Subsurface Utility Engineering in review

- **1982** – Traditional ways not working, SUE developed
- **1985** – First statewide SUE contract with Virginia Department of Transportation
- **1986** – First statewide UC contract with Virginia Department of Transportation
- **1991** – FHWA began promoting SUE
- **2002** – Standard ASCE 38-02 was adopted by American Society of Civil Engineers
- **2018** – 38+ State DOTs using Statewide\District-Wide\Region-Wide UES Services
- **2022** – Anticipating the release of Standard ASCE 38-22
The American Society of Civil Engineers (ASCE) has developed a National Consensus Standard, CI/ASCE 38-02, titled “Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data”. This National Consensus Standard (NCS) is used by courts and lawyers, along with contractual instruments, to assist in both defining a professional’s standard of care and level of responsibility.
The intent of this standard guideline is to present a system of classifying the quality of data associated with existing subsurface utilities."

Such a classification will allow the project owner, engineer, constructor, and utility owner to develop strategies to reduce risk by improving the reliability of information on existing subsurface utilities in a defined manner.”
What is Subsurface Utility Engineering?
ASCE Standard 38-02: Quality Levels

Quality Level D  Quality Level C  Quality Level B  Quality Level A

Least Certain
Subsurface Utility Engineering is an interpretive science; therefore, a skilled team with knowledge of construction history & years of experience sets us apart.

Most Certain
Utility Quality Level:

- A professional opinion of the quality and reliability of utility information. Such reliability is determined by the means and methods of the professional.
  - These levels are cumulative
  - Each QL is defined in the Standard
ASCE Quality Level D (QL-D)

**Existing Utility Records**

- Information derived from existing records or oral recollections. It is assigned when there is no other data other than records.
  - Record Drawings
  - As-built records
  - GIS Data
  - Field Notes
  - DOT / City Records
  - Circuit Diagrams
  - Mtgs. w/ Staff
  - Land Owner
  - Valve Guides
ASCE Standard 38-02 - Quality Level “C”
Topographic Survey

- Use of above ground surface features to indicate subsurface alignment, such as:
  - Valves
  - Fire hydrants
  - Power Poles
  - Manholes
  - Telephone pedestals
- Verified to ASCE Quality Level D records
ASCE Quality Level B (QL-B)- Designating

**Designating**: The process of using a geophysical method or methods to interpret the presence of a subsurface utility and to mark its approximate horizontal position (its designation) on the ground surface.
ASCE Quality Level B (QL-B)- Designating

Determining the existence and approximate horizontal position of subsurface utilities.

Radio Frequency Pipe and Cable Locators

Radio Frequency Pipe & Cable Locaters

Single channel Cable Locator

Single / Multi channel GPR
Utility Point Sheet and Sketch

- This sheet references any paint marks that are identified by geophysical methods.
- Periodically placed marks over the utility identifies line position, critical bends, beginning and end of target lines.
- This process ensures that each paint mark has been captured when compared to the survey file and report.
- It’s important to have this systematic plan in place to ensure thorough recording of our findings.

Part of our QA/QC process for QLB.
Differences between One-Call marks and Quality Level-B?

• One-Call designed as a risk based system used for excavation
• The information received has no guarantee of accuracy
• One-Call locator has a single utility focus / limited time
• Rely on utility records with minimal detail
• Do not perform utility sweeps
• Do not locate private utilities
• No point sheet or sketch for accuracy
• Survey of one-call paint marks is not QL-B
• Utility data records research, interpretations, and designation not performed under the responsible charge of a registered professional.
ASCE Quality Level A (QL-A) Locating

Utility Locating

- Precise location by actual exposure
- Minimally intrusive excavation method: A method of excavation that minimizes the potential for damage to a structure being uncovered.
- Survey grade accuracy
- Supported by QL-D, QL-C, and QL-B
ASCE Quality Level - A SUE Deliverable
Looking to the Future - Advanced Geophysics

3D Multi-channel GPR Results
3D Multi-channel GPR Field Collection
3D SUE Modeling
Time To Take Action

- Utility Corridors will continue to get more congested.
- The Importance of Accurate Reliable Information will increase as will the use of 3D Models.
- Experienced Utility Coordinators will become increasingly important roles on design projects.
What is a 3D Model

2D SUE Drawing
- Horizontal alignment (i.e. flat).
- Depths (inverts, test holes) are typically notes on the drawing or reports.

3D Model
- Creates a 3D representation of the buried underground infrastructure.
- Depth is added to the SUE Drawing based on physical measurements, assumed depths and records.
- 3D Model is a blend of:
  - verified data points \((x,y,z)\)
  - alignments with assumed depths \((x,y)\)
  - assumed elements
- Assumptions will need to be stated in the project scope document.
  - Technical Memo
What Clients Benefit from 3D Model

- 3D Model projects have typically been created for larger linear projects developed for transportation.
- Engineering design for projects being completed using 3D.
- Ease of conflict identification.
- Accessibility – Online viewer
- “Beauty of 3D, comfortable user interface to consume it. Historically unable to do so easily.” Clients are finding it much more intuitive.
Thank You

There are more difficult things to deal with on the job than utilities!
Additional Information

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