GDOT Planning Level Cost Estimation Review Study

2010 ISPA/SCEA Joint Conference & Training Workshop
Jeff Carroll, Wilbur Smith Associates
San Diego, California
June 8 - 11, 2010
Agenda

• National Approach to Planning Level Cost Estimates (PLCE)
• Challenge, Solution, and Outcome
• New Processes and Procedures
• Planning Level Right-of-Way and Utility Cost Estimation Tool
• Planning Level Cost Estimation System Tool
• Equity
• Successes
National Approach to PLCE

• Prepared by planners, designers, estimators, or consultants
• NCHRP 20-7/152
  – 31 DOTs use estimating cost data to create conceptual estimates, based on historic lane-mile cost averages or square-foot cost data
  – 18 states go into greater detail and determine material quantities based on the conceptual design and use historic average unit price estimates
  – 1 state allow engineers to use any process to generate cost estimate
Planning Level Cost Estimates

• Challenges
  – The current funding environment has created a critical need to ensure that planning level cost estimates are reliable and that they are kept current based on the latest project information.

• Solution
  – Ensure planning level cost estimates are completed early in the project planning process and to provide decision-makers reliable information to prioritize and develop sound transportation programs.
GDOT Outcomes

• Planning Level Cost Estimation Handbook

• Right of Way and Utility Relocation Cost Estimate Tool (RUCEST)
  – Estimates right-of-way and utility costs based on current and proposed typical sections and known and assumed utilities

• Cost Estimation System Tool (CES©)
  – Enhanced the AASTHO TransPort© CES©, which estimates the construction costs based on the typical section using recent bid prices
New Processes and Procedures

- Standardized planning level cost estimate process, department-wide
- Reliable construction cost assumptions
- Reliable right-of-way cost assumptions
- Reliable utility relocation cost assumptions
- Reliable Preliminary Engineering cost assumptions
- Contingencies to account for project risk and uncertainty
- Improved communication between GDOT offices
What does RUCEST do for you?

• Generates and documents planning level cost estimate for Right of Way (ROW) and Utility Relocation
  – Uses database of cost items organized by counties (ROW) and DOT District (Utility)
• Creates cost sheets that can be exported to PDF or print for archival purposes
• Catalogs different cost scenarios as snapshots
Supporting Databases

• RUCEST’s Lists
  – Projects / Typical Sections
  – ROW Land Use Cost Items
    • All 159 Georgia counties have cost info for each land use type (commercial, residential, agricultural and industrial)
  – ROW Relocation and Improvement Cost Items
    – Includes cost for “takings” residences, business, and other structures
  – Utility Cost Items
    • Organized by GDOT’s 7 districts and utility types
  – Contingencies
    – Default contingency values based off recently let ROW phases projects
  – Snapshots / Documents database (attachment files)
How RUCEST works

• Use aerial imagery (GIS or Google Maps) to estimate project ROW, takes, and utility
• Complete worksheet to compile input information before starting a new Snapshot
• Enter info from worksheet into RUCEST to generate a planning level cost estimate
• Add attachment files (PDF maps of corridor)
• Finalize “snapshots” to save record in RUCEST
Complete Worksheet

• Spreadsheet developed to organize the supporting information needed to produce planning level cost estimates
• Determine primary land type and use Google measurement tool to determine the total length of the project
• Enter land type lengths under “Land Cost” into RUCEST Worksheet
• Attach worksheet to generated snapshots for documentation
Worksheet Example

BEFORE ESTIMATING KNOW THE PROJECT BEGINNING AND ENDING POINTS, SOME PROJECTS ARE JOINED BUT ARE SEPARATE PROJECTS.

Input Areas

<table>
<thead>
<tr>
<th>P.I. #</th>
<th>Estimator and Firm</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Widen SR 104 (Washington Road) from existing four-lane section near Blanchard Road to William Few Parkway - Columbia Co.</td>
<td></td>
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<tr>
<td></td>
<td>Jeff Carroll - WSA</td>
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Right of Way Estimate

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Improvements

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Relocations

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Utility Relocation

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Railroad Crossing

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<tr>
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</tbody>
</table>
Complete Worksheet

• Determine number of “Improvements” (a.k.a. takings)
  – Residential
  – Commercial
  – Misc. Small and Large Improvements
    • Monuments (signs in front of business or subdivisions)
    • Entryways (gated subdivisions with walls/fences)

• New roadway may not be symmetrical, roadway may vary to avoid structures.
Complete Worksheet (Cont.)

• Determine visible and non-visible (sub-grade) utilities may exist adjacent to the roadway

• Assumptions
  – Within City areas – assume water, sewer and gas are present.
  – Overhead power/telephone polls indicate electric/phone lines
  – Fire hydrants indicate water lines
  – Man hole covers in street indicate sewer lines
  – Assume no utilities on Interstate and HOV projects

• Estimate and measure utility relocations
  – Record as either linear feet or as counts in worksheet
RUCEST Home Page

Select County
Select Project
New Project
Project Information
Cost Snapshots
Support Documents
Creating a New Project

Before adding a new project, check to see if an estimate has already been done for the project, by searching for the PI # or look in the County of your project.

- Click on New
Creating a New Project

Title is a Required field
Use PI # if known
If no PI #, use County / Route # / project type

Once done hit “save & stop editing”

Description = Required field

Input info as available

Required field

Required field
Creating Snapshots

• Start by clicking on the “Create” hyperlink

Click on the “Create” Hyperlink to open the snapshot form
Uploading Project Attachments

• Simply follow on-screen instructions

• You can attach a title and description to uploaded documents

• Study
• Need and Purpose
• Corridor sketch
• Other study related documents
Editing Existing Snapshots

Click on Snapshot Name
### The Snapshot Form

**Create / View Cost Snapshot**

<table>
<thead>
<tr>
<th>Save</th>
<th>Save &amp; Close</th>
<th>Close (Does not SAVE form)</th>
<th>Finalize</th>
</tr>
</thead>
</table>

**CES Project ID:** 00005093  
**DOT PE Number:** 00002093  
**MPO Plan ID:**  
**Accounting Number:**

**Description:**  
SR 208 FROM SR 32 IN DOUGLAS TO CR 143 / MOSLEY ROAD  
**Primary Work Type:**  
**Sub District Number:**  
**Main County:**

**Cost Snapshot Name:** Total Amount: $0.00

**New Cost Item**

- **Type of Cost:**
- **Cost Description:**

**Typical Sections**

- **Terrain:**
- **Urbanization Level:**
- **Typical Section:**
- **Width:**

**Existing**

- **Existing:**
- **Length:**
- **Area:**

**Future**

- **Future:**
- **Length:**
- **Area:**

**Land Costs (Help)**

<table>
<thead>
<tr>
<th>County</th>
<th>Land Use</th>
<th>Type</th>
<th>Width Needed (ft)</th>
<th>Length (Miles)</th>
<th>Area in Acres</th>
<th>Cost Per Acre ($)</th>
<th>Revised Cost ($)</th>
<th>Total Cost ($)</th>
<th>Comments</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Commercial</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Land Cost SubTotal:** $0.00

**Improvement Costs (Help)**

<table>
<thead>
<tr>
<th>Improvement</th>
<th>#</th>
<th>Unit Cost ($)</th>
<th>Revised Cost ($)</th>
<th>Total Cost ($)</th>
<th>Comments</th>
<th>Justification</th>
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</thead>
<tbody>
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<td>0.00</td>
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**Improvement Cost SubTotal:** $0.00

**Relocation Costs (Help)**

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<th>Revised Cost ($)</th>
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<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0.00</td>
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<td></td>
</tr>
</tbody>
</table>

**Relocation Cost SubTotal:** $0.00

**Deductions Percentage:** 10.00%

**Total Land Deductions:** 10.00%

**Contingencies**

- **Scheduling:** 50.00%
- **Administration And Court Cost:** 50.00%

**Utility Cost Item (Help)**

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<thead>
<tr>
<th>District Utility</th>
<th>Cost Item</th>
<th>Unit Cost ($)</th>
<th>Revised Cost ($)</th>
<th>Quantity Unit</th>
<th>Total Cost ($)</th>
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</thead>
<tbody>
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**Utility Sub Total:** $0.00

**Support Documents (Help)**

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</tbody>
</table>

**Click here to attach a file**

**Add a Document**

**Save | Save & Close | Close (Does not SAVE form) | WilburSmith**

**Georgia Department of Transportation**

Presented at the 2010 ISPA/SCEA Joint Annual Conference and Training Workshop - www.iceaaonline.com
The Snapshot Form

• Project Related Information

• Snapshot Name

Fields filled automatically from “Project Details” are underlined

Snapshot “name” MUST be entered by user
The Snapshot Form

• ROW Typical Sections
  – Based on the project’s main county
  – Need to pick terrain type

Create / View Cost Snapshot

<table>
<thead>
<tr>
<th>CES Project ID: 0000293</th>
<th>GDOT PI Number: 0000293</th>
<th>MPO Plan ID:</th>
<th>Accounting Number:</th>
</tr>
</thead>
</table>

Description:
SR 206 FROM SR 32 IN DOUGLAS TO CR 143/MOSELEY ROAD

Primary Work Type: Widening
Dot District Number: 4
Main County: Coffee

Total Amount: $0.00

Row Cost Items

Typical Sections
Terrain:

<table>
<thead>
<tr>
<th>Urbanization Level</th>
<th>Typical Section</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing</td>
<td></td>
<td>ft</td>
</tr>
<tr>
<td>Future</td>
<td></td>
<td>ft</td>
</tr>
</tbody>
</table>
The Snapshot Form

- **ROW Land Costs**
  - Organized by county
  - Select land use type
  - Enter length (miles)
  - "Width Needed" defaults to typical sections difference
  - If needed, revise cost per acre; Approval needed and you must justify and document your reason

<table>
<thead>
<tr>
<th>County</th>
<th>Land Use Type</th>
<th>Width Needed (ft)</th>
<th>Length Miles</th>
<th>Area In Acres</th>
<th>Cost Per Acre($)</th>
<th>Revised Cost($)</th>
<th>Total Cost($)</th>
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<tr>
<td>Barrow</td>
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<td>60.00</td>
<td>3.76</td>
<td>30.46</td>
<td>20,000.00</td>
<td></td>
<td>729,212.12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Presented at the 2010 ISPA/SCEA Joint Annual Conference and Training Workshop - www.iceaaonline.com*
The Snapshot Form

• Improvements Costs
  – Use imagery to identify takes
  – Pick category from drop-down list
  – Enter number of units
  – If needed, revise cost
The Snapshot Form

- Relocation costs
  - Determine number of residential or commercial buildings that need to be taken
  - If needed, revise cost

---

<table>
<thead>
<tr>
<th>Relocation Costs</th>
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</tr>
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</table>

**IMPORTANT:** There should be the same number of residential/commercial relocations as residential/commercial improvements. Relocation costs should be included with all takes, as the user should not assume a property is vacant. In other words, if you have 10 residential improvements (full takes) you would also have 10 residential relocations.
The Snapshot Form

- Contingency percentages
  - RUCEST includes contingency defaults
    - “Damages Cost Percentage” – 30 percent
    - “Scheduling Contingency” – 55 percent
    - “Administration and Court Cost Contingency” – 60 percent

<table>
<thead>
<tr>
<th>Contingency Percentages</th>
<th>Contingency Amounts</th>
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<tr>
<td>Damages Cost Percentage</td>
<td>Total: $1,946,181.82</td>
</tr>
<tr>
<td>(Land + Improvement + Relocation) Damages Cost</td>
<td>Damages Cost: $583,854.55</td>
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<tr>
<td>Contingencies Scheduling</td>
<td>Contingency Cost: $1,070,400.00</td>
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<tr>
<td>Administration And Court Cost</td>
<td>Contingency Cost: $1,167,709.09</td>
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<tr>
<td>Administration And Court Cost</td>
<td>Total: $4,768,145.46</td>
</tr>
</tbody>
</table>
The Snapshot Form

• Utility Costs
  – Identify items using maps and enter on the worksheet
  – Field visit checklist
  – Add items into RUCEST, cost based on DOT District
  – If needed, revise cost per acre; Approval needed and justify/document reason
  – The contingency is applied to the sub total (defaults to 50%)
The Snapshot Form

• Supporting Documents
  – Can be attached to the snapshot

• Printing Snapshots
  – Use the print view button on the top left of the form
  – Formatted for better printer output & Print to PDF

• Saving and Close
  – Provided at both the top and bottom of the form
  – Save early save often
The Snapshot Form

- **Finalize Snapshot**
  - Locks estimate forever and prevents users from changing it
  - Planner must attach the RUCEST worksheet and all other assumptions and documents
  - Check the Finalize checkbox and click “Save & Close”
What does CES do for you?

• Generates planning level estimates for Construction costs using pre-made project templates
• Template uses predetermined Cost Groups info to calculate planning level cost estimate based on the project length and the typical section
  – Uses historical bid tab data (3 year window) and updated each quarter
• Provides contingency percentages for unknowns
• Documents all planning level assumptions in an attached text file
### Project Type Templates available

<table>
<thead>
<tr>
<th>Auxiliary lanes</th>
<th>Passing lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridges</td>
<td>Ramps</td>
</tr>
<tr>
<td>Frontage roads</td>
<td>Roadway (new alignment)</td>
</tr>
<tr>
<td>HOV lanes</td>
<td>Roundabouts</td>
</tr>
<tr>
<td>Median work</td>
<td>Sidewalks</td>
</tr>
<tr>
<td>Multi-use Trail</td>
<td>Turn lanes</td>
</tr>
<tr>
<td>Park and Ride Lots</td>
<td>Widening Projects</td>
</tr>
</tbody>
</table>

**Note:** Some projects can be completed by running multiple templates above.
The way it works

• Research project description (logical termini, typical section needed)

• Use aerial imagery (Google Maps) to confirm
  – Project Length
  – Existing section
  – Urban/rural
  – Proposed improvements
    • Primary work type (i.e. widening, new roads)
    • Secondary work type (i.e. bridges)
The way it works (cont.)

• Select appropriate template in CES
  — Primary Project template (required)
  — Secondary template (add as needed)
• Enter appropriate project length and width
• Enter secondary items as appropriate
  — Traffic Signals, Turn Lanes, Major Intersections.
  — Document all assumptions for planners and designers to review your cost assumptions
Step 1 in CES Process

- Highlight (single click) the appropriate template

<table>
<thead>
<tr>
<th>Job Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLAN_BRG_WID_RD</td>
<td>PLANNING_TEMP_BRIDGE WIDENING OVER ROAD</td>
</tr>
<tr>
<td>PLAN_BRG_WID_RR</td>
<td>PLANNING_TEMP_BRIDGE WIDENING OVER RAILROAD</td>
</tr>
<tr>
<td>PLAN_BRG_WID_W</td>
<td>PLANNING_TEMP_BRIDGE WIDENING OVER WATER</td>
</tr>
<tr>
<td>PLAN_INT_WIDE_1</td>
<td>PLANNING_TEMP_INTERSTATE WIDENING RURAL ASPHALT</td>
</tr>
<tr>
<td>PLAN_INT_WIDE_2</td>
<td>PLANNING_TEMP_INTERSTATE WIDENING RURAL CONCRETE</td>
</tr>
<tr>
<td>PLAN_INT_WIDE_3</td>
<td>PLANNING_TEMP_INTERSTATE WIDENING URBAN ASPHALT</td>
</tr>
<tr>
<td>PLAN_INT_WIDE_4</td>
<td>PLANNING_TEMP_INTERSTATE WIDENING URBAN CONCRETE</td>
</tr>
<tr>
<td>PLAN_NEW2LANE_R</td>
<td>PLANNING_TEMP_NEW ALIGNMENT 2 LANE RURAL</td>
</tr>
<tr>
<td>PLAN_NEW2LANE_U</td>
<td>PLANNING_TEMP_NEW ALIGNMENT 2 LANE URBAN</td>
</tr>
<tr>
<td>PLAN_NEW4LNFM_R</td>
<td>PLANNING_TEMP_NEW ALIGNMENT 4LN 14FT FLUSH MEDIAN RURAL</td>
</tr>
<tr>
<td>PLAN_NEW4LNFM_U</td>
<td>PLANNING_TEMP_NEW ALIGNMENT 4LN 14FT FLUSH MEDIAN URBAN</td>
</tr>
<tr>
<td>PLAN_NEW4LN3M_R</td>
<td>PLANNING_TEMP_NEW ALIGNMENT 4LN 44FT DEPRESSED MEDIAN RURAL</td>
</tr>
<tr>
<td>PLAN_NEW4LN3M_U</td>
<td>PLANNING_TEMP_NEW ALIGNMENT 4LN 44FT DEPRESSED MEDIAN URBAN</td>
</tr>
<tr>
<td>PLAN_NEW4LNRM_R</td>
<td>PLANNING_TEMP_NEW ALIGNMENT 4LN 24FT RAISED MEDIAN RURAL</td>
</tr>
<tr>
<td>PLAN_NEW4LNRM_U</td>
<td>PLANNING_TEMP_NEW ALIGNMENT 4LN 24FT RAISED MEDIAN URBAN</td>
</tr>
<tr>
<td>PLAN_NONINTWID</td>
<td>PLANNING_TEMP_NON-INTERSTATE WIDENING RAISED MEDIAN RURAL</td>
</tr>
<tr>
<td>PLAN_NONINTWID2</td>
<td>PLANNING_TEMP_NON-INTERSTATE WIDENING RAISED MEDIAN URBAN</td>
</tr>
<tr>
<td>PLAN_NONINTWID3</td>
<td>PLANNING_TEMP_NON-INTERSTATE WIDENING RAISED MEDIAN URBAN</td>
</tr>
</tbody>
</table>
Step 2 in CES Process

- Double-click on selected project

Your new CES file
(1) Select appropriate county, urban/rural, and District

(2) Add length based on measurement from Google maps

(3) Add width based on assumptions in attachment text file

(4) Confirm contingency and document paving cost
Select appropriate GDOT District

<table>
<thead>
<tr>
<th>District</th>
<th>Engr</th>
<th>Office Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>71100</td>
<td>DE01</td>
<td>P. O. BOX 1057</td>
</tr>
<tr>
<td>72200</td>
<td>DE02</td>
<td>P.O. BOX 8</td>
</tr>
<tr>
<td>73300</td>
<td>DE03</td>
<td>115 TRANSPORTATION BLVD.</td>
</tr>
<tr>
<td>74400</td>
<td>DE04</td>
<td>710 WEST 2ND STREET</td>
</tr>
<tr>
<td>75500</td>
<td>DE05</td>
<td>204 HWY 301 NORTH</td>
</tr>
<tr>
<td>76600</td>
<td>DE06</td>
<td>P.O. BOX 10</td>
</tr>
<tr>
<td>77700</td>
<td>DE07</td>
<td>5025 NEW PEACHTREE RD, NE</td>
</tr>
</tbody>
</table>
(1) Click on Cost Groups Tab

(2) Highlight each row with Calculation Rule – NORM
   Note: There are only 2 rows with NORM calculation rates
   Click the “$” button at the top (Step 3), then repeat for the next row with a NORM calculation rate

(3) Click on $ to calculate accurate price
Complete Items Tab

(1) Click on Items Tab

Important: CES automatically calculates curb and gutter, sidewalks, and raised medians.

Look for “MISC ITEMS” with *** (asterisks in the comment field) in those Rows - Enter the number of Traffic Signals, Right Turn Lanes, Left Turn Lanes, and Intersecting State Routes along the project corridor. Just enter a Quantity #, a planning level cost for each item is already computed for you.
Traffic Signals within Project

• Enter the number of signals to be replaced or added under Quantity under items tab
• $125,000 is the cost per traffic signal
• List all traffic signal locations in text file
Turn Lanes within Project

• Enter the number of right and left turn lanes in the Quantity Column
• List all assumed locations in Text File
Intersecting State Routes

• Enter the number of Intersections with Intersecting State Routes (where SR meets your project corridor).
• Enter # into the Quantity Column
• List all assumed locations in Text File
Complete Primary Project Estimate

• Once complete with items go back to Main CES page and Note the final cost in the bottom right corner.

• **Confirm** contingency percent:
  – 15% Rural
  – 30% Urban Arterial Projects (non-interstates)
  – 45% Urban HOV, Interchange, Interstate Widening projects

• Document final cost of the primary project in Text file

• Note secondary projects (i.e. bridges, etc.) have not been accounted for yet

• Once estimate is finalized, create a snapshot
Secondary Project - Bridges

• For planning purposes, bridges are typically part of the widening project

• In Main CES job list, select appropriate Bridge template
  – New or Replacement Bridge
  – Bridge Widening
Implementation

• All planning level cost estimates included in GDOT programs must now go through this process

• New tools, processes and procedures have been implemented with the Department and are being used by internal staff, MPOs, and consultants
Equity

• Provides GDOT with detailed information on project costs:
  – 13 congressional districts
  – 7 GDOT districts
  – 15 MPOs

• Geographical information provides valuable information for developing compliant and equitable transportation programs
GDOT Successes

• Provides a systematic process to complete and update cost estimates
• Provides senior management confidence in the cost estimates
• Stabilizes the GDOT transportation programs
• Provides reliable information to the public
• Integrates planning level cost process with planning, engineering, right-of-way, and utility offices
• Right-of-way and Utility Offices using tools for more advanced cost estimation
• GDOT, MPOs and consultants are using the tools
Questions and Comments?
Contact Information

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jcarroll@wilbursmith.com