

Project Estimating Breakout Session

2017 ACEC/WisDOT Transportation Improvement Conference
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Presenters

- ▶ Scott Lawry, P.E., WisDOT Bureau Project Development
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- ▶ Cheryl Simon, P.E., WisDOT NC Region Project Development

Outline

- ▶ Implications of estimate accuracy
- ▶ Performance measures
- ▶ Market trends
- ▶ Bidder analysis
- ▶ Managing risk
- ▶ Tools and resources
- ▶ Estimate development, documentation and review

Implications of Estimate Inaccuracy

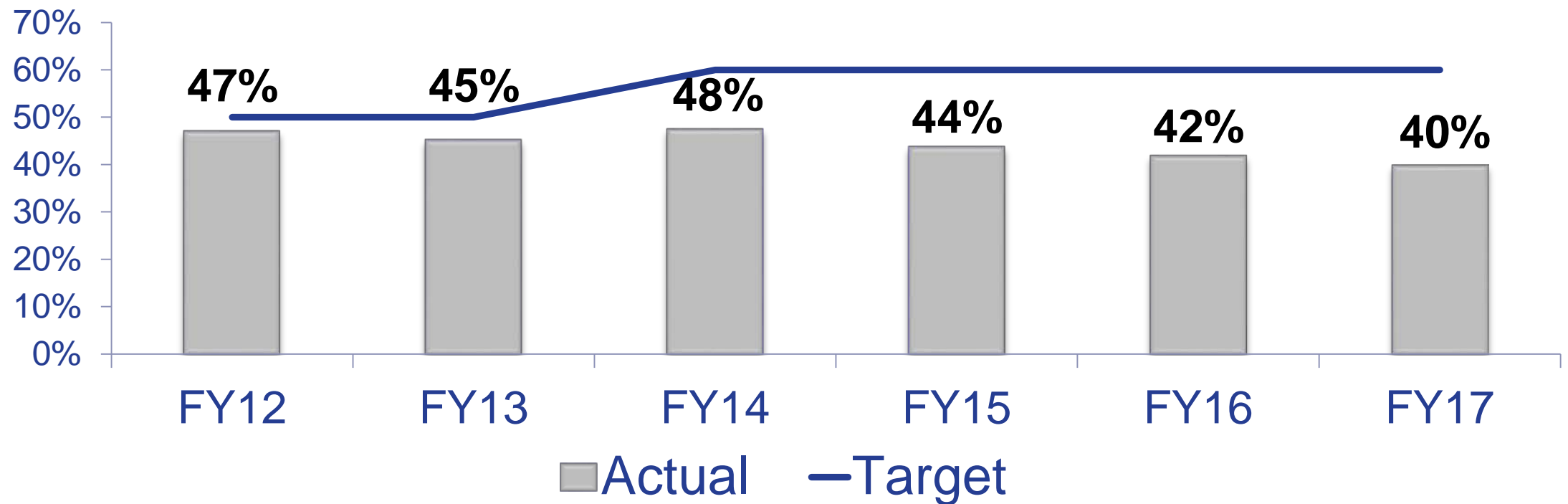
- ▶ Why estimate accuracy is important:
 - Program and budget stability
 - Fewer projects rejected
 - Department & local municipalities have a stable program
 - Letting the right projects at the right time

Engineering Estimate Accuracy (EEA) Performance Measure

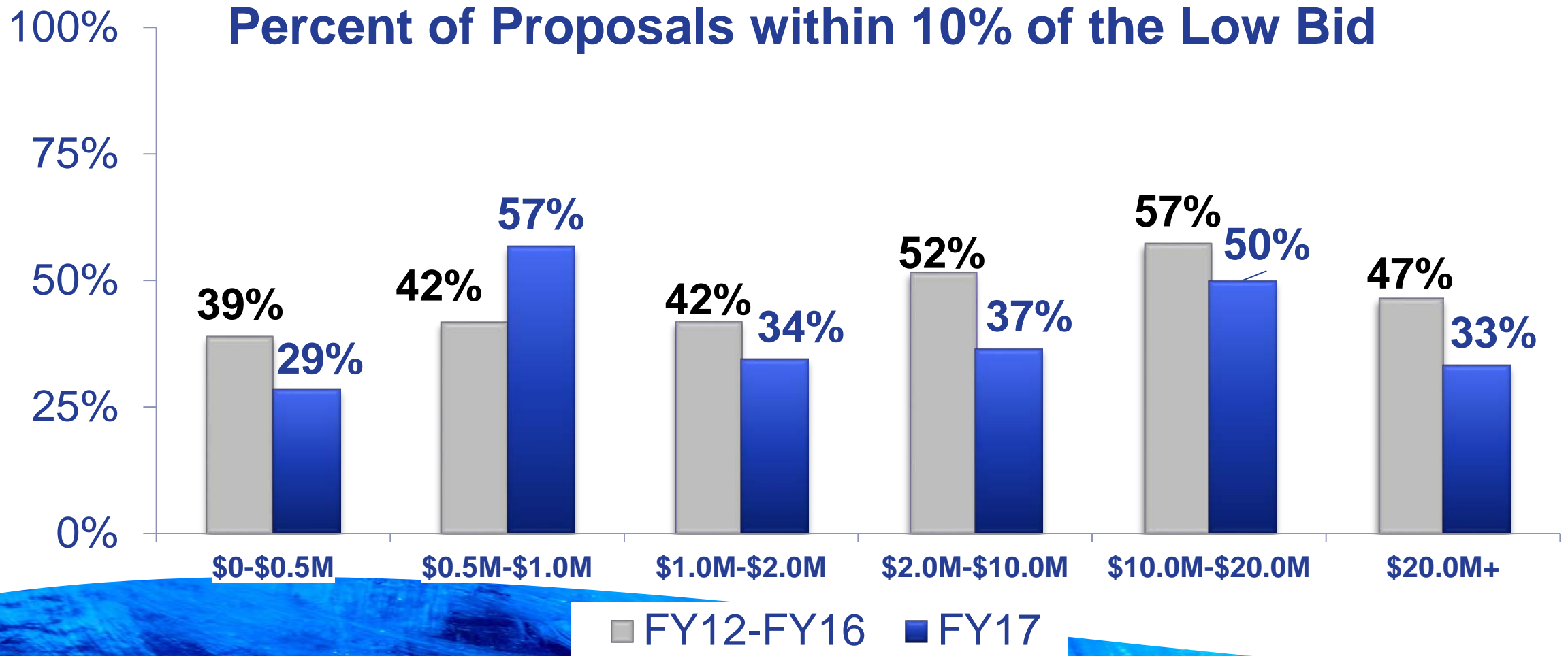
- ▶ FHWA/WisDOT Stewardship Agreement (Sept 2010) goal
 - 50% of estimates within 10% of low bid
- ▶ WisDOT goal
 - 60% of estimates within 10% of low bid
 - 75% of estimates within 15% of low bid
 - Goals tracked in Estimate accuracy report
- ▶ WisDOT external MAPPS measurement - <http://wisconsindot.gov/Pages/about-wisdot/performance/mapss/measures/accountability/on-budget.aspx>

Estimate Accuracy: All Projects

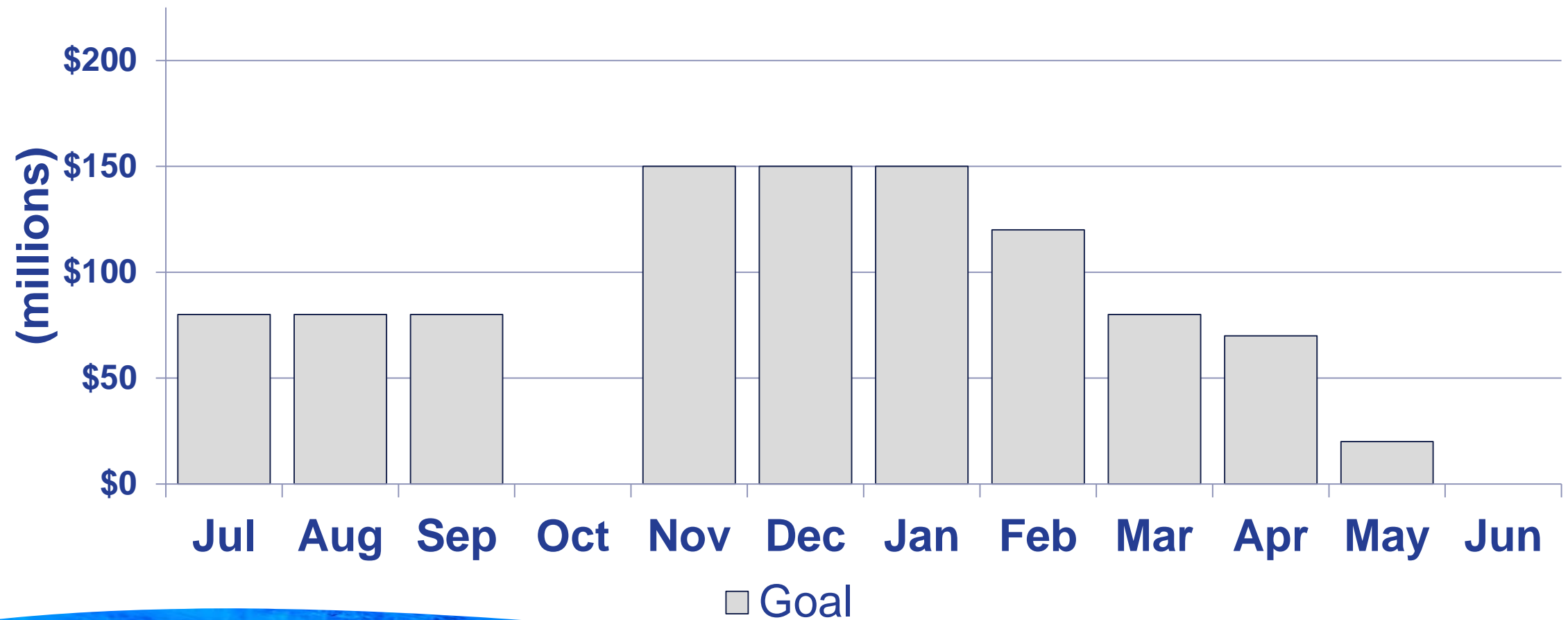
Percent of Proposals Within 10% of the Low Bid



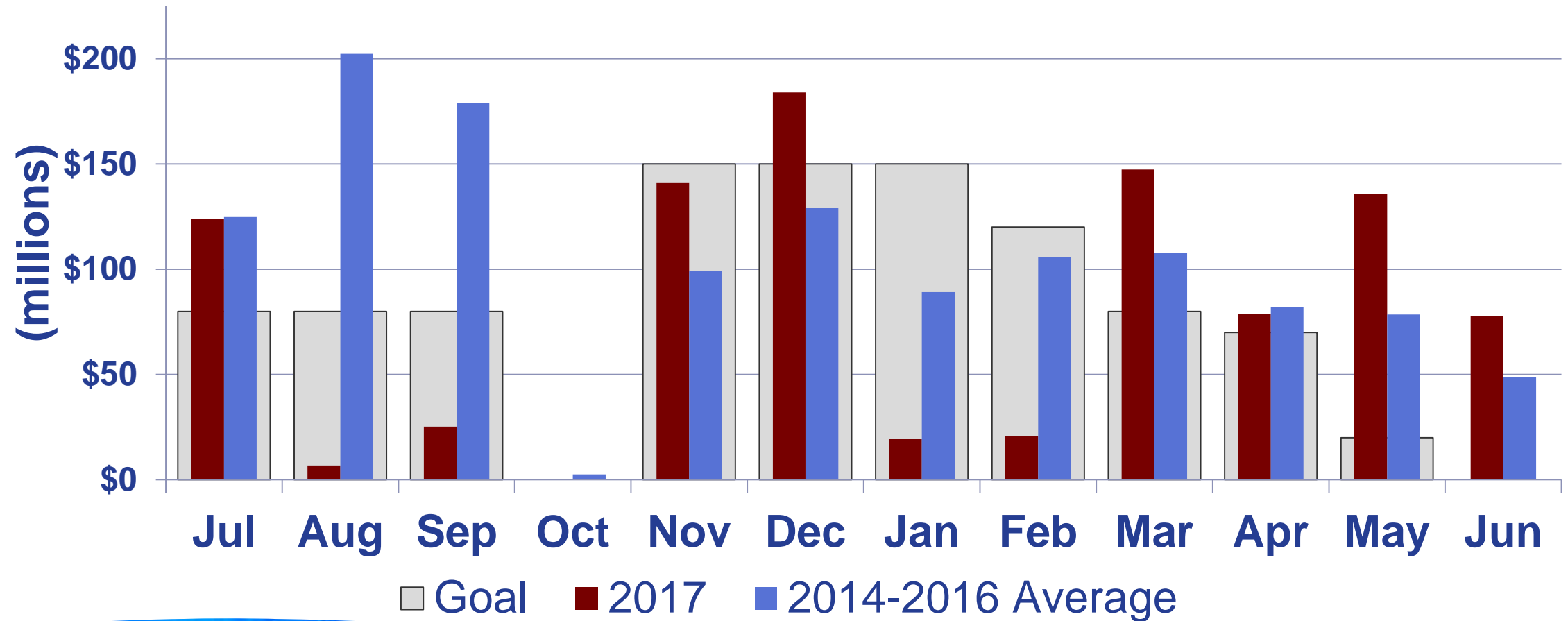
Estimate Accuracy: Project Size



Letting Implementation Plan: Goals



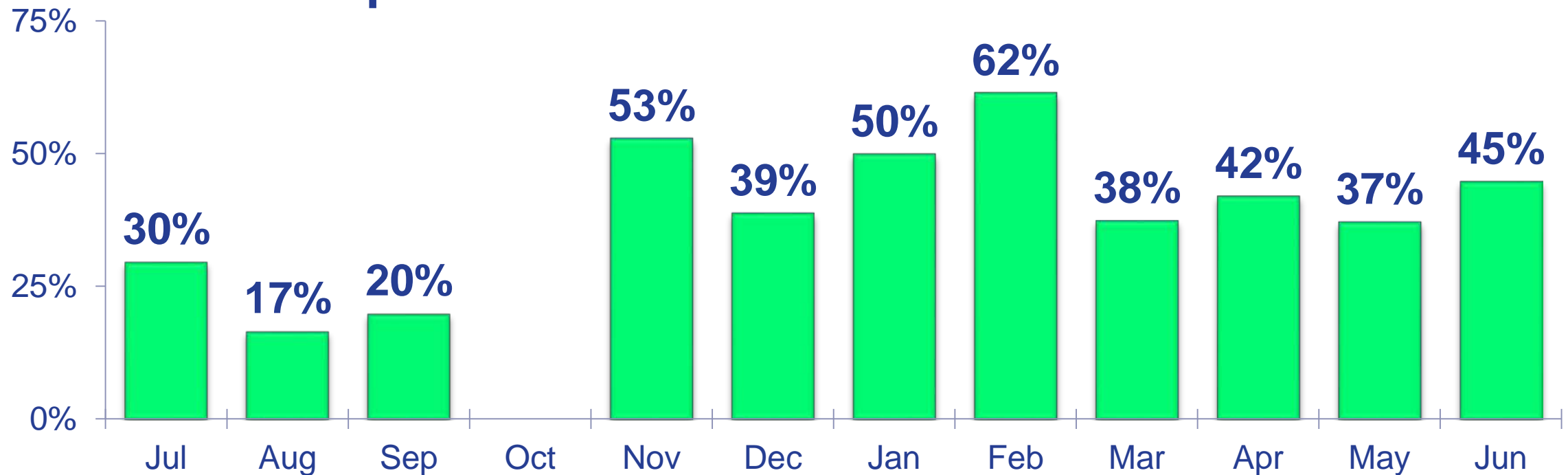
Letting Implementation Plan



Estimate Accuracy: By Let Month

FY12-FY16

Proposals within 10% of the Low Bid

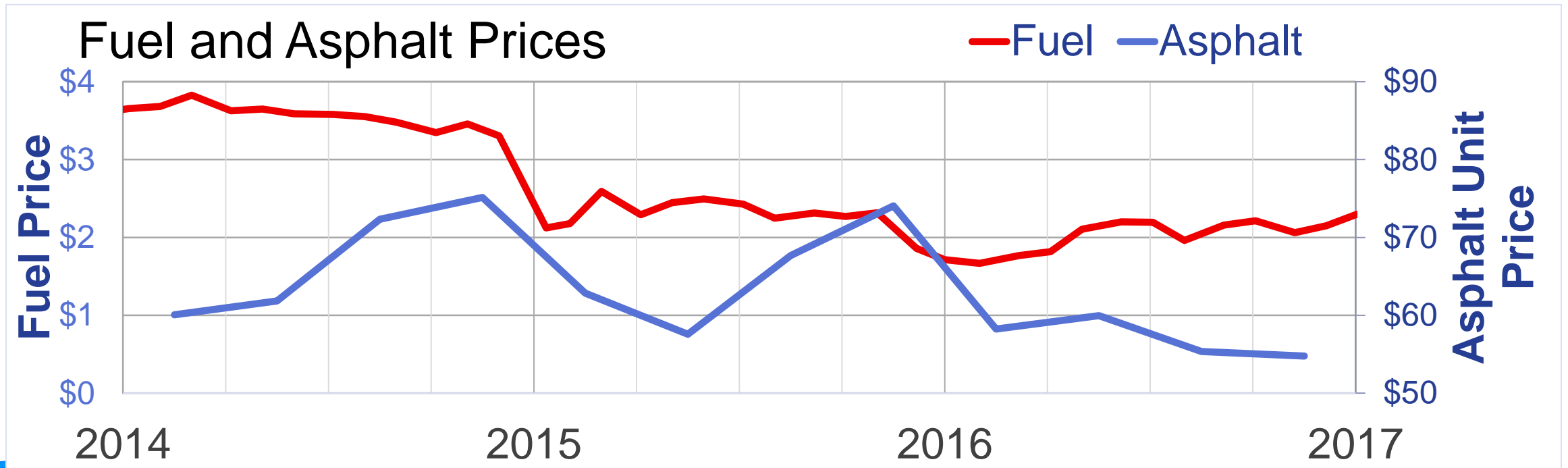


Market Trends

- ▶ Cement shortages
 - Concrete masonry prices have returned to normal.
 - Prices were averaging \$675/CY during the highest quarter with the cement shortages.
 - Prices have generally decreased each quarter since then.
 - Prices were averaging \$517/CY the last quarter of 2016.
- ▶ Increased competition

Market Trends

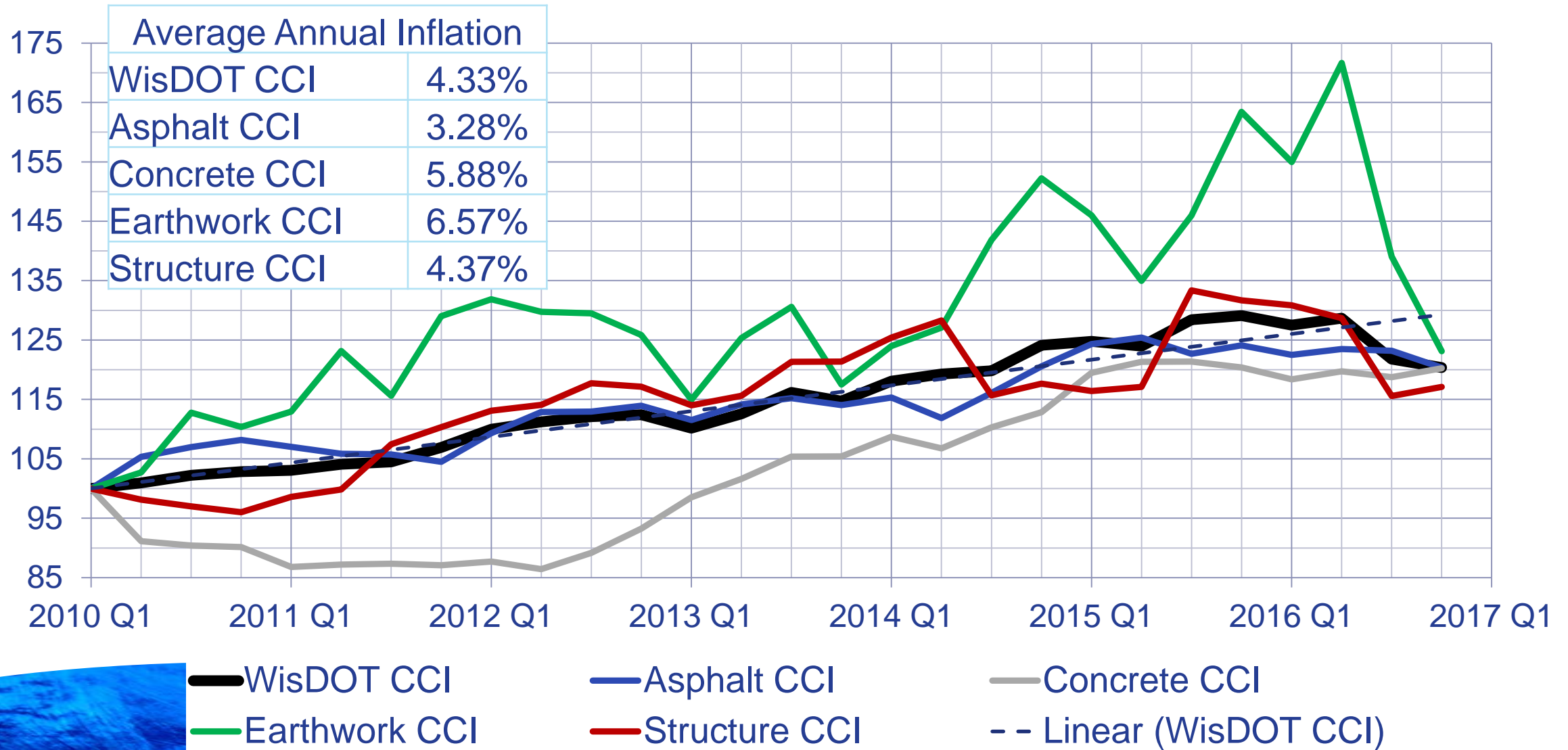
- ▶ Low fuels prices
 - Low asphalt prices and lower costs for all items



Market Trends: Construction Cost Index

- ▶ A cost index is an indicator of the average cost of representative items over time.
 - It measures average inflation or deflation of costs over time.
- ▶ A cost index can be used to track construction costs.
- ▶ The Department previously had used the Quarterly Price Index (QPI).
 - QPI was based upon 7 bid items.
 - Quantities for these items were based upon the base year and did not fluctuate based upon their use.
 - QPI became less relevant as it became older. The base year needed to be regularly updated.

Market Trends: Construction Cost Index



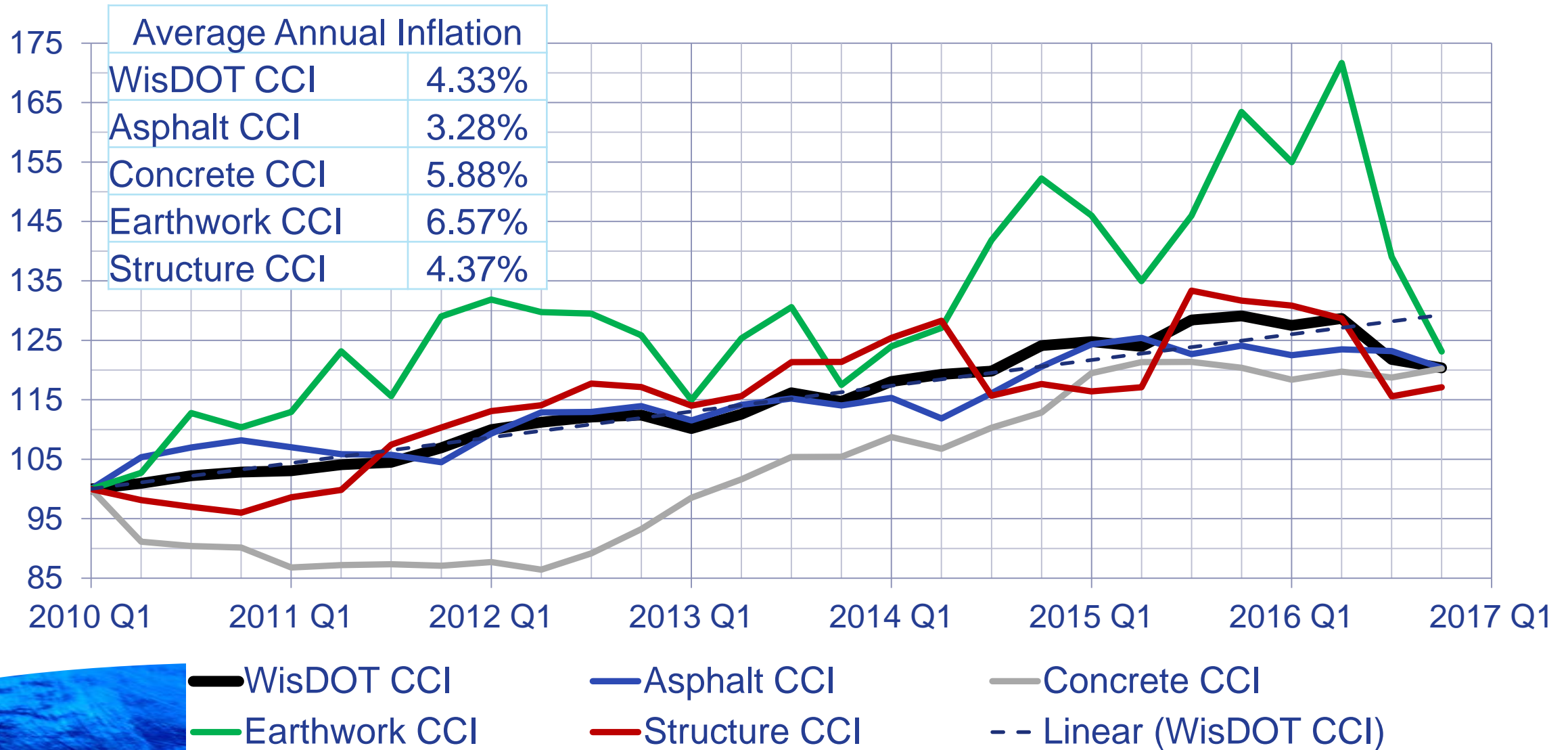
Market Trends: Construction Cost Index

- ▶ The Chained Fisher Construction Cost Index (CCI)
 - The CCI is typically made up of 90 to 100 items.
 - Accounts for changes in type and usage of items.
 - Eliminates issue of updating the base period.
 - Able to accommodate usage for the current year and base year.
 - Performs better than fixed-weight indices when prices and quantities are volatile.
- ▶ The Federal Highway Administration (FHWA) uses a Chained Fisher approach— <http://www.fhwa.dot.gov/policyinformation/nhcci.cfm>

Market Trends: Construction Cost Index

- ▶ Includes standard bid items with measurable units.
- ▶ Does not include lump sum items such as Mobilization, Traffic Control Projects, and Removing Old Structure bid items.
- ▶ Does not include SPVs.

Market Trends: Construction Cost Index

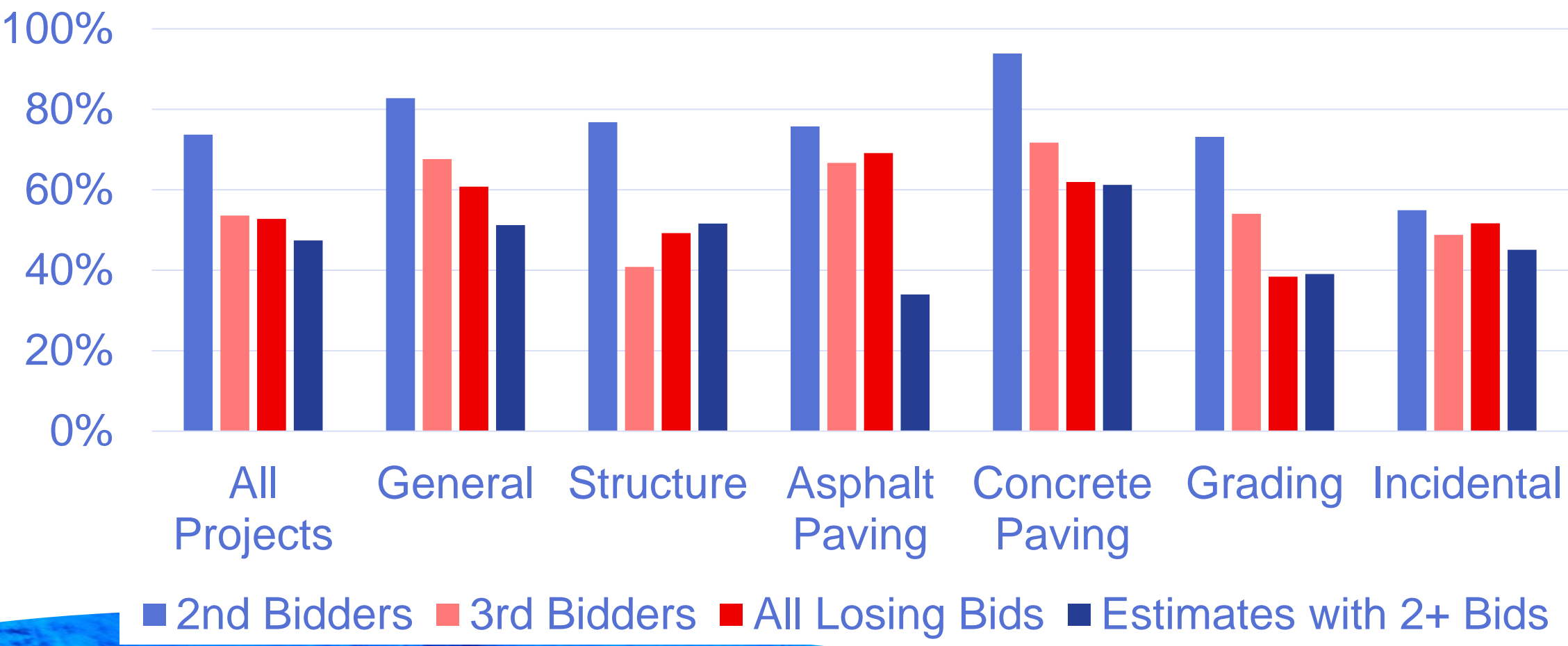


Bidder Analysis

- ▶ Accuracy of losing bids compared to low bid
- ▶ Average number of bidders per proposal
- ▶ Correlation by number of bidders and estimate accuracy

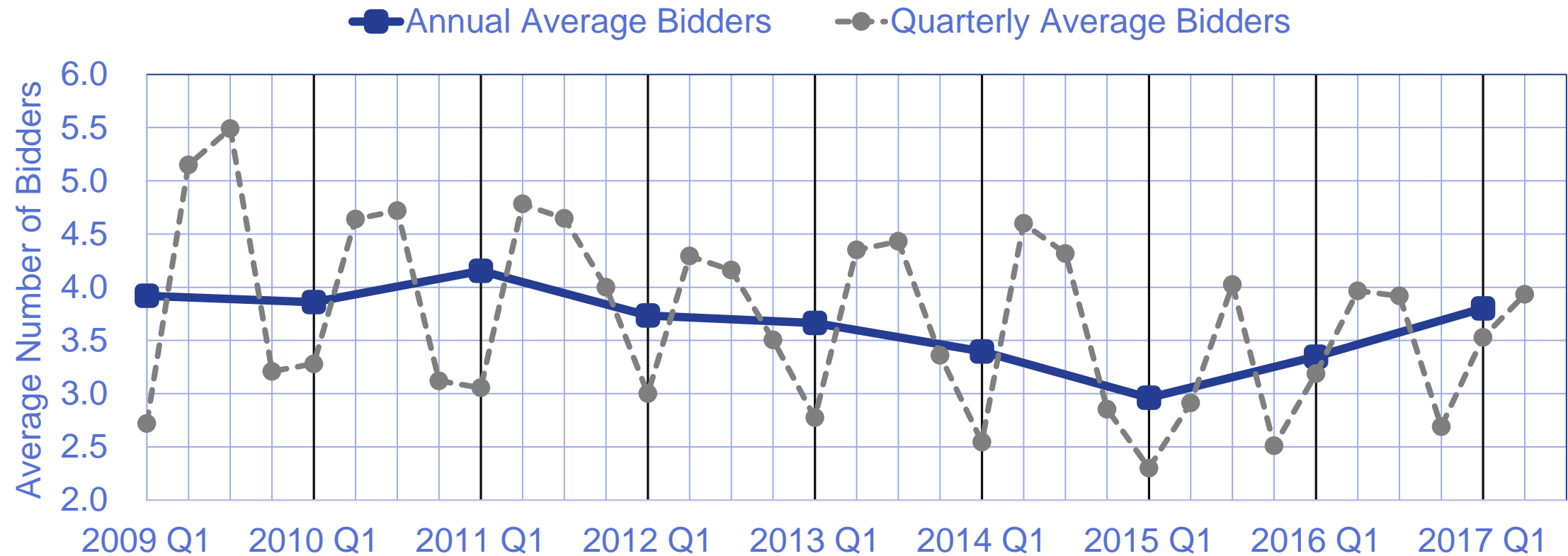
Bidder Analysis: Competition Accuracy

By Low Bid - 2014 to 2016

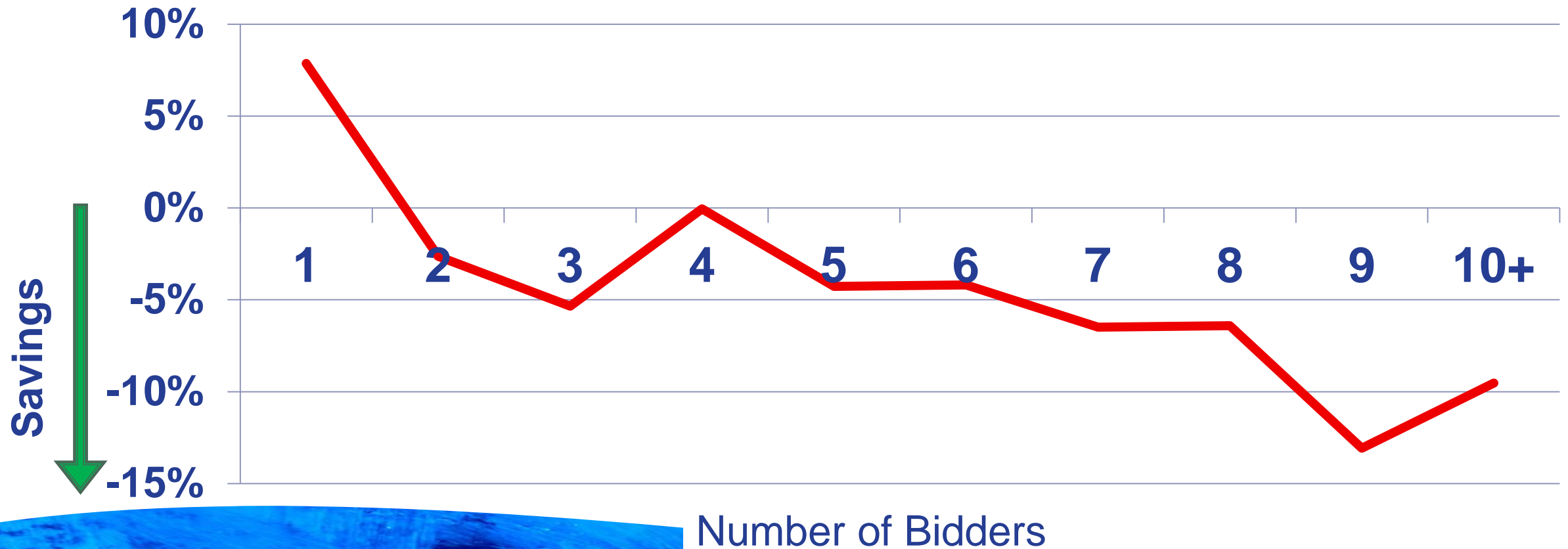


Bidder Analysis: Number of Bidders

Average Number of Bidders per Proposal by Fiscal Year



Bidder Analysis: Estimate Accuracy and Number of Bids (FY12-FY17)



Bidder Analysis: Number of Bidders

- ▶ More desirable projects will have more bidders.
 - Medium and large projects
 - Mainline closure or off alignment work
- ▶ Some areas across the state predominantly have a single bid.
There may be a single asphalt paving, structure, or other prime contractor in the area.

Managing Risk

- ▶ The more uncertainty or risk in a proposal, the greater chance the contractor will increase the bid cost to protect against financial loss.
 - Risk = Cost
- ▶ Clear special provisions
- ▶ Clear intent of the project for how it's going to be built
- ▶ Accurate quantities
- ▶ Limit the number of undistributed quantities
- ▶ Estimate according to the amount of known risks

Managing Risk: SPV Reduction

- ▶ Make up 25% of awarded bids.
- ▶ May not have been vetted by statewide technical committees.
- ▶ May not reflect changes to General Requirements in the Standard Specifications.
- ▶ Contractors have to interpret the SPVs, increasing risk and cost.
- ▶ Has little or no bid history.
- ▶ Non-standard items may be in short supply and are more expensive.

Managing Risk: SPV Reduction

- ▶ If the result for a task is the same for an SPV and a standard bid item, then use the standard bid item.
- ▶ If you must use an SPV, use SPV libraries maintained by the region first.
- ▶ If create your own SPV item, avoid using lump sum unit measures.

Managing Risk: Lump-Sum SPVs

- ▶ Transfers risk to a contractor.
- ▶ Difficult to manage in the field if multiple sub-contractors complete the item.
- ▶ Try not to be prescriptive for the means of construction and materials. Specify the requirements for the final item.
- ▶ Most lump-sum items are very different from one project to another.

Tools and Resources: Overview

- ▶ FDM Chapter 19-5 <http://wisconsindot.gov/rdwy/fdm/fd-19-05.pdf>
- ▶ Estimator
- ▶ Bid Express
- ▶ Estimating website <http://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrcs/tools/estimating/default.aspx>
- ▶ Structure Costs <http://wisconsindot.gov/dtsdManuals/strct/manuals/bridge/ch5.pdf>
- ▶ Cost-based Estimating
- ▶ Average Unit Prices
- ▶ Production Rate Tool

Tools and Resources: FDM 19-5

- ▶ Bid item usage
- ▶ Estimating tools
- ▶ Estimate development
- ▶ Estimate documentation
- ▶ Estimate reviews

Tools and Resources: Estimator and Bid Express

▶ Estimator

- AASHTOware software
- Last three years of bid results
- Calculated cost based on location, work type and quantity

▶ Bid Express (BidX)

- Info Tech Inc web-based product
- Historical bid tab data
- Review awarded contracts
- Searchable - bid items, item descriptions, data ranges for quantity, dates, prices
- User guide: <http://wisconsindot.gov/Documents/doing-bus/eng-consultants/cnslt-rsrcs/tools/estimating/bid-express-user-guide.pdf>

Tools and Resources: Estimating Website

- ▶ Quantities 2 Plan (Q2P)
- ▶ Asphalt
- ▶ Mobilization
- ▶ Pit Location Tool
- ▶ Majors and Backbone
- ▶ Construction Cost Index (dotnet)

Tools and Resources: Production Rate Tool

- ▶ WisDOT Construction Productivity Rates
- ▶ Maintaining current production rates of bid items vital to the construction schedule.
- ▶ The tool can be found at the following location:
<https://sites.google.com/a/wisc.edu/wisdot-productivity/>

Tools and Resources: Production Rate Tool

- ▶ Data is entered by construction staff.
- ▶ Designers obtain information from the Productivity Estimation Tool.

WisDOT Construction Productivity Rates
UNIVERSITY OF WISCONSIN-MADISON
COLLEGE OF ENGINEERING
CONSTRUCTION AND MATERIALS SUPPORT CENTER



Home Asphalt Paving Bridges Concrete Paving Earthwork Miscellaneous **Productivity Estimation Tool**

[Home](#) >

Productivity Estimation Tool

To download the latest version of the Productivity Estimation Tool, select the red download arrow to the lower right.

Related websites
UW-Madison home
College of Engineering
Civil and Environmental Engineering
Wisconsin Department of Transportation
Construction and Materials Support Center

 Productivity Estimation Tool (v2.8).xlsm (1414k) BRENT FLATEN, Oct 14, 2015, 12:21 PM v.1 

Tools and Resources: Production Rate Tool

Project ID	Project Location	Date	Description	Name/Initials of Respondent

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Step 1: Thinking of the project for which you want to estimate productivity rates, determine for each of these project factors whether 1, 2 or 3 would best describe your project.

Factor	Description	Severity
Type of work	1 = New construction project 2 = Reconstruction, resurfacing or maintenance project 3 = Rehabilitation project (structure currently used for transportation)	
Project Size	1 = Small (≤ 10,000 total tons) 2 = Medium (10,000 - 50,000 total tons) 3 = Large (≥ 50,000 total cubic tons)	
Expedited Project Schedule	1 = 40 hours week, 8 hours per day, normal (optimum) crew size, no work on holidays. 2 = 50 hours per week, larger than normal or constantly changing crew sizes, work on some holidays. 3 = Working beyond 50 weekly hours (overtime), much larger than normal crew sizes (overmanning), working on all holidays, no excuse completion dates.	
Night Time Paving	1 = Daytime paving 3 = Nighttime paving	

Introduction

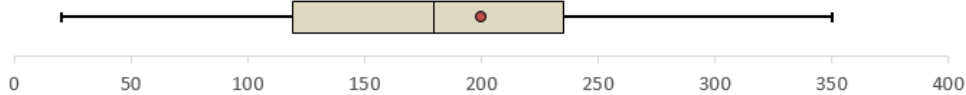
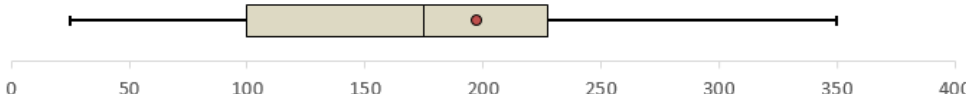


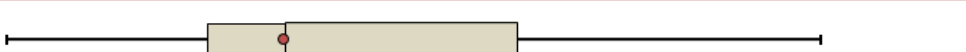
Main Menu

Earthwork

Output Earthwork

Asphalt Paving

Tools and Resources: Production Rate Tool

Please find in the table below the estimated productivity rates for your project based on an 8 hour working day.				
Productivity Rates				
Activity	Min	Predicted Value	Max	Unit/Day
HMA Placement Lower Layer	20	200	350	Tons/Hour
				
HMA Placement Surface Layer	25	197	350	Tons/Hour
				
Hand Placement of Asphalt Pavement	4	95.7	150	Tons/Hour
				
Thick Milling (>2")	1467	11,226	20500	S.Y./Day
				
Base Course Placement	60	1,199	3400	Tons/Day
				

Tools and Resources: Production Rate Tool

- ▶ Advantages of this tool
 - Production rates can be updated regularly.
 - More accurate contract time schedules in the design phase.
 - Identification of need for extraordinary.
 - Bid item prices increased or decreased.

Estimate Development

- ▶ Competition
- ▶ Unit Price Considerations
 - Multiple projects in a proposal
 - Estimator regression curves
 - Past project comparison similarities
 - Mobilization needs
 - Combined asphalt pricing
 - Project characteristics

Estimate Development: Project Characteristics

- ▶ Haul distances
- ▶ Rural/Urban
- ▶ Location
 - Suppliers
 - Competition
- ▶ Time constraints
- ▶ Traffic
 - Staging
 - Night work
- ▶ Other conflicts

Estimate Documentation and Review

- ▶ Estimate Documentation Report
 - Consists of executive summary, project characteristics, item level documentation, review summary
 - Updated guidance with an upcoming FDM transmittal
 - Standard template

Estimate Documentation and Review

- ▶ Independent review
- ▶ Region Program Controls review
- ▶ Central Office reviews
 - Pre-letting
 - Post letting
 - Estimate Justification
 - Checking quantities for penny bids
 - Unbalanced Bid Analysis for changes in quantities

Additional Efforts

- ▶ Estimate review summaries is shared with QA Engineers
- ▶ Preliminary Plans
- ▶ Pre-bid Questions and Answers

Preliminary Plans

- ▶ Preliminary Plan Availability
 - Provide industry information early for large/complex projects.
 - Located on HCCI site: <http://wisconsindot.gov/Pages/doing-bus/contractors/hcci/prelim-plans.aspx>
 - One week prior to the advertisement, the plans and provisions will be removed from the website.

Preliminary Plans

- ▶ Preliminary Plans Process
 - Information will stamped PRELIMINARY AND NOT FOR BIDDING PURPOSES.
 - Information could include:
 - Plans/Special Provisions
 - Soils Reports
 - Digital Models
 - Construction Staging or Overview roll plots

Pre-Bid Question and Answers

- ▶ Questions and Answers have been available since June 2016.
- ▶ Questions submitted through Bid Express.
- ▶ Ability to view and search questions and answers through Bid Express or on the HCCI website.
- ▶ The questions and answers will be posted on Fridays after advertisement, as well as the Monday, Wednesday, Friday, and Monday before the letting.
- ▶ The postings will be available on Bid Express and the Bid Letting web pages.
- ▶ Documentation on the policy and how to use the feature will be posted on the HCCI site and in the FDM.

Upcoming

- ▶ FDM 19-5 Estimates section updates
- ▶ Estimate Documentation updates
- ▶ SPV Item Classification
- ▶ Estimate Training
- ▶ Cost Based Estimates
- ▶ FHWA Cost Review Report
 - <https://www.fhwa.dot.gov/construction/contracts/2014cost.pdf>

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