Mn/DOT’s Cost Estimating and Project Development

Capacity Building Workshop
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Your Destination...Our Priority
Overview:

• Why Mn/DOT needed to change
• Background on cost estimating and scoping
• Implementation of cost estimating and scoping
• What we are working on for cost estimating/cost management
MnDOT over-budget on many projects

Associated Press

MINNEAPOLIS — The Minnesota Department of Transportation was $140 million over budget on road projects in the last seven years, due to ineffective management and insufficient controls, an internal audit of the agency shows.

The 2007 audit, which was not made public but was obtained by the Star Tribune, found that MnDOT managers often expanded construction contracts without written justification or itemization, a violation of contract regulations.

“We believe our concerns are significant, as they also involve complying with requirements, maintaining the public trust, and maintaining good public relations,” Auditor Daniel Kahnke wrote in a March cover letter to Transportation Commissioner Carol Molnau.

The audit, which reviewed projects from 1999 through mid-2006, shows contractors and consultants often received millions beyond their original bids. That, while MnDOT delayed projects because of a lack of funding.

MnDOT said it is training managers to be more vigilant.

The audit, requested by Molnau, found that supplemental contracts were almost always arranged by MnDOT without competitive bids because managers are rushed to complete jobs.

The review came about after a road project south of Hastings on Highway 316 in fiscal 2005. The job’s original contract was for $5.5 million, but the cost rose to more than $8.6 million after three supplemental agreements. A third of the project’s value never went to competitive bids, the audit said.

Kahnke recommended that MnDOT create a task force to address its lack of controls. The task force hasn’t finished its work, but MnDOT plans to train managers to be more vigilant after projects start, said Lisa Freese, deputy commissioner of MnDOT.

“We feel like we are working hard with a process of continuous improvement,” Freese said.

Kahnke also warned that supplemental costs could rise even more because 40 percent of the projects he examined were still going on.

The report has yet to be distributed to legislators, who will start a new session in February.

Rep. Ron Erhardt, R-Edina and vice chairman of the House Transportation Finance Division, said legislators should examine the overruns.

“The decision-making process on the money that they have might not be going in the right direction,” Erhardt said.
Performance Measures

- Projects in 3rd (4th) Year of STIP are let on time
  - FY 2007 76% of projects
  - FY 2008 65% of projects
- Projects in 1st Year of STIP are let in current year
  - FY 2007 92% of projects
  - FY 2008 82% of projects
- Percentage of projects let within +/- 10% of original 3rd year STIP construction estimate
  - FY 2006 29% of projects
  - FY 2008 28% of projects
Cost Estimating Issues/Concerns

- Emphasis on estimating
- Transparency
- Public Trust and Confidence
- Credibility
- Following Through on Commitments
Cost Estimating Process Improvement and Organizational Integration Project

<table>
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<tr>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>Phase 4</th>
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<td>Data Gathering</td>
<td>Desired Solutions &amp; Implementation Plan</td>
<td>Reference Manual</td>
<td>Training</td>
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<td>July 07 – Dec 07</td>
<td>Jan 08 – Dec 08</td>
<td>June 08 – Dec 08</td>
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Guidance for Cost Estimation and Management for Highway Projects During Planning, Programming, and Preconstruction

- Make Estimating a priority by allocating time and staff resources
- Set project baseline cost early and manage throughout
- Communicate estimate meaning and uncertainty
- Protect estimators from internal and external pressures
- Complete every step in a structured estimating process
- Document estimate basis, assumptions, deviations
- Identify project uncertainties early and establish contingencies
- Perform estimate reviews and obtain management approvals
Cost Estimation Process Improvement and Organization Integration Project

- Created CE/CM vision for Mn/DOT
- Developed Policies and procedures
- Created an implementation plan
- Developed a manual (TRM)
- Developed a training course
- Completed this work December, 2008.
Mn/DOT’s Vision for CE/CM

- Department-wide priority on estimating, managing and controlling costs
- Total Project Costs (including Engineering, R/W, Construction and other elements)
- Reliable and accurate estimates
- Statewide uniformity and consistency
- Improved communication and credibility with external stakeholders
- Clear accountability
CE/CM Policies

1. Project Cost Estimation Policy
   - Districts will have dedicated estimators
   - Estimates will be Total Project Cost Estimates (TPCE)
   - Management approval required at gates

2. Uncertainty, Risk, and Contingency Policy
   - TPCE will identify risks and estimate contingencies
   - There is no program contingency, all contingency will be at the project level
   - Unused contingency will be returned to the program
CE/CM Policies

3. Cost Estimate Communications Policy
   • All projects will have a Project Summary Report (one-pager)
   • MN/DOT is only committed to projects in the STIP
   • Projects outside of STIP will be shown in ranges

4. Project Cost Management Policy
   • Projects will be managed against a Baseline Cost Estimate
   • Use of contingency requires approval of Program Manager
5. Program Management Policy
   • Projects will be managed to the scope
   • Scoping marks the end of discovery
   • Change to Baseline Cost Estimate requires approval of Transportation Program Investment Committee (MN/DOT Division Directors)

6. Emerging Issues (Not a policy in TRM)
   • Design-Build Projects
   • Special Programs/Funding, i.e. Chapter 152, ARRA
   • CE/CM during construction
CE/CM Implementation Plan

1. Develop system to track and define TPCE elements
2. Performance Measures and incentives
3. Role and Responsibilities
4. Communication of CE/CM
5. Resources Requirements
6. Technical Support
7. Integration with Scoping initiative and others processes
8. Accurately identify inflation impacts
9. Identify and develop additional tools and databases
11. Reduce the use of Setasides in the SRC
12. Emerging areas to be addressed
Technical Reference Manual Outline

• SECTION I INTRODUCTION (Vision for CE/CM)
• SECTION II: ESSENTIALS (Foundation for CE/CM)
  – Interaction of Project Development and CE/CM Processes
  – Policy statements
  – CE/CM Process – Key information Total Project Cost, Risk and Contingency, Roles/Responsibilities
• SECTION III: Practice
  – Overview of Cost Estimating and Risk Methodologies
  – Cost Estimating/Cost Management procedures for Planning, Scoping, Design and Letting
• SECTION IV: Appendix (Terms, Estimating Tools and Tips)
CE/CM Training

- Cost Estimating is 2 days
- Cost Management is 1 day
- Contract with University of Minnesota who is working with Stu Anderson, Jennifer Shane and Keith Molenaar as the instructors
- Early session was taped posted on our website
- Completed the initial training by June, 2010
- Trained over 330 people throughout Mn/DOT
CE/CM Training Comments

• Some were wanted to learn how to do an estimate
• Performance measures need to be developed
• Need to hear from top staff the reason for change, why we are changing
• We need to Minnesotaise the tools
• This is not how we have done this
• We don’t have the resources for this
Total Project Cost Estimate (TPCE)

- Beyond construction costs
- Includes Engineering, R/W and other construction elements
## Total Project Cost Estimate

### Total Project Cost Estimate Summary - Design-Bid-Build

<table>
<thead>
<tr>
<th>Item</th>
<th>Phase</th>
<th>Stage</th>
<th>Estimate</th>
<th>Actual</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1</td>
<td>Phase A</td>
<td>Stage 1</td>
<td>Estimate 1</td>
<td>Actual 1</td>
<td>Variance 1</td>
</tr>
<tr>
<td>Item 2</td>
<td>Phase B</td>
<td>Stage 2</td>
<td>Estimate 2</td>
<td>Actual 2</td>
<td>Variance 2</td>
</tr>
<tr>
<td>Item 3</td>
<td>Phase C</td>
<td>Stage 3</td>
<td>Estimate 3</td>
<td>Actual 3</td>
<td>Variance 3</td>
</tr>
</tbody>
</table>

**Total:**
- Estimate: Total Estimate
- Actual: Total Actual
- Variance: Total Variance

**Total Project Cost Estimate:**
- Estimate: Total Project Cost Estimate
- Actual: Total Project Cost Estimate
- Variance: Total Project Cost Estimate

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**Note:**
- Actual vs. Estimate: Analysis
- Variance Impact: Detailed Review

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**Approvals:**
- Estimated by: [Name]
- Approved by: [Name]

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**Date:**
- Date of Estimate: [Date]
- Date of Approval: [Date]
Total Project Cost Estimate

- **Contingency:**
  - Pre-letting Contingency
    - Total for Base Estimate Elements
  - Post-Letting Contingency
    - Supplemental Agreements/Change Orders
    - Cost Overruns
    - Incentives

- Total Project Cost Estimate = Base Estimate + Contingency
Total Project Cost Estimate

- Base Estimate Elements:
  - Engineering (Pre-Letting and Construction)
  - Project Construction Costs
  - Detours and Haul Roads
  - Traffic Management
  - Communications/Public Involvement
  - Right-of-Way (Land Costs)
  - Utilities
  - Railroads
  - Municipal/Local Issues
  - Turn-backs
  - Landscaping
  - Environmental Clean-up/Mitigation
  - Incentives
Baseline Estimate

- The TPCE at the end of Scoping is the Baseline Cost Estimate
- A project will have a Baseline Estimate prior to entering into the STIP
Implementation Results

• FY 10-13 STIP Projects
  – Districts delivered 94% of projects having scoping documents, TPCE and one-pagers

• FY 11-14 STIP Projects
  – Approximately 90+ percent of the projects in the 11-14 STIP have scoping documents, TPCE’s
Scoping Process Initiative

• Separate initiative from the CE/CM effort
• Began in 2006 by the Preconstruction Managers Group (PCMG) (assistant district engineers in the districts)
  – Developed a process
  – Developed a manual
  – Provided training ahead of implementation
• Completed in early 2008
Scoping Process Initiative

• Vision for New Scoping Process
  – Early
  – Comprehensive
  – Documented
  – Includes a Scoping Change Process

• Definition of Scoping: What’s In and What’s Out of a Project

• Coordinated with CE/CM effort in 2007
Scoping Process Flowchart

Planning - Scoping - Programming Process 2008  (Refer to Scoping Narrative for detail)

Needs Identification

- ID Needs
- Compiled List of Needs ("Needs" List)
- Define Project Concept
  1. Assume Fix
  2. Rough Cost Estimate
- Fiscal/other constraints
- Draft Project Planning Report

Candidate Projects

- Compiled List of Projects ("Long" List)
- Define Purpose
- Identify Alternatives
- Develop Cost Estimate Range
- Fiscal/other constraints
- Continue

Selected Projects

- Compiled List ("Short" List)
- Create project in PPMS, obtain SP#
- Project Planning Report
- Letting Planned and farm out
- HIP

Project Planning

- Project Scoping

- Alternative Selection

- Assign PM
- Develop Alternatives (See HPDP)
- Develop Preferred Alternative

- Issue Resolution and Agreement on Scope
- Issue + cost compiled by topic on Draft Scoping Report
- Prepare Baseline Cost Estimate
- Refine project schedule
- Finalize Project Scoping Report

- Approval of Final Scoping Report
- No
- Yes
- Prepare Baseline Cost Estimate
- Refine project schedule
- Finalize Project Scoping Report
- Approval of Final Scoping Report
- Yes
- No

- Project Programming

- Compile List of Approved Scoped Projects
- Analysis of effect on performance trends
- Fiscally constrained list
- ATP Process
- Don't Fund
- STEP

- Project Development

- Project Change Process

- Scope Cost Change
- Purpose Need Change
- Project Change Request Form
- Program Evaluation Form
- Change Approved
- No - Project Needs Rescoping

October 13, 2008
Scoping Implementation – Remaining Challenges

- Focusing on earlier coordination, especially with external stakeholders
- Need for Risk Management Plans
- Shifting resources to earlier in Project Development
- Ensuring change is sustained through continued training and resources
Mn/DOT Scoping and Cost Estimating website

www.dot.state.mn.us/cost-estimating
Organization Change/Integration

- Accountability
- Case for Change
- Communication
- Incentives
- Action Plans
- Vision
- Resources
- Processes
- Training
- Skills
- Sustained Change

Training
What did we learn?

• We need to shift resources to earlier in the project development process
• We need to establish performance measures
• We need to track project estimates and track actual costs
• We need to acknowledge and account for the unknowns in our earlier estimates (Risk Assessment/Management)
Performance Measures

- Involved people from across the department on developing the measures
- Developed the measures around the CE/CM policies
- Decision to build is key to our measures
Decision to Build

- Financial decision point for a project
- Mn/DOT is making a commitment to a project
- Based on project scope meeting program objectives at a particular cost
- Return on investment
- Project entering the STIP requires a scoping document with TPCE
Performance Measures

Project Development Timeline

Planning

STIP

Letting

Construction

Decision to Build
Performance Measures

• Measures and indicators
• Interim measures and indicators
  – Can be done with existing data and systems
• Developmental measures and indicators
  – Systems and data need development
Project Cost and Management Measures

• Baseline estimate compared to:
  – current year estimate
  – construction award cost
  – cost at substantial completion of construction
  – final project cost
Program Measures

• Percent of projects let for construction on schedule based on when entering the STIP

• Baseline estimate compared to current year estimate for projects by each district and statewide (Legislative request)
Scoping Measures/Indicators

• Measure:
  – Percent of projects entering the STIP with an approved scoping report

• Indicator:
  – Track the number of scoping amendments and cost of the amendments
Communications
Measures/indicators

• Measure:
  – Public confidence in estimates

• Indicator:
  – Project Summary Report updated and posted annually
Tracking System

• Involved people from across the department on developing the measures
• Key is TPCE (Engineering, R/W, Construction Letting, and Other Construction Elements)
• We do not have systems to track our estimates
Tracking System Outcome

• Short Term:
  – Identify improvements to current data warehouse as central repository
  – Identify barriers of matching funding with project estimates
Tracking System Outcome

• Long Term:
  – Develop information requirements for TPCE system
  – Develop link of actual costs to TPCE elements
Tracking System Outcome

• Other Items:
  – Better definition of TPCE elements and groupings
  – Project Managers need to understand project funding
  – Tracking of actual vs actual inflation
PUMA
Project Unification Management Application

• Bridging the gap between projects and the accounting system
• State Projects, SP (how Mn/DOT talks)
  – Multiple job numbers, multiple project numbers
• Accounting System (how accountants talk)
  – Tracks job numbers, how we pay for items
This is human who is coordinating these systems to make them talk with each other.
Related Initiatives

• Business Intelligence and Business Information Council
  – Trying to manage our data
  – Developing metadata (information about the data)
  – Identifying the source data
Preconstruction Estimating Tool (PET)

- Estimating engineering costs
- Developing grid based on project complexity and project type
- Driven by Transportation Taxpayer Accountability Act
  - Comparing consultant costs to in-house costs
- Need to compare actual costs to estimates
• Mn/DOT Land Management developed a R/W estimating tool
• Tool is complete and being used by our district’s
• Information is located in REALMS (R/W system)
• Getting R/W involved earlier in the project development process
Risk Management

• We have been doing risk assessment
  – Informal
  – Limited documentation
  – Weighing of options/techniques

• We need to do risk management
  – Early identification of possible events
  – Identify mitigation strategies
  – Manage the risk
Cost Risk Assessment Value Engineering (CRAVE)

- Conducted on 13 Major bridge projects with cost ranges $50-700M
- Projects were from across the state (District 2, District 6, District 7, Metro)
- Participants were from various districts
- Tied with Value Engineering
- Conducted fall of 2008
Project Scope and Cost Management Office

The essence of the Office:

Earlier and more comprehensive front end project planning so we are able to deliver the right project, on-time and on-budget.
Project Management

Scope

Quality

Risk

Budget

Schedule
What is the issue departments across the nation are facing with projects?

• Interstate Era
  – Cost to complete
• Perfection
• “As long as we are here”
• “We will not be back for 20 years”
Thank you for your interest in Mn/DOT’s Journey

Questions?

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