Transportation Estimator Association Nicole Coronado, P.E.



October 19, 2022

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TxDOT.gov (Keyword: #EndTheStreakTX)

TEA Conference 2022

Cost Base vs Bid Based



	Cost Based	Bid Based			
Advantages	 More refined at identifying the cost associated with the project Takes in to account the current market Is not tied to a certain delivery method (i.e., design build vs design bid build) Inflation, escalation and market conditions can clearly be analyzed Risks are clearly identified Method is more transparent 	 Efficiently applied to design bid build projects based on statewide average bid prices Data systems are developed based on bid items for analysis Simple calculation for project managers to reference Historically practiced in the industry 			
Challenges	 Resources are limited to have a sound cost-based estimate (i.e., cost estimator vs project manager) Is it applicable for all projects? Time and effort vs advantage for small projects Access and information on the pricing and market for labor and supplies 	 Assumptions are made that the bide prices accurately reflect actual cost, risk, inflation, and escalation Quickly referenced with little knowns about location and quantity It is bid rather than a cost break down on the item and less transparent Risk are embedded in bid pricing 			

NCHRP 20-68 "US Domestic Scan Program" Domestic Scan 21-03 "Successful Approaches to Setting Project Development Budgets"

Findings, Observations, and Recommendations





Domestic Scan 21-03 "Successful Approaches to Setting Project Development Budgets"

- This scan is being conducted as a part of NCHRP Project 20-68, the "U.S. Domestic Scan Program"
- The program was requested by the American Association of State Highway and Transportation Officials (AASHTO), with funding provided through the National Cooperative Highway Research Program (NCHRP)





NCHRP 20-68 U. S. Domestic Scan Program

- The Program is a multi year project conducting 3-4 scans per year.
- Each scan is selected by AASHTO and the NCHRP 20-68 Project Panel
- Each scan addresses a single technical topic of broad interest to many state departments of transportation and other agencies
- The purpose of each scan and of Project 20-68 as a whole is to accelerate beneficial innovation by:
 - facilitating information sharing and technology exchange among the states and other transportation agencies
 - identifying actionable items of common interest



AASHTO / NCHRP U.S. Domestic Scan Program



NCHRP Panel's General Guidance to the Scan Team

- Procedures for the estimation of construction costs are well established
- Procedures for estimating costs of internal staff and external consultant services for preconstruction activities are less reliable.
 - Scope development
 - Environmental documentation
 - Site investigations
 - Preliminary engineering
 - Final design
 - Public engagement
 - Project management
- These costs can impact the ability to deliver projects within budget





NCHRP Panel's General Guidance to the Scan Team (Cont.)

- Some agencies are viewed by peers as having developed successful procedures for budgeting costs for project development
- The objective of the scan is to document the experience of these leading agencies
 - Best practices
 - Lessons learned





NCHRP Panel's General Guidance to the Scan Team (Cont.)

- Key factors to be investigated
 - How agencies address budgeting project development
 - Process for final project scope development
 - Approach to addressing pre-construction risks
 - Assessment of accuracy of budgets developed using agency practice and lessons





Scan Team

Scott Pedersen, P.E. – Team Chair Metropolitan District – Resource Engineer Minnesota Department of Transportation

Stephen Bodge, P.E. Assistant Program Manager for the Highway Program Maine Department of Transportation

Nicole Coronado, P.E. Project and Portfolio Management Team Texas Department of Transportation

Jason Garza, P.E. Associate Region Engineer of Development Michigan Department of Transportation's Bay Region Michigan Department of Transportation

Wendy Longley, P.E. Central Federal Lands Federal Highway Administration, USDOT

Dean R. Moon, P.E. Assistant State Design Engineer Washington State Department of Transportation

Albert V. Shelby, III Director of Program Delivery Georgia Department of Transportation

Carmen E.L. Swanwick. P.E. Director of Project Development Utah Department of Transportation

Dennis R. Slimmer Retired from the Kansas DOT Subject Matter Expert





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Domestic scan 21-03 Team Members' Home States and Invited States NH WA VT ME MT ND MN OR WI ID -MA SD NY MI RI WY CT IA PA NE OH NV -NJ IL IN DE UT WV CO 'MD KS VA CA (FHWA) DC MO KΥ (SME) NC ΤN 00 ОК ΑZ SC ٩ NM AR MS AL GA LA ТΧ FL . 4 [®] \bigcirc 60 HI AK 0 \bigcirc **Team Member Home State** 0 **Invited Agency State** 0 ARORA and ASSOCIATES, P.C. Consulting Engineers

Excellence

The Scan Process

- Online presentations by 13 transportation agencies
- Following the presentations, the scan team met to identify the most significant findings and recommendations
- This presentation describes many of the findings, observations, and recommendations of the scan





Summary of Findings

General

- Project development makes up a significant % of total project cost
- Nearly half of the agencies that presented information budget for the total project cost including project development costs
- A few agencies set these budgets early and stick with them
- Several agencies adjust estimates and budgets at milestones and annually





- Scope development
 - More time and effort upfront is beneficial
 - Different scoping and estimating methods based on project size and complexity
 - Use experienced staff and cross functional teams
 - Early preliminary engineering phase in certain cases
 - Occasionally scopes are not consistent with system plans





Cost estimating

- Most agencies estimate project development costs as a % of construction costs
- Several agencies use cost estimating components consisting of base cost, risk, escalation, and contingency
- Several agencies use AASHTOWare software
- A dedicated cost estimating group can improve resource capacity and consistency
- Some agencies compare final costs against initial planning estimates to improve accuracy
- D-B construction creates challenges



- Risk
 - Several agencies incorporate risk-based contingencies in estimates
 - Use of Cost Risk Assessments and workshops
 - Risk contracts
 - Schedule risk
 - Risk based estimating tools
 - Lessons learned, resources used, and ways risks were mitigated





- Dashboards/tracking
 - Several agencies use dashboards to track budgets, expenditures, and schedules
 - Many of these dashboards have been built in-house





- Tools and data systems
 - Agencies have developed tools and data systems to aid in estimating and tracking project costs
 - Several agencies plan to update or replace legacy systems





- Contractor involvement
 - Several agencies use former construction estimators or consultants for reviews
 - Challenges during rapidly changing market conditions
 - Use of contractors and independent cost estimators during design
 - Balanced portfolio of projects can lower costs





Communication

- Use a range for estimates
- Definition and meaning of terms
- Peer exchanges are beneficial





- Miscellaneous
 - Earned-value used to monitor projects
 - Change management process to focus on project delivery
 - Owner-operator mindset
 - Use of digital models
 - New tools and methods can require commitment and change





Recommendations

- Scoping/Cost estimating
 - Standard templates, data systems, and tools
 - Review statewide plans for consistency of scope
 - Early preliminary planning phase
 - Owner's scope contract
 - Use of former construction estimators or consultants
 - Sharing scoping and estimating tools with local agencies
 - Cost estimating manual and materials





- Scoping/Cost estimating (cont.)
 - Use of a flat percentage of construction cost
 - Uniform policy on escalation
 - Cost estimating programs should capture history and assumptions
 - More focus on 20% of items related to 80% of costs





- Risk
 - Risk-based contingencies to account for unknown and identified risks
 - Schedule risk analysis
 - Approach that is scalable to total project cost and/or complexity
 - Document lessons learned at closeout
 - Risk contract to develop risk registry and schedule





- Budgeting/Tracking
 - Cost of project development should be budgeted
 - Dashboards and tools to track and communicate progress
 - Actual costs compared to planning estimates
 - Change management process
 - Earned-value analysis to tie schedules and resources
 - Mindset of an owner-operator





- Tools and data systems
 - Programs and systems that "talk" with each other
 - Technology costs, data security, maintenance, and data quality
 - Updating and replacing legacy systems
- Communication
 - Peer exchanges are beneficial
 - Communicating accuracy of estimates
 - Define terms and consistently communicate





Implementation Actions

- Conferences and meetings
 - Agency, local, state, regional, and national
- Webinars, workshops, and training





Further information on this scan and the NCHRP 20-68 "U.S. Domestic Scan Program" is available at:

http://144.171.11.40/cmsfeed/TRBNetProjectDi splay.asp?ProjectID=1570

Or

http://www.domesticscan.org/



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Break – 15 minute



TEA Time Community of Practice



Cost Estimates and Risk



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Cost Estimating Dashboard

Row Labels	Bas	e Estimate	Allowances	Bisk Based Contingency	Incentives	Disincentives	Force	Accounts
2032	\$	÷	\$ 8,033,433,302		\$	÷	\$	÷
2031	\$		\$ 72,920,000				1	
2030	\$	÷	\$ 55,400,000		\$	÷	\$	÷
2029	\$	-	\$ 148,285,714		\$	-	\$	-
2028	\$	÷.	\$ 1,479,893,569		\$	÷	\$	
2027	\$	-	\$ 153,355,959		\$	-	\$	-
2026	\$	÷	\$ 2,428,625,624		\$	÷.	\$	
2025	\$		\$ 729,151,887		\$	•	\$	- 1
2024	\$	÷.,	\$ 408,840,632		\$	*	\$	
2023	\$	1,550,000	\$ 2,321,955,476		\$		\$	
2022	\$	76,253,327	\$ 1,095,546,683		\$	÷	\$	
Grand Total	\$	77,803,327	\$ 16,927,408,846		\$		\$	





Allowence Rick Based_ Inuclives -Force Accurate



Cost Estimating Dashboard

Project Cost Details	-	_			
Planning Estimate Sealed Engineer's Estimate	Letting Complete	Actual Cost			
Project Cost Estimates	Comm	ients	Percentage	Project	Total Contract
Roadway Bid Items	Q			\$71,879,502.00	\$71,879,502.00
Bridge Bid Items	Q			\$15,698,452.00	\$15,698,452.00
Pedestrian Bid Items	ρ			\$5,587,275.00	\$5,587,275.00
Utility Joint Bid Items	Þ			\$0.00	\$0.00
Base Estimate				\$93,165,229.00	\$93,165,229.00
Allowances	Q			\$0.00	\$0.00
Risk Based Contingency	Q			\$2,794,957.00	\$2,794,957.00
Letting Estimate				\$95,960,186.00	\$95,960,186.00
Change Order & Contingency	P		6.29%	\$6,035,895.70	\$6,035,895.70
Incentives/Disincentives	Q		0.52%	\$500,000.00	\$500,000.00
Other Force Account Work	D		0.42%	\$400,000.00	\$400,000.00
Total Contingency			7.23%	\$6,935,895.70	\$6,935,895.70
Construction Estimate				\$102,896,081.70	\$102,896,081.70
Construction Estimate without Joint Bid				\$102,896,081.70	\$102,896,081.70





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Cost Estimate Components by Project Phase



*Risk Based Contingency - is based on the identified risk of the project.

**At letting stage, there is expectation of minimal allow ances





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Contraction of

Texas Department of Transp **BE SAFE.** DRIVE SMARLE