LOOKING THROUGH PAVEMENT:
Benefits of Subsurface Utility Engineering

Presented by:
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Chris Ernst, PE

• 15 Years Experience
• Secretary of ASCE Texas UESI Chapter
• Love Coaching Sports
OVERVIEW

• Subsurface Utility Engineering (SUE)
• Project Examples
• New and Future Technologies
WHAT IS SUE?

• Branch of engineering practice that involves:
  - Utility mapping at appropriate quality levels
  - Utility relocation design
  - Utility condition assessment
  - Communication of utility data
  - Utility relocation cost estimates
  - Implementation of accommodation policies
  - Utility design

*Source: Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, CI/ASCE 38-02, American Society of Civil Engineers, 2002
WHO USES SUE?

- Texas Department of Transportation
- Atmos Energy
- City of Keller
- Plano
- McKinney
- City of Denton
- Denton Municipal Electric
- Garland
- Grand Prairie
- Prosper
- Denton County
- Brazos Electric Cooperative
- Farmers Branch
- Lewisville
- UNT University of North Texas
- Fort Worth
- Bartonville
- City of Kaufman
SUE QUALITY LEVELS

A
LOCATING

B
DESIGNATING

C
SURVEYING

D
RECORDS RESEARCH
QUALITY LEVEL “D” - RECORDS

- Existing records
- Personal Interviews
QUALITY LEVEL “C” - SURVEYING

- Survey Visual Utility Appurtenances
QUALITY LEVEL “B” - DESIGNATING

• Radio signal used to pinpoint horizontal position
QUALITY LEVEL “A” - LOCATING

- Non-destructive excavation
- Most accurate vertical & horizontal position
QUALITY LEVEL “A” - LOCATING

• OQ (Operator Qualification) Certified
**SUE DELIVERABLES**

- Signed QL-A Data Sheets
- Signed SUE Plan Sheets
WHAT IS CONFLICT ANALYSIS?

• Proactive approach in determining conflicts
  ▪ Uses SUE data
  ▪ Evaluates your design plans for your project
  ▪ Perform Clash Detection/3D Modeling

<table>
<thead>
<tr>
<th>Conflict ID</th>
<th>Drawing or Sheet No.</th>
<th>Utility Type</th>
<th>Size and/or Material</th>
<th>Utility Conflict Description</th>
<th>Start Station</th>
<th>Start Offset</th>
<th>End Station</th>
<th>End Offset</th>
<th>Utility Investigation Level Needed</th>
<th>Test Hole</th>
<th>Recommended Action or Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Water</td>
<td></td>
<td>Water line longitudinal beneath proposed pavement. Level C/D SUE performed.</td>
<td>290+91</td>
<td>16.5' RT</td>
<td>326+93</td>
<td>21.0' RT</td>
<td>QLA</td>
<td>TH 1, TH 8, TH 10, TH 12, TH 20</td>
<td>Need verification of depth/location via QLA or any additional construction plans we could obtain.</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Water</td>
<td></td>
<td>Abandoned asbestos water line longitudinal beneath proposed pavement. Level D from drawings.</td>
<td>290+91</td>
<td>6.3' RT</td>
<td>329+41</td>
<td>10.1' RT</td>
<td>QLA</td>
<td>TH 4</td>
<td>Need verification of depth/location via QLA or any additional construction plans we could obtain.</td>
</tr>
</tbody>
</table>

UTILITY OWNER: City of Big Wells

CSJ: # 1799-02-27
UTILITY CONFLICT LIST
UPDATED ON 6/1/2018
“I’VE GOT A LITTLE STORY FOR YOU...”
“YOU HIT WHAT?”
“YOU HIT WHAT?”
“YOU HIT WHAT?”
“THE FIBER GOES WHERE?”
“THE FIBER GOES WHERE?”
WHAT ARE THE RISKS?

- Utility Strikes
- Safety of Public
- Safety of Construction Workers
WHAT ARE THE RISKS?

Gas Pipeline Explosion
WHAT ARE THE RISKS?

- Delay of Projects
- Contractor Claims
- Environmental Issues
- Re-Design Fees
- Negative Publicity
- Change Orders

$160 per lane mile with SUE

$3,000 per lane mile without SUE
KNOWING BEFORE YOU DIG

- Knowing what is underground BEFORE you start saves Time, Money and Lives
  - Easier to interface design data with existing utilities
  - Reduces ROW acquisition cost
  - More accurate project bids
  - Minimizes utility strikes
  - Ensures a safer work environment
  - Reduces or eliminates redesign conflicts in construction
2000 Study by Purdue University commissioned by the Federal Highway Administration

Every dollar spent on SUE, TxDOT would see:

$4.27 Saved
Drone Surveying Interface with SUE

- Quality Level C
- Quality Level B Marks
TO INFINITY AND BEYOND....

- 3-D Modeling

Subsurface Utility Engineering (SUE) involves building intelligent 3D feature-based models of buried construction zones.
TO INFINITY AND BEYOND....

• Utilities and Mixed Reality (Virtual and Augmented)
  ▪ 2D/3d Pipes Projection for Excavation
IN SUMMARY....

• New Technologies – only as good as data you input
• Clients recognize a significant savings in:
  ▪ Total project cost
  ▪ Reduced time to complete projects
  ▪ Fewer surprises requiring work stoppages for re-design and conflict resolution
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