GDOT Planning Level Cost Estimation

Risk Based Peer Exchange

GDOT Office of Planning

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Planning Level Cost Estimation

- Cost Estimation at the Planning Level
  - The current funding environment has created a critical need to ensure planning level cost estimates are both accurate and current
  - Federal / State / Local funding requires estimates to be accurate to assist with spending prioritization
  - Need to identify and account for project risks as early as possible (during the planning stage).

Previous Planning Level Cost Estimation Process

- Prior to GDOT's Planning Level Cost Estimation Study (2010) the methods of Planning Level Cost estimation were to perform the following...
    - Determine Project type to be estimated
    - Locate a similar project in the vicinity
    - Review the previous estimates (PE, ROW, CST)
    - Calculate a per-mile estimate based off the previous project's estimate and then apply it to the new project

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Previous Planning Level Cost Estimation Process

- Drawbacks of previous methods:
    - Little contingency was considered
    - Project cost vary by geographic location
    - Potential environmental impacts are unknown
    - Did not take into account any changes in design standards that occurred over time
    - Scope creep
    - Lack of Documentation of planning assumptions

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Cost Estimation Tools

- GDOT has developed 2 software tools that are unique to Georgia that have standardize planning level cost estimation.
  - **Cost Estimation System (CES)**
    - AASHTO software product tailored to GDOT Planning
    - Estimates CST & PE phases
  - **Right of Way and Utility Relocation Cost Estimate Tool (RUCEST)**
    - Tool created by GDOT

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Cost Estimation System (CES) Planning version

- CES generates planning level estimates for Construction costs using pre-made project "templates"
- Since detailed quantities are unknown at the planning stage, each template breaks the various bid-items into known and unknown categories
- Examples of known bid-items: Pavement, Earthwork, Erosion Control, Traffic Control, Signing & marking.
- CES templates calculate the items we know will be included in a project based on the project's type and typical section

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Cost Estimation System (CES) Planning version
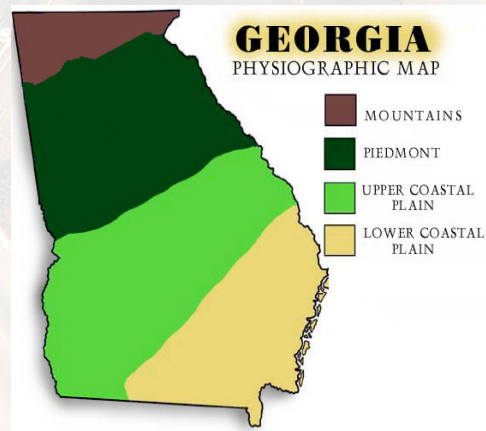
- Templates use built-in contingency factors to capture the remaining <u>unknown</u> items to account for risk and uncertainty found later in scoping, concept developing, and environmental review.

- Examples of unknown items: concrete walls, culverts, landscaping, lighting, etc.)

- Urban Area templates already have default assumption built-in to assume curb & gutter and bike/ped facilities

- CES allows user to add secondary project items (bridges, traffic signals, turn lanes, etc.) as needed.

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Cost Estimation System (CES) Planning version

Geographic regions built-in to software to account for typography and cost based on those regions and different contingencies are used in various areas to account for risk and uncertainty.

GEORGIA PHYSIOGRAPHIC MAP

- MOUNTAINS
- PIEDMONT
- UPPER COASTAL PLAIN
- LOWER COASTAL PLAIN

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Project Templates created

•Auxiliary lanes	•Passing lanes
•Bridges	•Ramps
•Frontage roads	•Roadway (new alignment)
•Intersection Imp.	•Roundabouts
•Managed lanes	•Sidewalks
•Median work	•Turn lanes
•Multi-use Trail	•**Widening Projects**
•Park and Ride Lots	

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Summary of information needed to generate a planning level cost estimate...

- Items needed by planner to create an estimate:
  - Project: Length, Location, Typical Section, Alignment
  - Any secondary projects (Bridges, turn lanes, etc.)
  - Any notable environmental impacts (GIS)
  - ROW impacts or displacements
  - Utility Relocations

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CES Project Screen

CES Cost Groups Screen

PE Estimation

- Developing Preliminary Engineering Estimate
    - PE currently = 8% of CST cost estimate total

    - If project has notable environmental issues will increase PE from 8% to 10%

ROW & Utility Estimating Tool (RUCEST)

- Risk is also associated in ROW and Utility Relocation as there are additional unknowns
- Challenges involved with ROW and Utility Estimating during the planning stage:
    - Land Values vary
    - Unknown Acquisition Cost (ex. Court cost)
    - How much ROW is needed for projects
    - Determining # of displacements / relocations
    - Determining location of Sub-Grade Utilities

RUCEST- ROW & Utility Estimating Tool

- Improvements RUCEST system has provided:
  - Land Value Cost for all 159 counties in Georgia
  - Assumptions on how much ROW is needed
  - Relocation cost of homes/businesses
  - Contingency cost assumptions for Damages, Administrative, Court Cost.
  - Cost assumptions for all utility items (electric, water, sewer, gas, telecom, railroad, etc.)
    - Utility contingency is 50%

Benefits of GDOT Planning Level Cost Estimation Process…

- Generate estimates that decision makers can use during the planning stage to make informed decisions on how and when a project should move forward.
- Standardized the process across various offices and agencies.
- Software assists our MPO planning partners in the updating of their financially constrained LRTPs.
- New software tools have yielded more conservative results, but have helped GDOT get cost estimates to a better starting point
- Allows GDOT to maximize our resources accordingly by managing cost and risk factors

GDOT Planning Level Cost Estimation General Lessons Learned

- Successes
  - Better review of external partners deliverables that include cost estimates
    - MPO LRTP
    - Consultant deliverables
  - Done in-house - Improved creditability by executive management

GDOT Planning Level Cost Estimation General Lessons Learned

- Accuracy
  - Run test estimates on recently let projects
  - Additional test involve 2-3 staff members run same estimate
  - Documentation improved
  - Estimates reviewed by SME within Planning office

GDOT Planning Level Cost Estimation General Lessons Learned

- Challenges
  - Expertise of software tool users is limited
    - Knowledge retention / Limited training
    - Takes repeated and regular use of software to master
    - Should have dedicated 2-3 SME's.
  - Technical Issues of external (non-GDOT) users
  - No metrics to measure success
  - No independent review or tracking cost as they move forward

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Questions?

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RUCEST Screenshot
Land Value (example)

Typical Sections

Terrain: Rolling

	Urbanization Level	Typical Section		Width	
Existing	Rural	2 Lanes with 24 feet Pavement		60	ft
Future	Rural	4 lanes with 44 feet grassed median		200	ft

Land Costs(help)

County	Land Use Type	Width Needed (ft)	Length Miles	Area in Acres	Cost Per Acre($)	Revised Cost($)	Total Cost($)	Comments	Justification
Macon	Agricultural	140.00	3	50.91	10,000.00		509,090.91		-
Macon	Residential	140.00	1	16.97	50,000.00		848,484.85		-
Macon	Commercial	140.00	.25	4.24	125,000.00		530,303.03		-
Macon	Industrial	140.00	.25	4.24	15,000.00		63,636.36		-

Add a Land Item

Last Updated Dates: 3/28/2008,3/28/2008,3/28/2008,3/28/2008

Total Length: 4.50 mile(s)

Land Cost SubTotal : **$1,951,515.15**

RUCEST Screenshot
(Utility example)

Utility Cost Items(help)

Contingency: 50.00 %

District	Utility Type	Cost Item	Unit Cost ($)	Revised Cost($)	Quantity	Unit	Total Cost($)
2	Water	8 inch ductile iron water line	150.00		5,280		792,000.00
2	Electrici	Power Poles	7,000.00		25		175,000.00
2	Gas	2 inch steel gas main (local govt)	35.00		5,280		184,800.00
2	Telepho	Buried telephone copper cable (bored	16.00		5,280		84,480.00
2	Sewer	6 inch and 8 inch PVC sewer lines (g	75.00		5,280		396,000.00
2	Two-Lar	1 RR track warning devices, 2 lane ro	187,500.00		1		187,500.00

Add a Utility Item

Last Updated Dates: 4/4/2008,4/4/2008,4/4/2008,4/4/2008,4/4/2008,4/4/2008

SubTotal : $1,819,780.00

Contingency SubTotal : $909,890.00

Utility Sub Total : **$2,729,670.00**