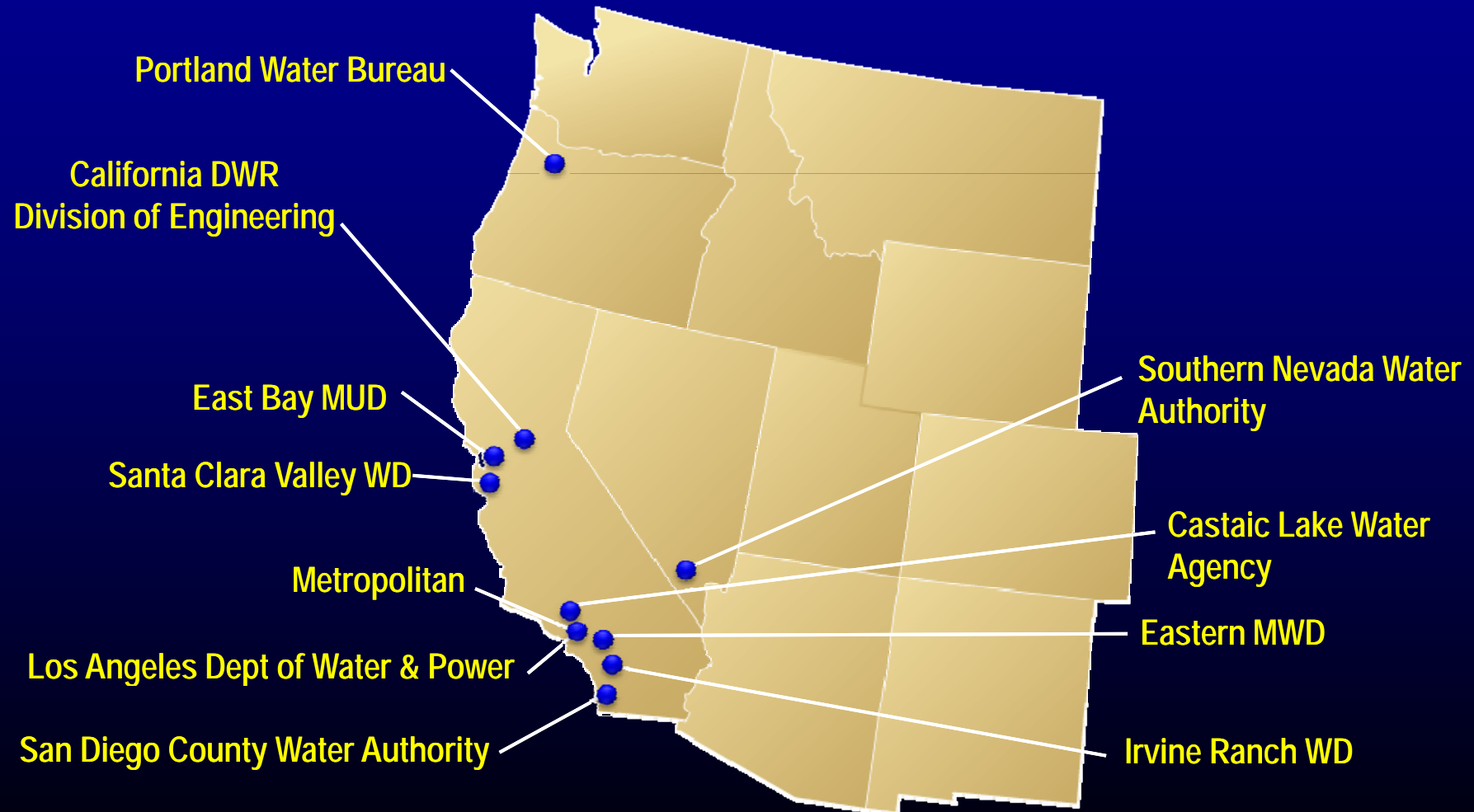


Engineering Services Section Multi-Agency Benchmarking

**Engineering and Capital Programs Committee
February 2009**

Benchmarking Program

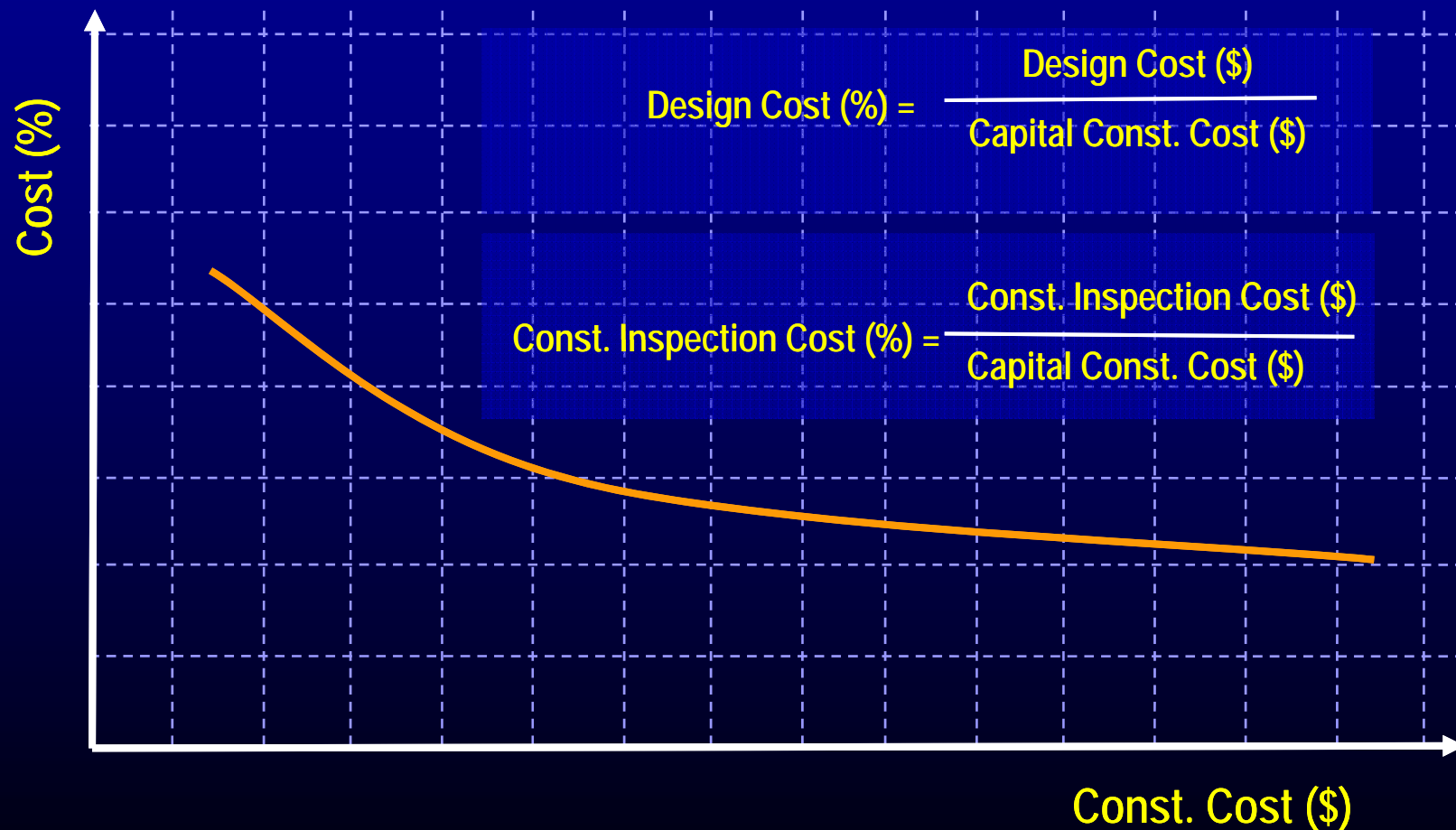
11 Agency Participants



Benchmarking Program Objectives

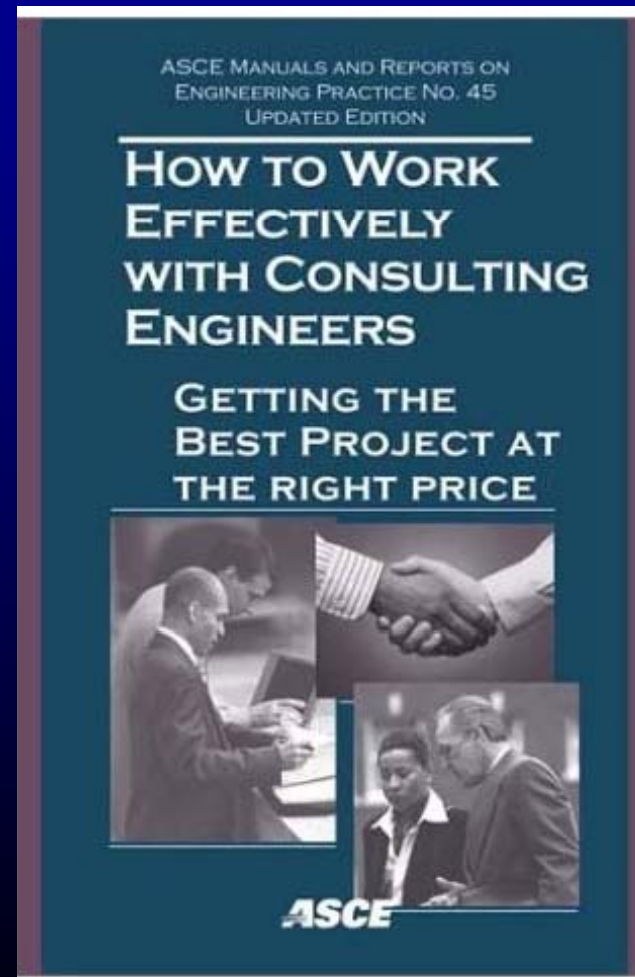
- **Designed to Address Key Participant Issues**
 - **Define Key Performance Indicators (KPIs)**
 - **Evaluate & compare performance**
 - **Identify best practices relative to performance drivers (BMPs)**

Traditional Industry Performance Paradigm



Traditional Performance Paradigm Is Strongly Institutionalized

- **ASCE Manual of Practice 45**
“How to Work Effectively
with Consulting Engineers”
- **Metropolitan is agency
participant for new
update**



Design % Widely Used As Key Performance Indicator

- **Program budgeting**
- **Individual project budgeting**
- **Managing/measuring performance**
- **Evaluating project mgmt**
- **Proposal evaluation**
- **Establishing fees for services**

Engineering Services Key Performance Measures

Function	Performance Measure	Target
Design	Design as % of Const.	>\$3M: 9-12% <\$3M: 9-15%
Inspection	Inspection as % of Const. Cost	>\$3M: 9-12% <\$3M: 9-15%

Variables for Design %

$$\text{Design Cost (\%)} = \frac{\text{Design Cost (\$)}}{\text{Capital Const. Cost (\$)}}$$

- **Const. cost is estimate at start of design**
- **Actual const. bids vary with:**
 - **Economic cycles**
 - **No. of bidders**
 - **Quality of design**
 - **Reputations**
- **Metropolitan's performance measure**
 - **Goal established as design commences**
 - **Actual results based on final costs**

Benchmarking Program Evaluates Data for 7 Types of Water Infrastructure Projects



Pipelines



Pump Stas.



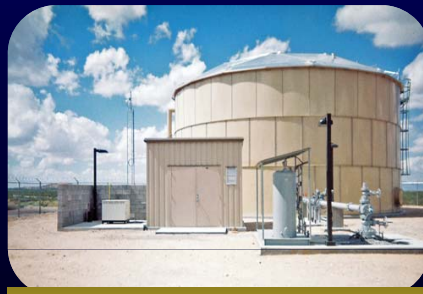
Flow Control Stas.



Buildings



Water Treatment
Plants

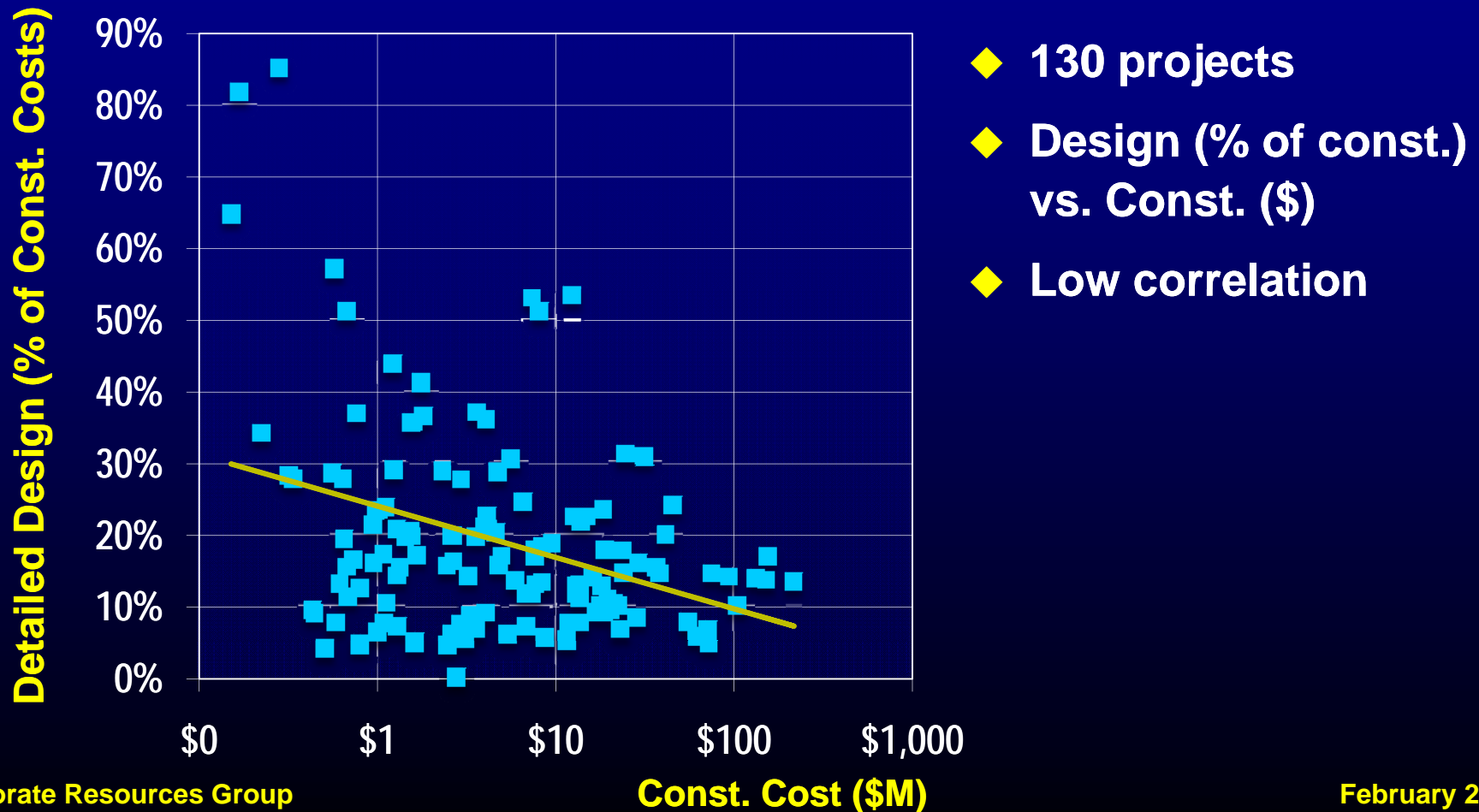


Water Storage
Facilities

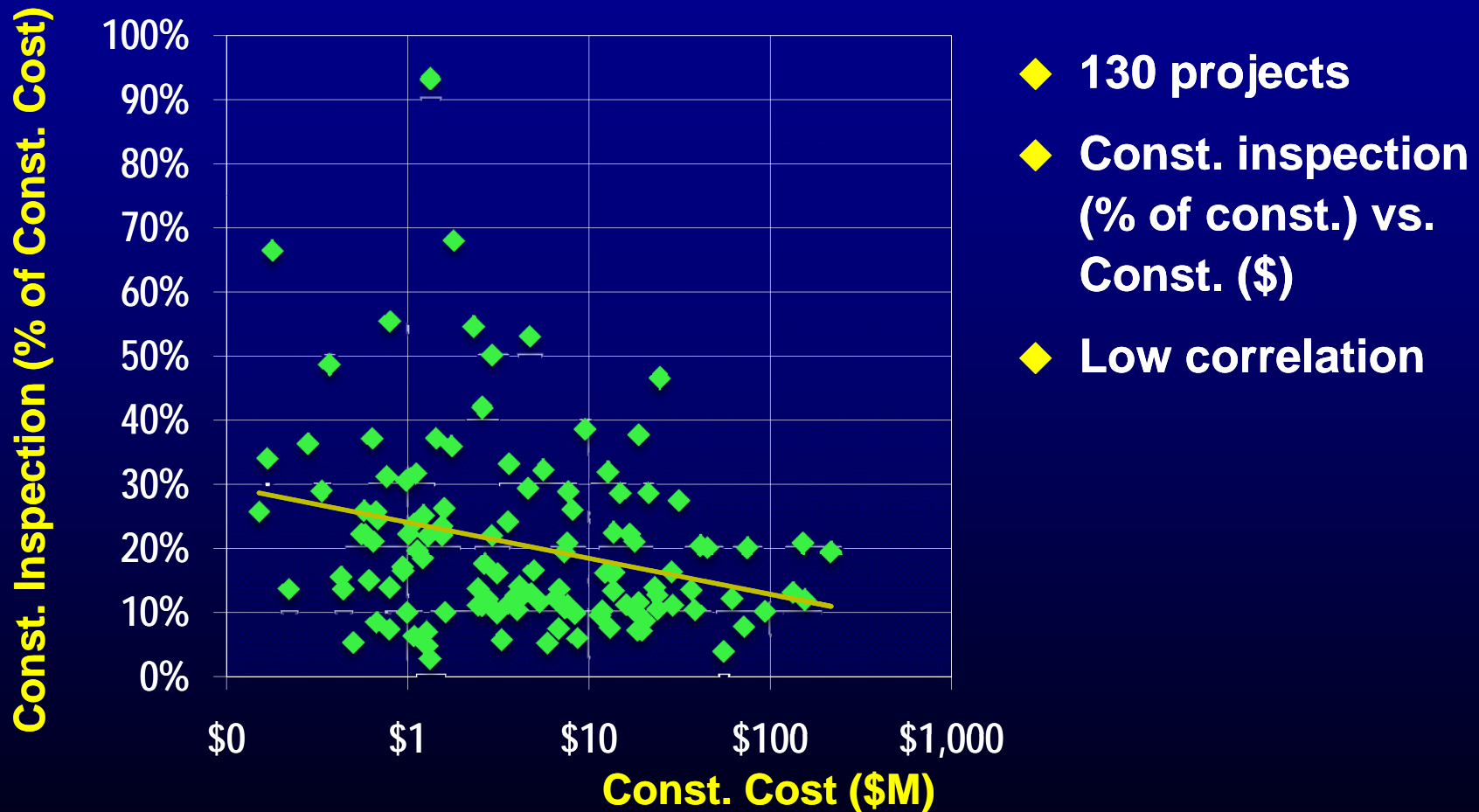


Other Capital
Const. Projects

Initial Results: Low Correlation of Design % & Construction Cost



Similar Results for Inspection % & Construction Cost



Initial Results Did Not Support Traditional Paradigms

- Low correlation between variables tested
- Many regression models tested different variables & functions
- Difficult to collect consistent data from all agencies

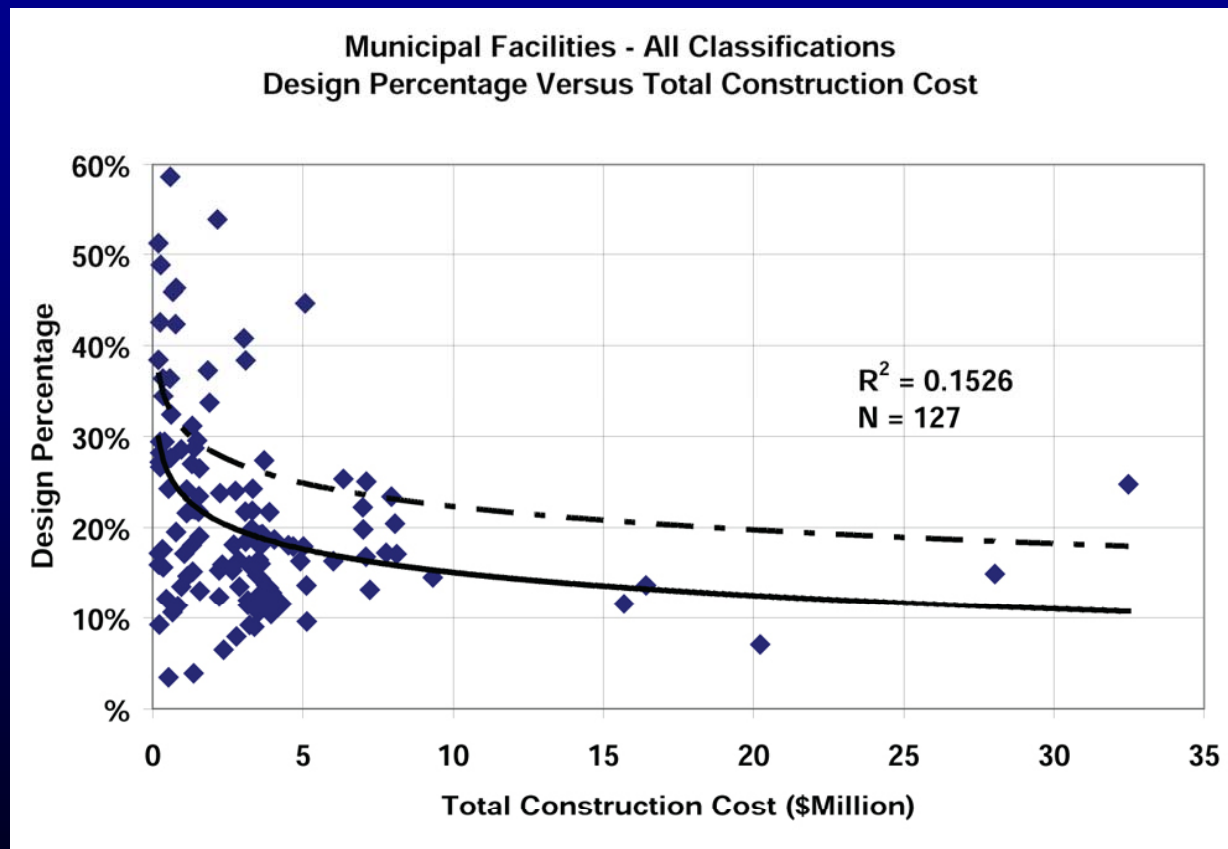
Extensive Adjustments Required to Compare Multiple Agencies

- ◆ Differences in accounting practices across agencies
- ◆ Differences in project-level accounting among projects by same agency
- ◆ Differences across geography
- ◆ Difference in time



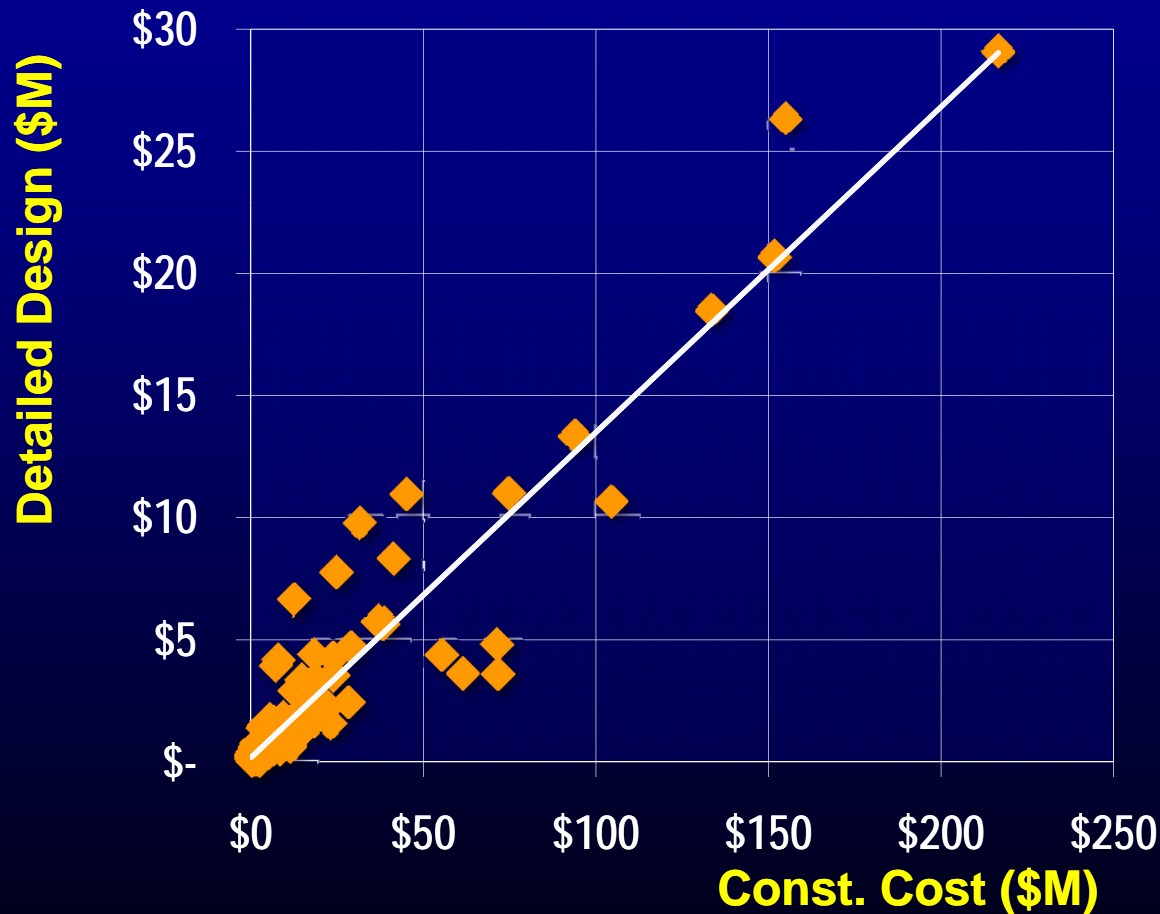
Other Benchmarking Studies Showed Similar Results

- Municipal facilities
- Design (% const.) vs. Const. (\$)
- $R^2 = 0.1526$



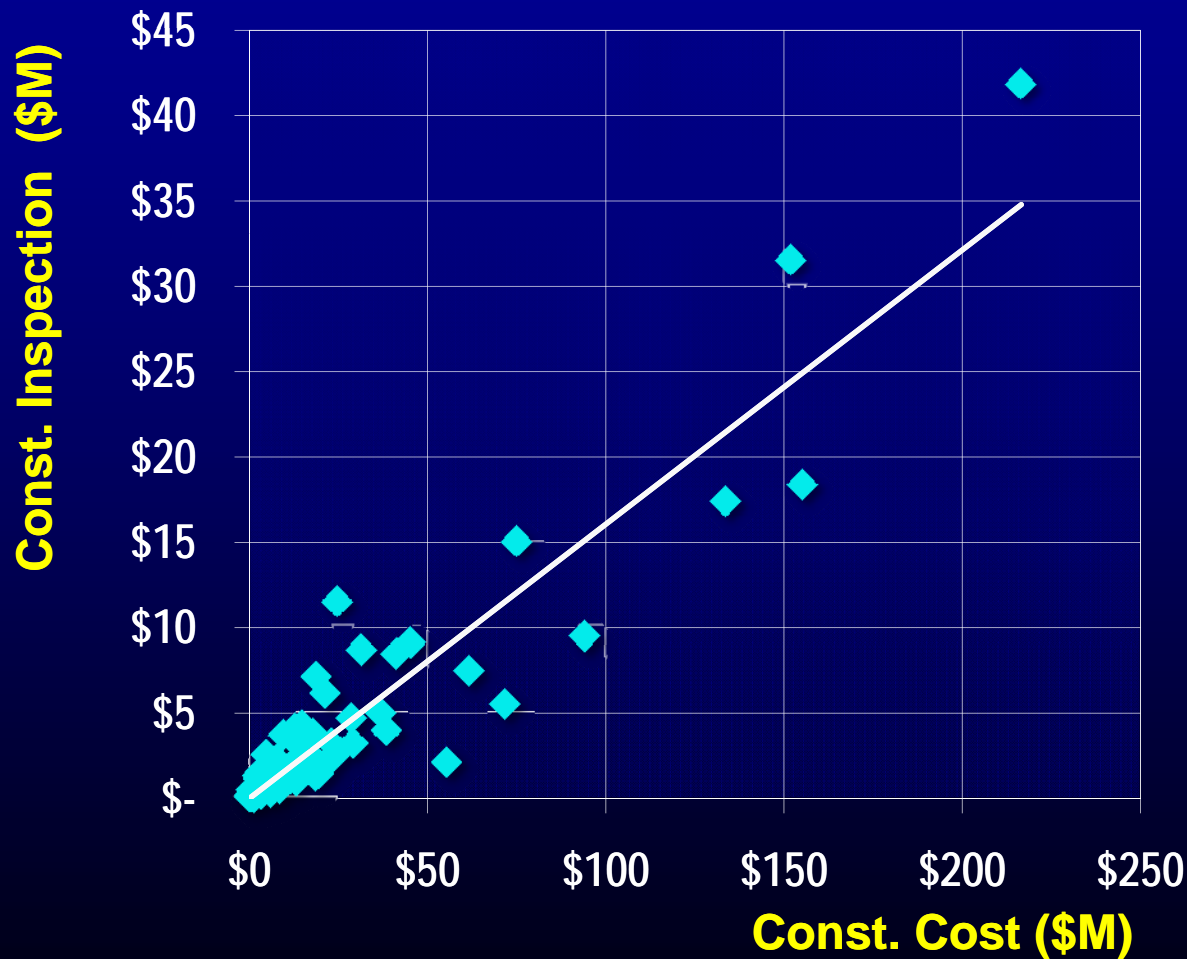
Source: California Multi-Agency CIP Benchmarking Study (Update 2007 Report)

Change in Regression Model Design Measure



- ◆ Design (\$) vs. Const. (\$)
- ◆ 130 projects
- ◆ Better correlation

Change in Regression Model Inspection Measure



- ◆ Const. inspection (\$) vs. Const. (\$)
- ◆ 130 projects
- ◆ Better correlation

Benchmarking Efforts Underway

- **Multi-agency benchmarking**
 - Adding more projects to database
 - 155 projects total
 - Identify BMP's for cost control
 - Develop planning phase BMP's & performance indicators
- **ASCE Manual of Practice 45**
 - Release delayed 1-2 years
- **Metropolitan performance measures**
 - Return to E&CP Comm. with new goals