Utility Roadway Designer Training

Office of Utilities
January 2018
Utility Roadway Designer Training
Introduction

Team

• Jeff VanDyke – Agenda/Introduction
• Randy Sanborn – Identify Existing Utilities/Conflict Resolution/UC
• Kerry Gore – Utility Cost Difference
Utility Roadway Designer Training
Introduction

Agenda
• Background - Need and Purpose
• Part 1 – Identifying Above Ground and Below Ground Utilities
• Break
• Part 2 – Understanding the Cost Difference
• Part 3 – Conflict Resolution
• Part 4 – Coordination
Utility Roadway Designer Training

Introduction

Background

• Utility Coordination Task Force

• Risk Management
  o Risk Registry
  o Implemented prior to PTIP and/or Concept Team meeting

5 step process:

1. Identify existing utilities
2. Identify utility impacts
3. Identify cost of impacts (conflicts)
4. Resolve conflicts
5. Coordinate utilities
Utility Roadway Designer Training
Introduction

Background

• Training

1. The intent of this class is to have the designers resolve their own utility issues w/o SUE (utility owners identifying existing utilities – 1st submission)
2. Focus on utilities, not just design
3. Raise awareness of utilities early in the process as the alignments are developed. Early communication/coordination is the key
4. Risk mitigation

*Not employing all available resources to gather reliable utility information DOES NOT relieve owners and engineers of responsibility if an accident occurs due to lack of utility data.
Utility Roadway Design Training

Introduction

Utility Owners Marking Existing Facilities (1st submission)

- SUE
- Purposes of this class (assume no SUE)
- Basically QLC and D
UTILITIES PLAN SUBMITTALS WITHOUT SUE
(Hand marked, Transcribed and/or Electronic)

Concept
- Concept Invitation
  PRELIMINARY COST ESTIMATE

1st
- Preliminary Proposed Utilities
  As early as possible, after mapping and utility sheets are created

PFPR
- Existing Utilities

2nd
- Proposed Utilities
  To District Utilities as soon as drainage, erosion control, bridges and walls, strain/signal poles, construction limits are ready

FFPR
- Final Plans
  REIMBURSABLE ESTIMATE

Final
- Final utility plans back to Project Manager 5 months before FFPR
Utility Roadway Designer Training
Introduction

Background

- Role of Utilities Offices
  - Front line of defense
  - District Office Contacts (see handout)

http://www.dot.ga.gov/PS/Utilities

- General Office Org Chart (See handout)
  This is currently not on the website
Utility Roadway Designer Training

Part 1 – Identifying Above Ground and Below Ground Utilities
Utility Roadway Designer Training
Part 1 – Identifying Above Ground and Below Ground Utilities
Utility Roadway Designer Training
Part 1 – Identifying Above Ground and Below Ground Utilities

Obtaining Existing Utilities (utility first submission letter – existing mark-ups)

Steps...

• Send plans to GDOT PM/District Utility Office
• Overhead and Underground are different
• District Utilities Office or Locals – will receive marked plans
• District Utility Office returns marked plans to designers (30-120 days)
Utility Roadway Designer Training
Part 1 – Identifying Above Ground and Below Ground Utilities

Obtaining Existing Utilities (mark-ups) continued...

- Transfer info. to plans (electronic or hard copy)
- Correlate to above ground surveyed features

➤ General location of major utilities

- Understand utility “lingo” – use professional engineering judgment when transferring record information
Utility Roadway Designer Training
Part 1 – Identifying Above Ground and Below Ground Utilities

Obtaining Existing Utilities (mark-ups) continued...

• Size and Type of major utilities
• Cost to move major utilities (could impact alignment)
• Traditional engineering practice
• Concept Development (PDP)
• First submission

Follow up - it is ultimately the designers responsibility to make sure existing utilities get on the plans and are shown correctly
Utility Roadway Designer Training
Part 1 – Identifying Above Ground and Below Ground Utilities

Site Visit/Field Review

• Emphasize a site visit focused only on utilities in the Concept Development Phase (see Risk Registry)

• Understand features and what lies beneath
• Bring required tools
• Open MHs and vaults if possible (what are you looking for?)
  ➢ Telephone
  ➢ Water
  ➢ Electric
• Identify utility poles and their attachments
• Gravity Sanitary Sewer-inverts and flow direction
• Appurtenances (cabinets, lift stations, transformers, etc.)
Utility Roadway Designer Training
Part 1 – Identifying Above Ground and Below Ground Utilities

Site Visit/Field Review
## Utility Roadway Designer Training
### Part 1 – Identifying Above Ground and Below Ground Utilities

<table>
<thead>
<tr>
<th>Color</th>
<th>Proposed Excavation</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>Temporary survey markings</td>
</tr>
<tr>
<td>Fluorescent Pink</td>
<td>Electric power lines, cables, conduit and lighting cables</td>
</tr>
<tr>
<td>Red</td>
<td>Gas, oil, steam, petroleum or gaseous materials</td>
</tr>
<tr>
<td>Yellow</td>
<td>Communication, alarm or signal lines, cables or conduit</td>
</tr>
<tr>
<td>Orange</td>
<td>Potable water</td>
</tr>
<tr>
<td>Blue</td>
<td>Reclaimed water, irrigation and slurry lines</td>
</tr>
<tr>
<td>Purple</td>
<td>Sewers and drain lines</td>
</tr>
<tr>
<td>Green</td>
<td></td>
</tr>
</tbody>
</table>
Utility Roadway Designer Training
Part 1 – Identifying Above Ground and Below Ground Utilities
Utility Roadway Designer Training
Part 1 – Identifying Above Ground and Below Ground Utilities

• Check record information vs. what's in the field
  1. Look for evidence of underground utilities. Usually identified by physical appurtenances (markers, MHs, meters, valves, fire hydrants, etc.)
     • Example 1. If records show 2 water lines look for physical appurtenances such as fire hydrants, water valves or water meters
     • Example 2. If records don’t show gas lines and you see gas meters or test stations a question should be raised.

• In Summary...get out from behind your desk and visit the field.
• Take advantage of the District Utility Office (DUO)
Concerns

- Multiple facilities shown as a single line
- Records provided are “as-designed” not “as-built”
- Roads change – records most likely don’t
- Facilities are discovered at time of construction, resulting in additional costs associated with damages, construction delays, relocations and/or engineering re-designs

A study performed by the Center of Innovative Technology in Virginia documented errors of more than 90% and 25% omissions.
This is what happens when existing utilities are not identified accurately

- Gas line damages
Utility Roadway Designer Training

10 Minute Break
Utility Roadway Designer Training

Part 2 – Understanding the Cost Differences
Utility Roadway Designer Training
Part 2 – Understanding the Cost Difference

- Pole with no attachments vs poles with a lot of attachments
Utility Roadway Designer Training
Part 2 – Understanding the Cost Difference

• Distribution vs Transmission

• Other Attached Utility Owners
• NESC requirements
• Clear Zone
• Relocation Time
• Easement Acquisition
• No yearly relocation limitations
• Relocation Costs $20,000 - $40,000
Utility Roadway Designer Training
Part 2 – Understanding the Cost Difference

• Distribution vs Transmission

• Other Attached Utility Owners
• NESC requirements
• Clear Zone
• Relocation Time
• Easement Acquisition
• Seasonal Limitations
• Extended Coordination
• Self-Supporting
• Relocation Costs $80,000 – $100,000
Distribution vs Transmission

- Easement acquisition for each pole can be from 30’ for distribution poles and up to 250’ for transmission poles
Utility Roadway Designer Training
Part 2 – Understanding the Cost Difference

• What’s exactly on the pole?
• How much space does each level need?
• What’s the hierarchy?
Utility Roadway Designer Training
Part 2 – Understanding the Cost Difference

• What’s exactly on the pole?
• How much space does each level need?
• What’s the hierarchy?
• Pedestrian heights vs. vehicle heights
Utility Roadway Designer Training
Part 2 – Understanding the Cost Difference

• Pedestal vs Cabinet
Utility Roadway Designer Training
Part 2 – Understanding the Cost Difference

• Telephone Copper Pairs

300 Pair

1500 Pair
Utility Roadway Designer Training
Part 2 – Understanding the Cost Difference

• Fiber Optic Cables

  • Limited Splice Points for Fiber
  • Splicing Time differs between Copper and Fiber
  • Special Circuits and Service Considerations
  • Higher Replacement Costs
Utility Roadway Designer Training
Part 2 – Understanding the Cost Difference

- Underground Vaults (usually identified by MHs). Don’t just look at the MH cover itself but what lies beneath.
Utility Roadway Designer Training
Part 2 – Understanding the Cost Difference

- Underground Vaults (usually identified by MHs). Don’t just look at the MH cover itself but what lies beneath.
Utility Roadway Designer Training
Part 2 – Understanding the Cost Difference

- Underground Vaults (usually identified by MHs). Don’t just look at the MH cover itself but what lies beneath.
Utility Roadway Designer Training
Part 2 – Understanding the Cost Difference

- Underground Vaults (usually identified by MHs). Don’t just look at the MH cover itself but what lies beneath.
Utility Roadway Designer Training
Part 2 – Understanding the Cost Difference

What lies beneath?

Gas Regulator

Water Vault
Utility Roadway Designer Training
Part 2 – Understanding the Cost Difference

What lies beneath?
Utility Roadway Designer Training
Part 2 – Understanding the Cost Difference

What lies beneath?

Gas Regulator

Water Vault
Utility Roadway Designer Training
Part 2 – Understanding the Cost Difference

Price per ft. of certain utilities and types (furnished and installed)

<table>
<thead>
<tr>
<th>Telecom Facility</th>
<th>Size (inches)</th>
<th>Spot Adjustment Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>200 Pair</td>
<td>$2.78/ft.</td>
</tr>
<tr>
<td>Copper</td>
<td>400 Pair</td>
<td>$5.51/ft.</td>
</tr>
<tr>
<td>Copper</td>
<td>600 Pair</td>
<td>$7.89/ft.</td>
</tr>
<tr>
<td>Fiber</td>
<td>48-288 Strand</td>
<td>$1.71/ft.</td>
</tr>
<tr>
<td>Manhole (precast)</td>
<td></td>
<td>$10,000.00 - $15,000.00</td>
</tr>
<tr>
<td>Manhole (cast in-place)</td>
<td></td>
<td>$5,000.00 - $25,000.00</td>
</tr>
<tr>
<td>Cabinet</td>
<td></td>
<td>$25,250.00</td>
</tr>
<tr>
<td>Pedestal</td>
<td></td>
<td>$2,250.00</td>
</tr>
<tr>
<td>Site Relocation</td>
<td></td>
<td>$25,000.00 - 1,000,000.00</td>
</tr>
<tr>
<td>Buried Cable (trenching)</td>
<td></td>
<td>$5.00 - 7.00</td>
</tr>
<tr>
<td>Buried Cable (boring)</td>
<td></td>
<td>$12.00 - 100.00</td>
</tr>
<tr>
<td>Aerial Cable</td>
<td></td>
<td>$8.00 - 10.00</td>
</tr>
<tr>
<td>Engineering Rate</td>
<td></td>
<td>$50.00 - 100.00/hr</td>
</tr>
<tr>
<td>Construction Rate</td>
<td></td>
<td>$100.00 - 250.00/hr</td>
</tr>
</tbody>
</table>

*Please remain seated until the ride has come to a complete stop. These prices are educational purposes and based on current information, this is not a guarantee of cost for services. Prices are based on availability and are subject to change without notice.*
### Utility Roadway Designer Training
#### Part 2 – Understanding the Cost Difference

- **Price per ft. of certain utilities and types (furnished and installed)**

<table>
<thead>
<tr>
<th>Facility</th>
<th>Size (inches)</th>
<th>Type</th>
<th>Cost per foot</th>
<th>Spot Adjustment Cost</th>
<th>Hot Tap Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas</td>
<td>2</td>
<td>PVC</td>
<td>$55.94</td>
<td>$2,750.00</td>
<td>$5,000</td>
</tr>
<tr>
<td>Gas</td>
<td>2</td>
<td>Steel</td>
<td>$83.88</td>
<td>$5,100.00</td>
<td></td>
</tr>
<tr>
<td>Gas</td>
<td>4</td>
<td>PVC</td>
<td>$62.57</td>
<td>$4,870.00</td>
<td>$7,500</td>
</tr>
<tr>
<td>Gas</td>
<td>4</td>
<td>Steel</td>
<td>$89.63</td>
<td>$6,900.00</td>
<td></td>
</tr>
<tr>
<td>Gas</td>
<td>6</td>
<td>PVC</td>
<td>$78.75</td>
<td>$5,560.00</td>
<td>$12,000</td>
</tr>
<tr>
<td>Gas</td>
<td>6</td>
<td>Steel</td>
<td>$100.35</td>
<td>$9,300.00</td>
<td></td>
</tr>
<tr>
<td>Gas</td>
<td>8</td>
<td>PVC</td>
<td>$97.32</td>
<td>$6,870.00</td>
<td>$20,000</td>
</tr>
<tr>
<td>Gas</td>
<td>8</td>
<td>Steel</td>
<td>$115.97</td>
<td>$10,300.00</td>
<td></td>
</tr>
<tr>
<td>Gas</td>
<td>12</td>
<td>PVC</td>
<td>$106.21</td>
<td>$8,250.00</td>
<td>$30,000</td>
</tr>
<tr>
<td>Gas</td>
<td>12</td>
<td>Steel</td>
<td>$122.23</td>
<td>$12,250.00</td>
<td></td>
</tr>
</tbody>
</table>

- Regulator Station - $75,000
Utility Roadway Designer Training
Part 2 – Understanding the Cost Difference

- Price per ft. of certain utilities and types (furnished and installed)

<table>
<thead>
<tr>
<th>Facility</th>
<th>Size (inches)</th>
<th>Cost per foot</th>
<th>Spot Adjustment cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>6  PVC</td>
<td>$75.00</td>
<td>$6,000.00</td>
</tr>
<tr>
<td>Water</td>
<td>6  DIP</td>
<td>$97.42</td>
<td>$11,000.00</td>
</tr>
<tr>
<td>Water</td>
<td>8  PVC</td>
<td>$95.00</td>
<td>$9,000.00</td>
</tr>
<tr>
<td>Water</td>
<td>8  CI</td>
<td>$108.35</td>
<td>$13,500.00</td>
</tr>
<tr>
<td>Water</td>
<td>8  DIP</td>
<td>$110.40</td>
<td>$16,250.00</td>
</tr>
<tr>
<td>Water</td>
<td>12 PVC</td>
<td>$106.00</td>
<td>$14,000.00</td>
</tr>
<tr>
<td>Water</td>
<td>12 CI</td>
<td>$115.65</td>
<td>$18,750.00</td>
</tr>
<tr>
<td>Water</td>
<td>12 DIP</td>
<td>$122.67</td>
<td>$22,000.00</td>
</tr>
<tr>
<td>Water</td>
<td>24 PVC</td>
<td>$118.76</td>
<td>$20,000.00</td>
</tr>
<tr>
<td>Water</td>
<td>24 CI</td>
<td>$125.24</td>
<td>$24,250.00</td>
</tr>
<tr>
<td>Water</td>
<td>24 DIP</td>
<td>$132.87</td>
<td>$27,000.00</td>
</tr>
</tbody>
</table>
Utility Roadway Designer Training
Part 2 – Understanding the Cost Difference

• Price per ft. of certain utilities and types (furnished and installed)

<table>
<thead>
<tr>
<th>Facility</th>
<th>Size (inches)</th>
<th>Cost per foot</th>
<th>Spot Adjustment cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>30 PVC</td>
<td>$122.70</td>
<td>$23,500.00</td>
</tr>
<tr>
<td>Water</td>
<td>30 CI</td>
<td>$138.95</td>
<td>$32,650.00</td>
</tr>
<tr>
<td>Water</td>
<td>30 DIP</td>
<td>$152.00</td>
<td>$35,000.00</td>
</tr>
<tr>
<td>Water</td>
<td>36 PVC</td>
<td>$157.89</td>
<td>$38,500.00</td>
</tr>
<tr>
<td>Water</td>
<td>36 DIP</td>
<td>$172.45</td>
<td>$57,000.00</td>
</tr>
<tr>
<td>Water</td>
<td>48 PVC</td>
<td>$166.55</td>
<td>$54,500.00</td>
</tr>
<tr>
<td>Water</td>
<td>48 DIP</td>
<td>$183.93</td>
<td>$62,000.00</td>
</tr>
<tr>
<td>Water</td>
<td>60 PVC</td>
<td>$174.11</td>
<td>$58,750.00</td>
</tr>
<tr>
<td>Water</td>
<td>60 DIP</td>
<td>$202.44</td>
<td>$74,000.00</td>
</tr>
<tr>
<td>Meter Vault</td>
<td></td>
<td></td>
<td>$25,000 each</td>
</tr>
</tbody>
</table>
Utility Roadway Designer Training

10 Minute Break
Utility Roadway Designer Training

Part 3 – Conflict Resolution
Conflict Identification

1. How sure are we of the conflict and its resolution?
2. What appears to be a conflict on paper may not be a conflict in reality.

- Need good utility data
- Need proposed design
- Evaluate the complete plans
- Understanding of utility costs
Potential Conflicts

1. Determine actual location \((x, y \text{ and } z)\)
2. DUE and Utility Owners
3. Resolve conflict
   - Not a conflict
   - Redesign
   - Relocate
4. Revise plans
   * Bottom line...take responsibility!
Utility Roadway Designer Training
Part 3 – Conflict Resolution

Where to find guidance

- Utilities Accommodation Manual Chapter 4 & 5
- Risk Registry
- PDP – use as a guideline on any project
- DUE
- Utility owners
  - Examples
    - Gas line clearances and blasting
    - Transmission line clearances
    - Utility separation clearances (from other utilities)
    - Bridge footings vs. proposed utilities
Utility Roadway Designer Training
Part 3 – Conflict Resolution

Conflicts are not just for design

Constructability Issues – what is the zone of influence?

- Transmission/Distribution clearance at bridge structures; placement of cranes
- Utilities being retained near proposed storm drainage; width of trenches
- Rock Blasting needed for project; gas facilities
- Bridge footings and walls; Size of excavation to install
- Installation of traffic signal poles; separation from power lines
- Permanent Easements for the construction and maintenance of slopes to purchase the right to place utilities

Bottom Line: Look for these type of issues and coordinate with the subject matter experts.
Zone of influence not very noticeable
Utility Roadway Designer Training
Part 3 – Conflict Resolution
Utility Roadway Designer Training
Part 3 – Conflict Resolution

Mse wall + tie back straps
Mse wall + Tie back straps + shoring (or sloped embankment)
Utility Roadway Designer Training
Part 3 – Conflict Resolution
Utility Roadway Designer Training

Part 4 – Coordination
Common Goal...to minimize impacts and disruptions in service and delivering projects in a timely manner.

The single, most important tool in your bag...

**Relationships**

- Face to face
- Early and often
- Ownership
- Educate
- Team

Each owner will most likely have their own agenda/schedule so it is important to win them over. Win their trust and win the project.
Utility Roadway Designer Training
Part 4 – Coordination

Proper Coordination – Best Practices

- Early and often
- Remember the 4-C’s
  1. Coordination
  2. Communication
  3. Cooperation
  4. Commitment

Coordination + Communication = Cooperation
Cooperation = Commitment
Commitment = Success!
Utility Roadway Designer Training
Part 4 – Coordination

• PID?
  Public Interest Determination

• Consumer responsibility
  The rate/tax payer pays

• District Utilities Office
Utility Roadway Designer Training
Part 4 – Coordination

Fieldwork

• Understand transmission vs. distribution
Utility Roadway Designer Training
Part 4 – Coordination

• Understand size difference
  1. Electric-single phase vs. 3 phase
  2. Telecom-pairs vs. fiber optic, duct banks vs. single runs
  3. Gas-low pressure vs. High pressure
General sequence of events

• First Utility Submission
• Second Utility Submission
• Bridge Utility Accommodations – Utility Attachments Known Early
• Conflict Resolution
• Utility Agreements
• Sign off and Certification
Improper coordination results in...

- Project Delays
- Damage to Utility Facilities
- Reduced Safety for Workers and Public
- Redesign Costs
- Higher Bids
- Change Orders
- Unnecessary utility relocations
Improper coordination results in...cont.

- Extra Work Orders
- Construction Claims
- Higher Insurance Costs
- Higher Financial Costs
- Traffic Detours
- Negative Publicity
Bad coordination results in…
Summary

- Negotiate hours for utilities
- ID utilities
- Understand basic utility costs
- ID and resolve conflicts
- Coordinate
  - 4-Cs
  - communicate early and often
  - Build relationships
- District Utility Office
There are worse things to deal with than utilities on the job!
Questions?