Subsurface Utility Engineering
And Early Utility Coordination

Presented by:
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2010 Road School

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Utility Coordination

- The IAC Rule
- Research
- Four Steps

Subsurface Utility Engineering - SUE

- Definitions
- Role in Utility Coordination
- When and Why?
The Department is authorized to manage the right-of-way of the state highway system. The purpose of the article is to establish a formal procedure for highway improvement projects that involve the relocation of utility facilities by providing for the exchange of information and the implementation of their respective responsibilities among the department, utilities, and the contractor.
Utility Coordination Process

- Research
- Initial Notice of Project
- Verification of Existing Utilities
- Conflict Review
- Work Plan Development & Approval
- Coordination During Construction
Early Utility Coordination Process

- Research
  - Indiana 811 – Indiana Underground
  - District Office for current permits
  - Central Office for previous plans
  - City / County agencies
  - Field visit
  - Existing utility records
  - Early SUE
Early Utility Coordination Process

- Initial Notice
  - Letter and map to each utility
  - Project limits defined
  - Description of work
  - Anticipated date Work Plan required
  - Anticipated RFC date
  - Designer information

- Utility to Provide Written Response
  - Type and location of facilities or ‘No facilities’
  - Utility records
Early UC Process - Plan Development

- **Surveyed Information - Typical**
  - Above ground features (power poles, pedestals, pipeline markers, manholes, etc.)
  - One-Call marks, where available (+/- 2 feet)
  - Utility records
  - CADD depiction

- **SUE Information**
  - Appropriate ASCE Quality Level
What is Subsurface Utility Engineering?
What is Subsurface Utility Engineering?

A branch of ENGINEERING PRACTICE that involves managing certain risks associated with:

- Utility Mapping at appropriate ASCE Quality Levels
- Utility Coordination
- Utility relocation & adjustment through conflict matrix resolution
- Utility relocation design and cost estimates
- Communication of utility data to concerned parties
- Implementation of Utility Accommodation Policies and utility design
The American Society of Civil Engineers (ASCE) has developed a National Consensus Standard, CI/ASCE 38-02, titled “Standard Guidelines 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.
Definitions

Designating - Using geophysical prospecting equipment to determine the existence and horizontal position of underground utilities.
Definitions

Locating -

Using non-destructive digging equipment, such as vacuum excavation, at critical points along a subsurface utility’s path, to determine the precise horizontal and vertical position of the underground utility line, to plan for proper protection, eliminate potential damage to underground utilities during construction, and avoid unnecessary utility relocations.
ASCE Standard – Quality Levels

- QL-D information comes from existing utility records, permits, old plans, etc.
- QL-C involves surveying visible above-ground utility facilities and correlating this information with QL-D information collected.
- QL-B involves the use of surface geophysical techniques to determine the existence and horizontal position of underground utilities.
- QL-A involves the use of non-destructive digging equipment at critical points to determine the precise horizontal and vertical position of underground utilities, as well as the type, size, material, and other characteristics of the utility.
ASCE Quality Level D (QL-D) Existing Utility Records

Involves the use of existing utility records, permits, plans to depict the ‘approximate’ horizontal position of underground utilities.
ASCE Quality Level C (QL-C) Survey of Visible Features

Involves surveying visible above ground utility facilities to assist with determining ‘approximate’ horizontal position of underground utilities. Used with QL-D.

- Manholes
- Power poles
- Hydrants
ASCE Quality Level B (QL-B) Determining Horizontal Alignment

Involves the use of surface geophysical techniques to determine the existence and horizontal position of underground utilities - Accuracy is +/- 2 inches

- Paint markings
- Flags
Ground Penetrating Radar (GPR)

Safe and Non-Invasive

GPR is a safe, non-invasive geophysical investigation method used to “look” underground for the purpose of locating subsurface features. GPR is not a standalone quality. It requires support from other QL-B equipment or verification through exposure in the QL-A process.

GPR detects metallic, non-metallic, natural and manmade underground objects, including soil and shallow rock strata, utilities, storage tanks, rebar, sinkholes and voids.
ASCE Quality Level A (QL-A) Utility Locating

Involves the use of non-destructive digging equipment at critical points to determine the precise horizontal and vertical position of underground utilities, as well as the type, size, material and other characteristics.
QL-A&B SUE Deliverable

ALL UTILITIES QUALITY LEVEL "B" UNLESS NOTED OTHERWISE.
### QL-A SUE Deliverable

#### Verified Utility Information

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<th>ACW</th>
<th>Size</th>
<th>Type</th>
<th>Ver.</th>
<th>Width</th>
<th>Depth</th>
<th>NPS</th>
<th>DHG</th>
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<td>G</td>
<td>2737</td>
<td>A22</td>
<td>1280</td>
<td>620</td>
<td>20</td>
<td>2</td>
<td>3</td>
<td>2</td>
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| 14" | G    | 2738 | A22  | 1280  | 620   | 20  | 2  | 3   | 2   | Use:
|     |      |      |      |       |       |     |    |     |     | Footing:
| 16" | G    | 2739 | A22  | 1280  | 620   | 20  | 2  | 3   | 2   |          |

- Footing:
  - 2737: 610 x 610
  - 2738: 610 x 610
  - 2739: 610 x 610

- Use:
  - 2737: 610 x 610
  - 2738: 610 x 610
  - 2739: 610 x 610

- Remarks:
  - 2737: 610 x 610
  - 2738: 610 x 610
  - 2739: 610 x 610
**Verified Utility Information**

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<th>Test Hole #</th>
<th>Size &amp; Type</th>
<th>Northing</th>
<th>Easting</th>
<th>Existing Tap Elevation</th>
<th>Existing Cut</th>
<th>Reference Elevation</th>
<th>Comments</th>
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QL-A&B on Plans (Plan View)
QL-A&B on Plans (Profile View)
QL-B on Plans (X-Sections)
QL-B on Plans (X-Sections)
When to Use SUE?
When to Use SUE?

- **Type of Project**
  - Roadway reconstruction / Added travel lanes
  - Widening / Intersection improvement
  - Signal replacement
  - Resurfacing
  - Facility design

- **Location of Project**
  - Urban / Suburban
  - Rural
When to Use SUE?

- Utilities involved
  - Major or minor
- Conflicts with utilities
- Compensable interest
- Limited access R/W
- Accuracy required
  - ASCE Quality Level?
- Level of risk
Why Use Subsurface Utility Engineering?
Why Use SUE?

- **Make Informed Design Decisions**
  Designers require accurate utility information, including constructability of multi-phase projects.

- **Savings and Safety**
  Inaccurate information can result in costly conflicts, utility damage, construction delays, service disruptions, redesign, claims, and even injuries and loss of life.
Why Use SUE?

- **Avoid Costly Conflicts / Utility Relocations**
  By knowing the exact horizontal and vertical location of underground utilities, costly conflicts and utility relocations may be avoided, along with not having to depend upon the utilities to relocate before construction can occur.

- **Avoid Using Unreliable Underground Utility Information**
  Avoid second guessing where a utility may be located.
Relative Cost Savings & Benefits

- Purdue Study
  - Commissioned by FHWA
  - 71 projects studied in 4 states (VA, NC, OH, TX)
  - Cost savings of $4.62 per $1.00 spent on Subsurface Utility Engineering
  - Un-quantifiable savings not included
Relative Cost Savings & Benefits

- University of Toronto Study
  - Ontario based study commissioned by OSWCA
  - September 2004 to October 2005
  - Cost Savings of $3.41 per $1.00 spent on Subsurface Utility Engineering
In an increasing number of states, lawyers and courts are using guidelines, agency policies and contractual instruments, to define and hold professionals accountable for their standards of care.

It is an Engineer’s responsibility, on behalf of an Owner, to utilize all available resources/methods to gather and provide the most accurate information possible.
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Questions?