	Project No./Code						
File Name: 19771_SUE_Pole_Diagrams.dgn	Date: _____ Comments: _____	 808 South 9th Street Grand Junction, CO 81501 Phone: 970-683-3300 Fax: 970-683-6369	No Revisions:	Designer: L. JONES	4499 0063-048						
Horiz. Scale: 1" = 40'	Vert. Scale: As Noted		Region 3	Revised:	Detailer: P. LUCERO	19771					
 100 CANYON DRIVE SUITE 100 650-0N, CO SPRINGS 80904 PHONE: 719-532-0000	<table border="1" style="width: 100%; height: 40px;"> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>							RBB	Void:	Sheet Subst: UTILITY	Sheet Number: 8

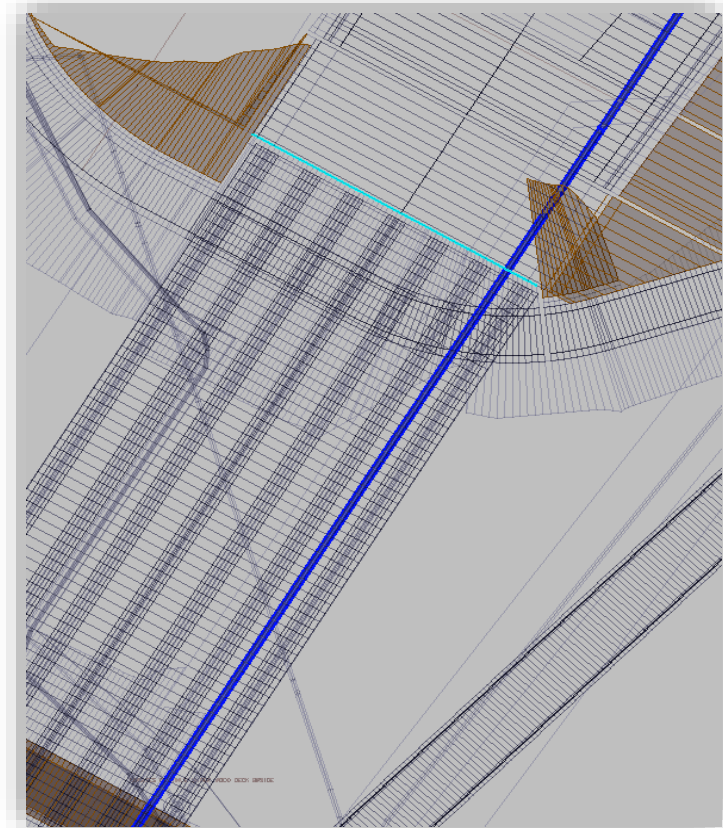
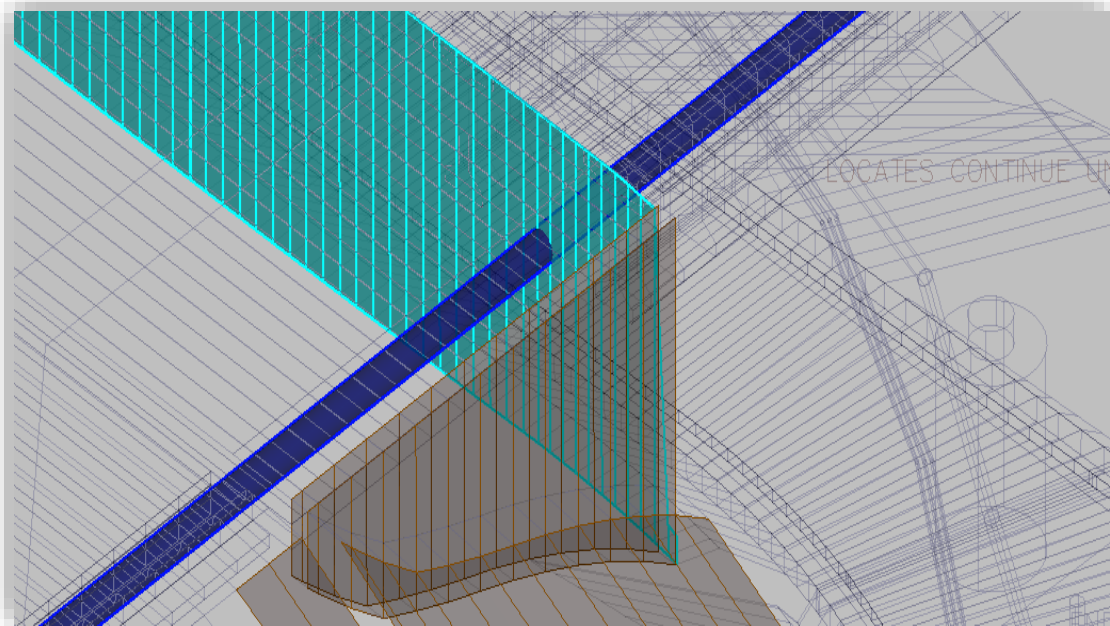


Final Deliverable ASCE 38



☰ Data for Conflict Analysis

3D-Potential Conflicts



Documenting Conflicts

Conflict Analysis

- Between QL-B investigation and current 30% design
- Compare proposed design to existing QL-B base map
- Find/define potential conflict points
- Determine QL-A locations using proposed plan and conflict matrix

QL-A locates: “Test Holes”
Begin to develop Test Hole Plan

Communicating Conflicts

- After conflicts have been identified, there should be a meeting with:
- SUE consultant (if Utility Coordination is included in their task order)
 - Utility providers
 - CDOT

Share what was found in the field:

- Results of the QL-B investigation – point out possible conflicts and test hole locations
- What utility relocations are anticipated?
- Are there any utility easements in the project area?
- Who pays for relocations?
- What types of agreements are needed? – ICC, SUA, Railroad Contracts, etc.

UTILITY OWNER	ID	I-70B 1st St and Grand Ave - Utility Conflict Matrix																	
		Conflict Location				Utility Data				Conflict Data				Conflict Resolution					
		Waypoint Name	Station	Distance U / of DL	File Name	Size	Material	Rating	Surf Depth	Minimum Depth	Utility Location	Utility Depth	Conflict Location	Conflict Depth	Conflict Description	Proposed Mitigation / Action	Complete by Year (Y)	Notes	
GAS	1.1	170 B	235+45	52.16	49	2"	PE						4576.50	4571.28	Test hole did not locate this line but it is near very close to conflict with Storm Pipe #10021	Contractor to coordinate with Hydro to adjust as necessary or flush to avoid storm pipe	Yes	At owners expense	
	1.2	170 B	235+46	47.12	50.5	2"	PE						4576.50	4571.28	Gas line near back side of Storm Pipe #10022 not conflict with excavation	Contractor to coordinate with Hydro Energy to adjust as necessary or flush to avoid pipe	Yes	At owners expense	
	1.3	170 B	236+07	30.18	43	12"	Steel	18672.080	89437.370	4576.04	3.33	4575.81	4574.75	4573.86	4573.61	Bottom of gas approx. 11 inches above Storm Pipe #10022B	Contractor to protect in place during installation of storm	Yes	
	1.4	170 B	232+96	17.18	50	12"	Steel	34603.480	89437.380	4576.00	3.16	4576.34	4575.18	4573.30	4571.41	Bottom of gas approx. 22 inches above Storm Pipe #10024	Contractor to protect in place during installation of storm	Yes	
	1.5	170 B	232+45	2.98	51	2"	Steel	10642.000	89437.370	4576.72	Not Found	N/A	N/A	4573.52	4571.60	The line not located and therefore has provided for and above Storm Pipe #10024	Contractor to protect in place during installation of storm	Yes	Contractor to verify gas location and depth during construction.
	1.6	170 B	235+10	43.18	46.1	7" x 9"	PE	18138.940	89447.240	4576.15	4.10	4575.13	4574.95	4573.87	4570.90	Gas line approx. 23 inches below the top of Storm Pipe #10021	Contractor to protect existing gas line and adjust during installation of storm	Yes	
	1.7	170 B	235+08	43.18	NE3	3"	PE									Gas line near back side of Storm Pipe #10024 and conflict with excavation adjust as necessary or flush to avoid pipe	Yes	At owners expense	
	1.8	170 B	233+46	30.18	53	2" OD	Steel	18628.850	89447.330	4576.50	4.55	4574.95	4574.75	4573.15	4571.57	Bottom of gas approx. 39 inches above proposed Storm Pipe #10023	Contractor to protect in place during installation of storm	Yes	
	1.9	170 B	235+10	53.18	56	12"	Steel	18612.410	89436.870	4576+0.0	2.97	4576.46	4573.40	4571.24	4569.64	Bottom of gas approx. 38 inches above proposed Storm Pipe #10022	Contractor to protect in place during installation of storm	Yes	
	1.10	170 B	235+07	42.18	60	12"	Steel	18610.670	89446.880	4580.15	3.69	4576.14	4575.90	4573.61	4571.80	Bottom of gas approx. 38 inches above proposed Storm Pipe #10022	Contractor to protect in place during installation of storm	Yes	
	1.11	170 B	236+14	12.14	62	12"	Steel	34604.880	89436.570	4580.17	3.11	4577.18	4575.98	4574.36	4572.24	Approx. 20 inches of clearance between bottom of gas and top of Storm Pipe #10021	Contractor to protect in place during installation of storm	Yes	
	1.12	170 B	236+16	12.16	67	10"	Steel	15615.120	89439.830	4579.35	5.65	4576.22	4573.92	4571.20	4568.54	Bottom of gas approx. 30 inches above proposed Storm Pipe #10021	Contractor to protect in place during installation of storm	Yes	
	1.13	N. 3rd St	500+97	42.78	75	16"	Steel	37463.250	89441.880	4581.15	2.48	4578.57	4577.24	4573.80	4570.88	Bottom of gas approx. 4.5 feet above proposed Storm Pipe #10027	Gas line lower existing gas line but will be above proposed storm. Contractor to protect gas in place	Yes	Gas will lower gas line to get adequate cover
	1.14	N. 3rd St	501+40	52.78	17	16"	Steel	37333.170	89441.270	4580.00	1.96	4580.34	4578.65	4575.36	4572.06	Bottom of gas line in approx 5 feet above the bottom of Storm Pipe #10028	Gas line lower existing gas line but will be above proposed storm. Contractor to protect gas in place	Yes	Gas will lower gas line to get adequate cover
	1.15	SR 340	624+88	42.88	40	12"	Steel	18629.800	89440.420	4579.57	2.96	4577.41	4576.81	4574.28	4571.59	Bottom of gas line in approx 20 inches above the top of Storm Pipe #10028	Contractor to protect in place during installation of storm	Yes	
	1.16	170 B	208+42	68.18	2	4"	Steel	18628.170	89390.440	4555.19	9.82	4532.37	4561.70			Gas line in the above proposed back-line of ditch	Contractor to protect in place during installation of storm	Yes	
	1.17	170 B	400+75	41.18	NE3	3"	Steel									Approx. 3.0 feet over the gas line in the trench area	Contractor to verify location and depth of gas line prior to excavation of trench area	Yes	Contractor to coordinate with Hydro Energy if the gas needs to be moved
	1.18	170 B	400+68	53.18	NE3	2"	Steel									Approx. 3.0 feet over the gas line in the trench area	Contractor to verify location and depth of gas line prior to excavation of trench area	Yes	Contractor to coordinate with Hydro Energy if the gas needs to be moved

ASCE 75-22 Handoff of Newly Installed Utilities





Thank you

Today's presenters



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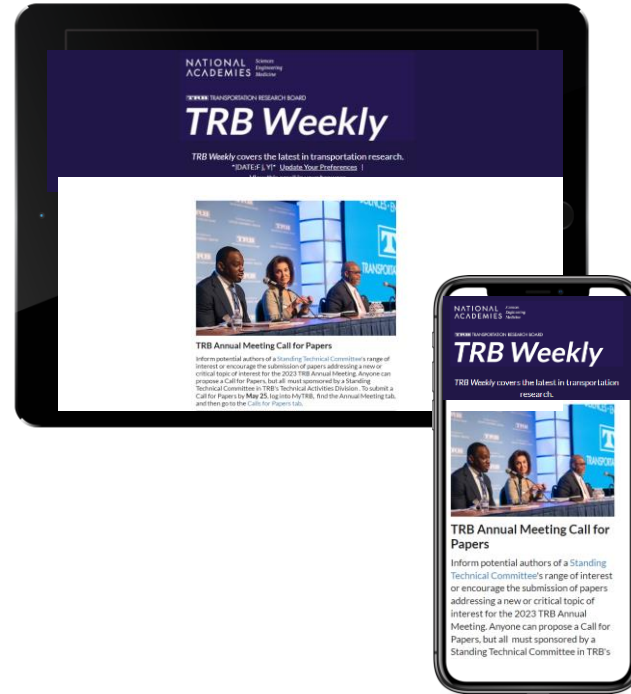
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