Capital Improvements Program (CIP)
Cost & Schedule Estimates
Facilities Projects

Department of General Services
September 25, 2009

CountyStat

CountyStat Principles

- Require Data Driven Performance
- Promote Strategic Governance
- Increase Government Transparency
- Foster a Culture of Accountability

Agenda

- **Introductions**
- **Facilities CIP process**
- **Project performance**
  - Design phase
  - Construction phase
- **Current processes for cost estimating and scope control**
- **Wrap-up**

Meeting Purpose

- **Develop data-supported analysis and a clear understanding of major contributing factors for delay and cost overruns in facilities projects.**
  - Responsible parties: CountyStat and DGS
- **Present possible solutions and the appropriate next steps in addressing those factors that cause delay and cost overrun.**
  - Responsible party: DGS

Patterns in Project Schedule and Cost

Goal:

- **Understand the how facilities projects perform against initial schedule and cost expectations**
  - Examine data from the design and construction phases of projects
  - Each phase establishes its own set of schedule and cost expectations with new CIP schedules and budgets
  - Exclude the planning phase because projects in the planning phase are not tracked separately in the budgeting system.
- **Compare historical patterns with the progress of current projects**

Facilities CIP Process

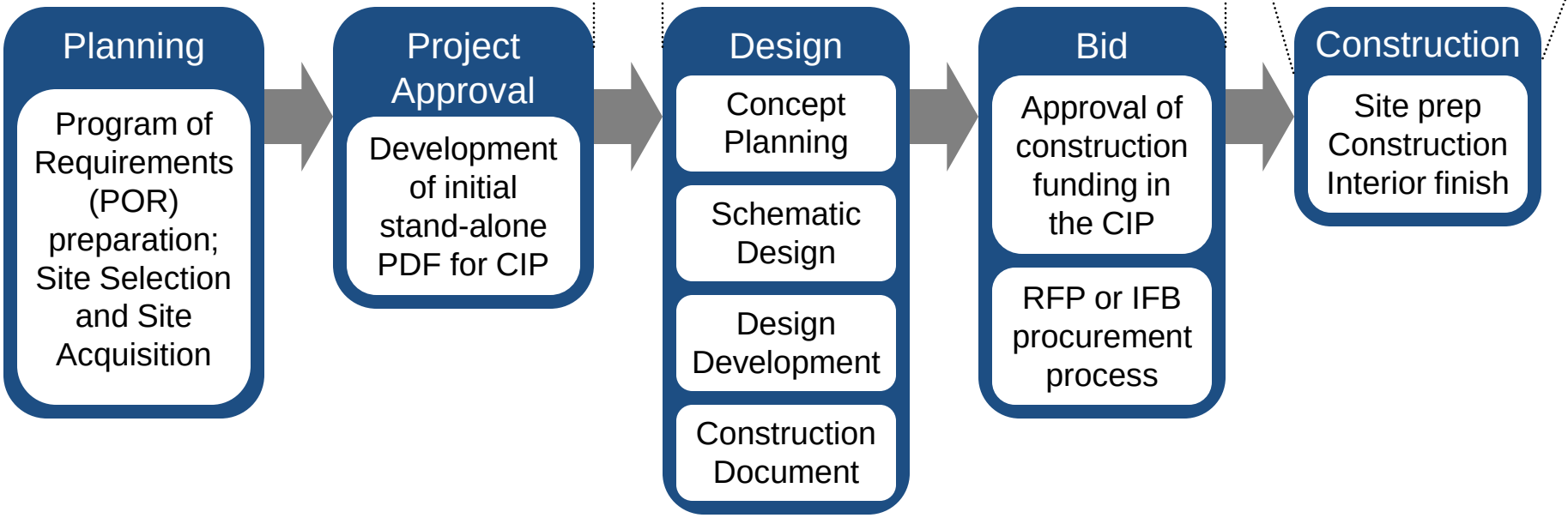
Budget Process:

Planning phase:
Funding through Facilities Planning

Design phase:
Stand-alone PDF with funding for design only

Construction phase:
Funding for construction added to PDF

Facilities Process:



Historical Patterns in Project Schedule and Cost Methodology

- **Threshold: major (>$1 million) "stand alone" projects plus smaller projects that have high-level interest**
- **Analysis of historical patterns**
  - Analyzed 55 major or high-interest projects started FY99-FY08
    - 36 had completed the design phase
    - 21 had completed the construction phase
  - Analyzed schedule performance for both design and construction phases
  - Analyzed cost performance for total project cost
- **Analysis of current projects**
  - Analyzed 47 major or high-interest projects
    - 29 are in the design phase
    - 13 are in the construction phase
    - 5 have been recently completed
  - Analyzed cost and schedule performance for both the design and construction phases

Reporting of Progress for Current Projects Definitions

- **The two major project phases will be tracked and reported separately**
  - Design: Baseline is the cost and schedule contained in the first stand-alone PDF for the project
  - Construction: Baseline is the cost and schedule contained in the first PDF that includes construction dollars
- **DGS, in consultation with OMB, can reset the cost and schedule baselines when the scope of a project has changed significantly**
- **Annual implementation rate will also be tracked to compare actual expenditures with expected expenditures**
- **Projects classified as being on hold will be tracked separately from those that are active**

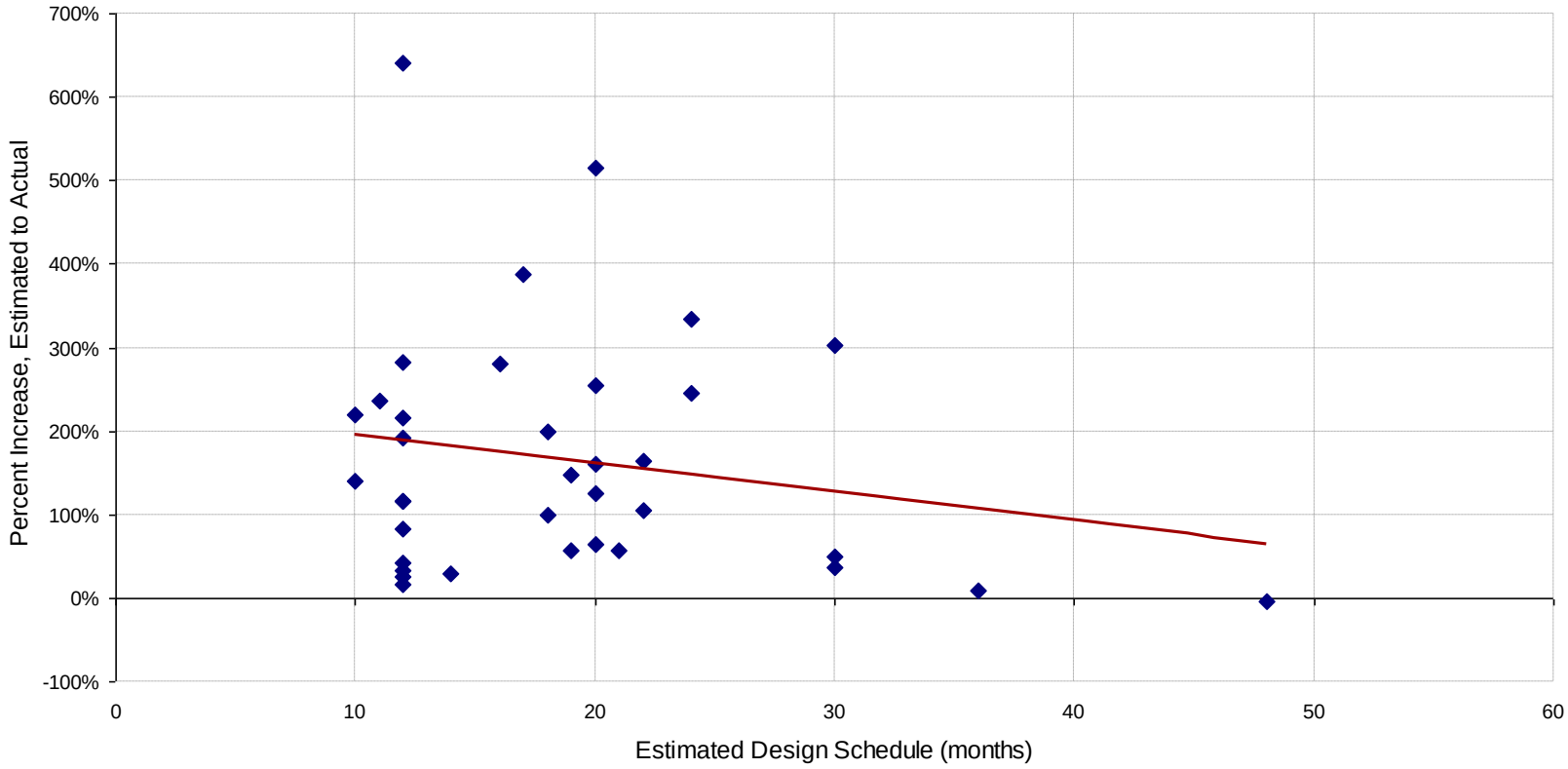
Reporting of Progress for Current Projects Definitions

- **Schedule status: current phase of project (design or construction) is projected to end**
  - Ahead of schedule: at least 90 days before the baseline end date
  - On schedule: within 90 days of the baseline end date
  - Behind schedule: more than 90 days after the baseline end date
- **Cost status: projected cost of current phase (design or construction) is**
  - Under budget: at least 5% below the baseline cost
  - On budget: within -5% to +10% of the baseline cost
  - Over budget: more than 10% above the baseline cost
- **Implementation rate status: projected expenditures for the fiscal year are**
  - Under budget: at least 10% less than budgeted expenditures
  - On budget: within 10% of budgeted expenditures
  - Over budget: more than 10% above budgeted expenditures

Project Performance: Design Phase

- **Historically, most projects do not meet their design schedule expectations by a wide margin**
  - In the chart, the original schedule estimate in months is plotted against the actual schedule expressed as a percent increase
  - Percent increase = (Actual months – Estimated months) / Estimated
    - 0% means no variance from the original estimate (on time)
    - Negative percentages mean the project was early
    - Positive percentages mean the project was late (100% = schedule doubled)
- **Projects currently in the design phase are also often behind schedule and over budget**
  - One third of current projects are on hold
  - 83% are estimated to finish the design phase late

Historic Changes in Design Schedule Since FY99



Average schedule estimate: 18.6 months Average actual: 47.4 months
Average percent increase: 155%

Data includes 36 projects since FY99 that have completed design phase.

Reporting of Current Project Progress: Design Phase Status of Active and On Hold Projects

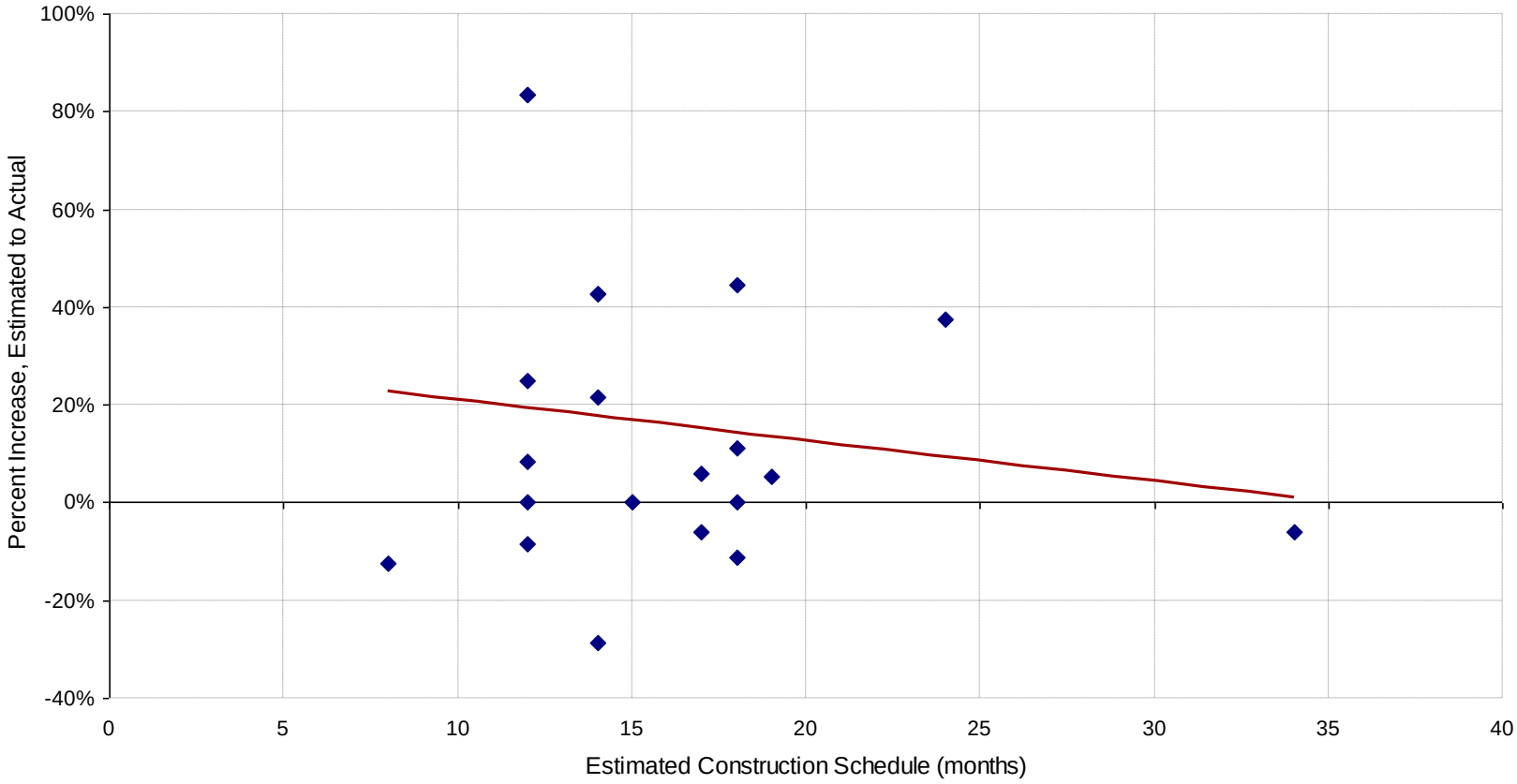
Item	Status	Active Projects	On Hold	Total
Current schedule vs. initial schedule	Ahead of schedule			
	On schedule	5		**5**
	Behind schedule	13	11	**24**
Current cost vs. initial cost	Under budget		1	**1**
	On budget	6	2	**8**
	Over budget	12	7	**19**
	Unknown		1	**1**
FY09 implementation rate	Under budget	10	4	**14**
	On budget	6	3	**9**
	Over budget	2	4	**6**
Total		**18**	**11**	**29**

All status is compared with initial PDF baselines.

Project Performance: Construction Phase

- **Historically, most projects' actual construction schedules are relatively close to their estimates**
  - In the chart, the original schedule estimate in months is plotted against the actual schedule expressed as a percent increase
  - Percent increase = (Actual months – Estimated months) / Estimated
    - 0% means no variance from the original estimate (on time)
    - Negative percentages mean the project was early
    - Positive percentages mean the project was late (100% = schedule doubled)
- **Historically, almost all projects cost more than their original estimates**
- **Most projects currently in the construction phase are behind schedule and over budget**
  - FY09 implementation rate is low with most projects behind their projected expenditures

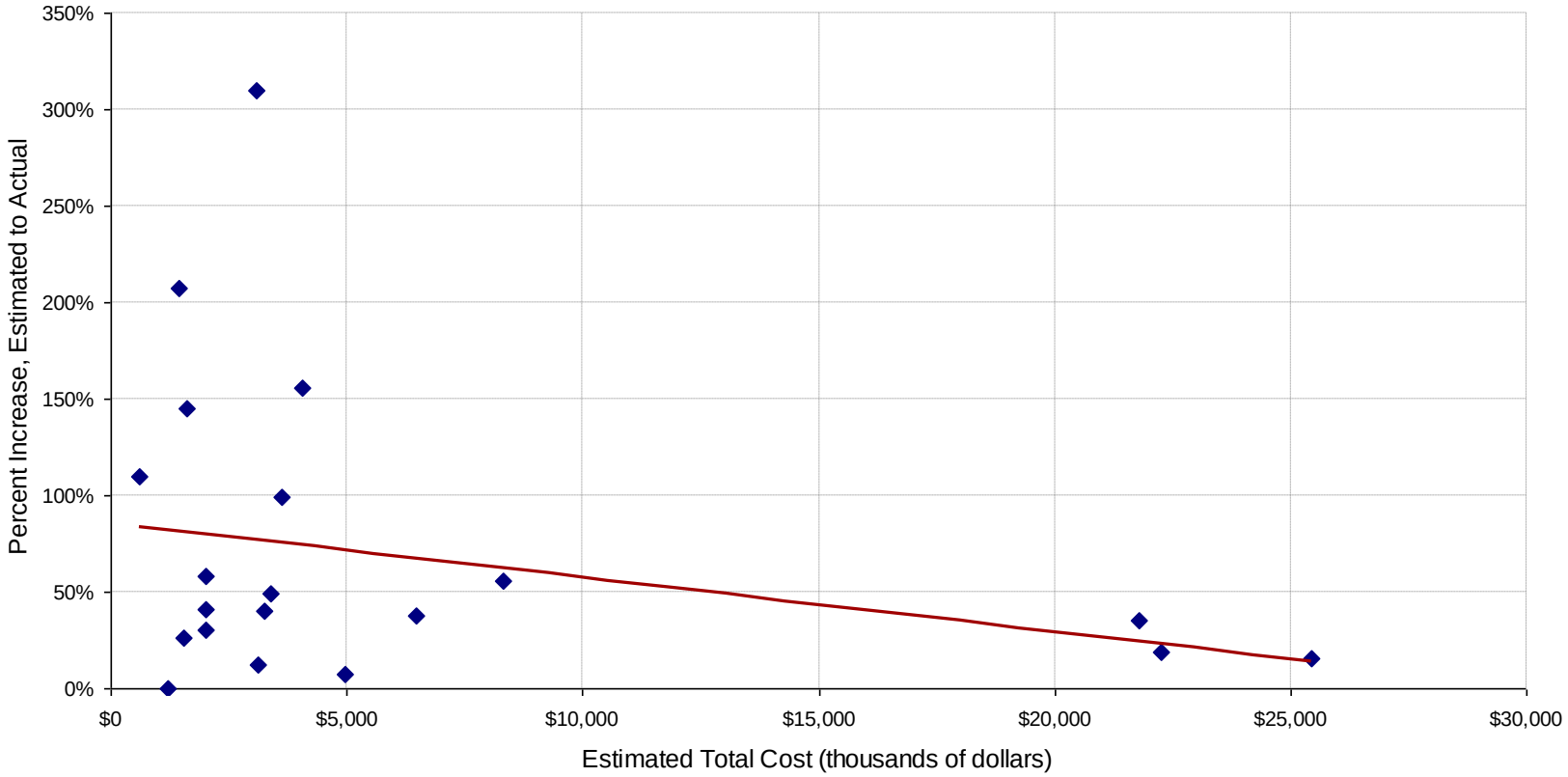
Historic Changes in Construction Schedule Since FY99



Average schedule estimate: 15.9 months Average actual: 18.2 months
Average percent increase: 14.7%

Data includes 21 projects since FY99 that have been completed.

Historic Changes in Total Cost Since FY99



Average cost estimate: $5,941,000 Average actual: $8,548,000
Average percent increase: 44%

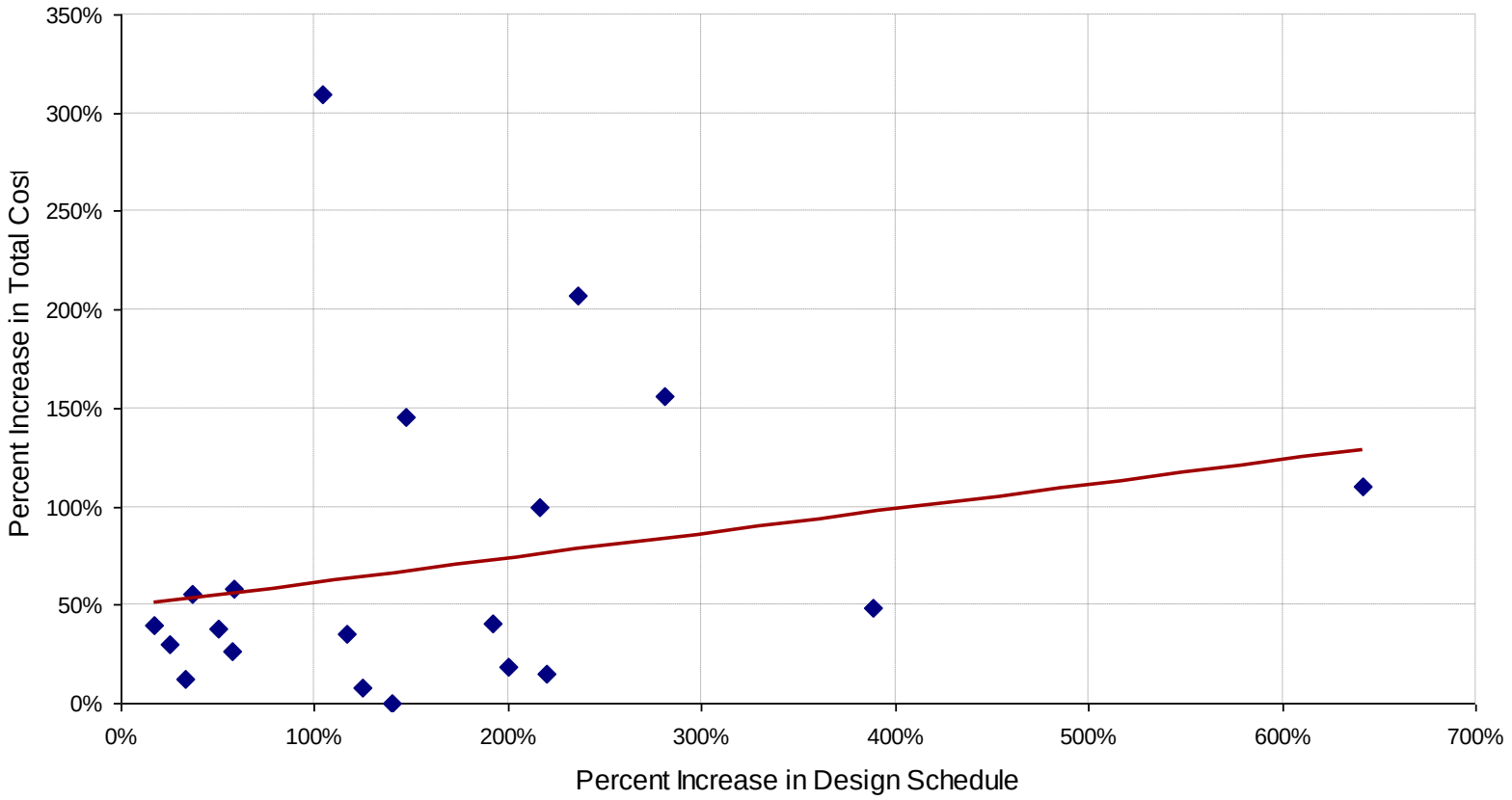
Data includes 21 projects since FY99 that have been completed.

Reporting of Current Project Progress: Construction Phase

Item	Status	Active
Current schedule vs. initial schedule	Ahead of schedule	1
	On schedule	1
	Behind schedule	11
Current cost vs. initial cost	Under budget	1
	On budget	2
	Over budget	10
	Unknown	
FY09 implementation rate	Under budget	9
	On budget	1
	Over budget	3
Total		**13**

All status is compared with initial PDF baselines.

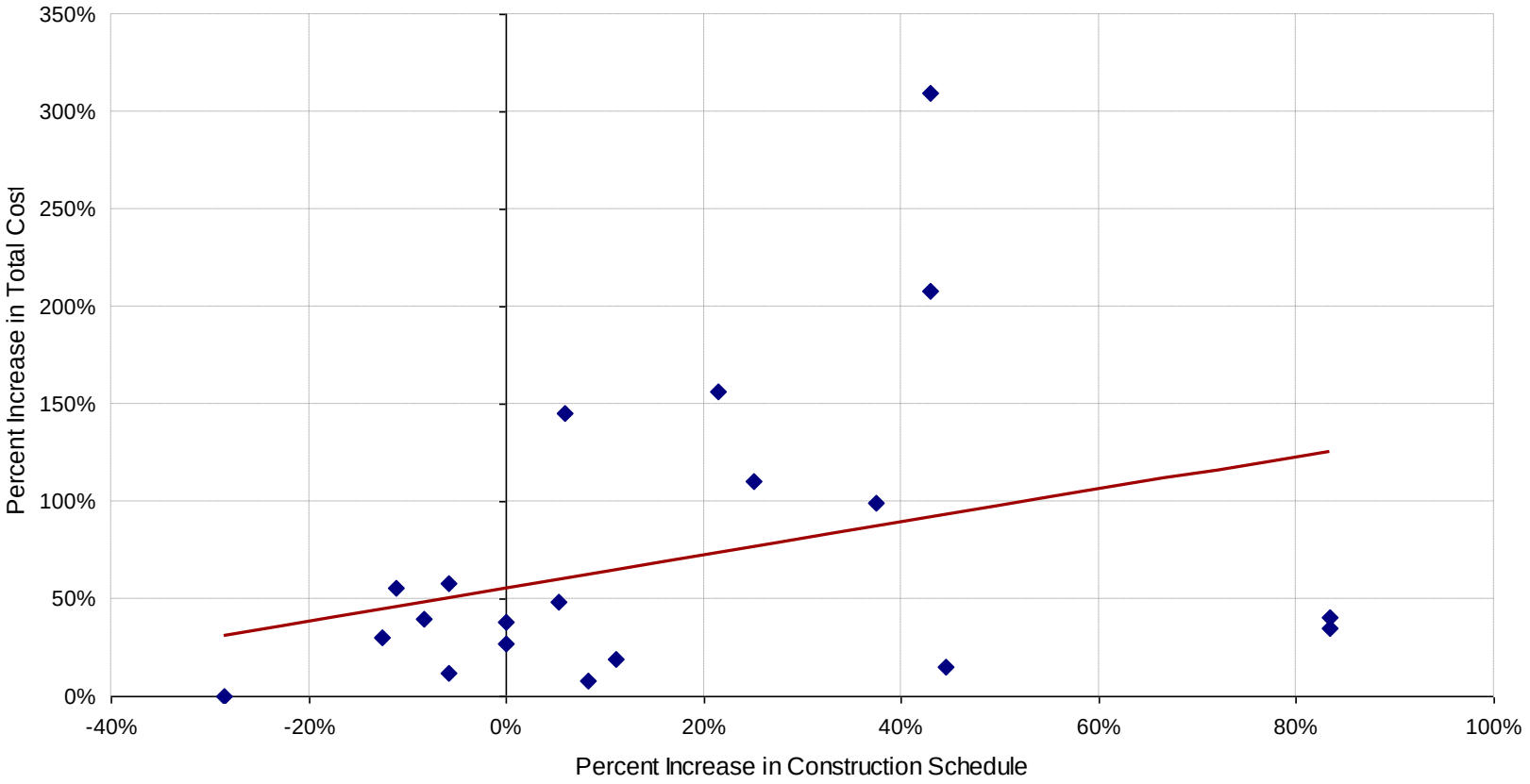
Historic Relationship Between Changes in Design and Changes in Total Cost Since FY99



Delays in the design schedule are associated with increases in total cost.

Data includes 21 projects since FY99 that have been completed.

Relationship Between Changes in Construction and Changes in Total Cost Since FY99



Delays in the construction schedule are associated with increases in total cost.

Data includes 21 projects since FY99 that have been completed.

Reporting of Project Progress
Status of Recently Closed Projects

Item	Status	Total
Current schedule vs. initial schedule	Ahead of schedule	
	On schedule	
	Behind schedule	5
Current cost vs. initial cost	Under budget	1
	On budget	
	Over budget	4
FY09 implementation rate	Under budget	
	On budget	1
	Over budget	4
Total		5

- **Recently completed projects include**
  - Council Office Building Renovations
  - Indoor Air Quality Improvements -Brookville H
  - Moneysworth Farm Reuse
  - Vehicle Recovery Facility
  - West Germantown Fire Station
- **Compared to most recent PDF**
  - Schedule
    - 2 - on schedule
    - 3 - behind schedule
  - Budget
    - 3 - under budget
    - 2 - on budget

All status is compared with initial PDF baselines.

Implementation Rate

	Expected FY09 Drawdown	Actual FY09 Drawdown	Difference
Design	$12,141	$6,098	-$6,043
Construction	$78,405	$24,559	-$53,846
On Hold	$3,518	$9,257	$5,739
Closed	$4,834	$10,089	$5,255
Total	**$98,898**	**$50,003**	**-$48,895**

Note: All amounts are in thousands of dollars

Causes of Schedule and Cost Discrepancies

	Number of projects*		Inside or Outside County Control			
	#	%	Inside	Outside	Both	N/A
Top Causes of Schedule Delays						
Scope	**20**	***43%***	6	0	9	5
Land issues	**13**	***28%***	4	2	5	2
Budget/financing	**5**	***11%***	2	1	2	0
Contractor delays	**5**	***11%***	1	2	2	0
Top Causes of Cost Discrepancies						
Scope	**11**	***23%***	8	1	2	0
Actual bids	**7**	***15%***	1	0	0	6
Site/environment	**5**	***11%***	3	1	1	0
Top Causes of Implementation Rate Discrepancies						
Design delays	**13**	***28%***				
Site or land issues	**9**	***19%***				
Scope	**6**	***13%***				

** of the 47 current major and high-interest projects*

Current Method of Schedule Estimating
Department of General Services

- **Design Phase Schedules**
  - Have traditionally been based on the project cost and architect/engineer's (A/E) contractual responsibility to develop the different stages of design.
  - Recent analysis has determined that the design phase schedule is typically controlled more by interaction by outside entities (WMATA, SHA, WSSC, M-NCPPC, private developer, etc.) than by A/E performance.
  - DGS has just started to model new design projects to more fully account for these third-party interactions.
- **Permitting Phase Schedules** are based on experience with DPS.
- **Bidding Phase Schedules** are based on experience with IFBs and RFPs.
- **Construction Phase Schedules**
  - Estimated initially during PDF generation and refined during the design process.
  - Some of the factors included in determining the construction duration are: project cost, project phasing requirements, and project type (example: renovation vs. new construction).

Project schedules are developed for four general project phases: Design, Permitting, Bidding and Construction. The schedule of each phase is developed primarily based on experience.

Current Method of Cost Estimating
Department of General Services

- **Base cost per square foot**
  - "Base" square footage costs (without markups for general conditions, escalation, etc.) for each type of building are determined based on recent County cost experience for that type of building. For buildings with limited recent data, industry cost numbers are used.
  - Base building costs are adjusted by standard factors for general requirements, overhead & profit, bonds, risk factors, escalation/inflation and contingencies.

- **Adjusted by escalation and risk factors***
  - Detailed County spreadsheet is utilized to incorporate adjustments
  - Inflation and escalation of price of goods & services *(2.5% for inflation, 2.8% for escalation)*
  - Risk factors for known project challenges like being in a historic district *(5% or less)*
  - Risk factors for unknown project challenges such as for unknown or uninvestigated sites
  - Contingency factors at all phases: design *(10%)*, bid *(1%)*, construction *(10%-12%)*

DGS and OMB have developed this new cost estimating method for the FY11-16 Capital Improvement Program.

**FY11-16 CIP escalation and risk factors are shown in parenthesis for each item.*

Old Method of Cost Estimating (Pre 2007)
Department of General Services

- **Base cost per square foot**
  - "Base" construction square footage costs were determined by outside cost estimators - who utilized their markups for General Conditions, Escalation, etc.). County staff determined other costs (such as design and furniture).

- **Adjusted by escalation and contingencies**
  - Inflation and escalation of price of goods and services
  - Contingency factors at all project phases (design, bid, construction)

New Method of Cost Estimating
Department of General Services

- **Pros**
  - Provide for more uniform approach and results for all projects within a building type and across building types
  - Incorporates knowledge learned on previous County projects into the process
  - Use of detailed spreadsheet provides standardization and allows easier comparison and adjustment of projects
- **Cons**
  - Budget preparer must be knowledgeable about the DGS spreadsheet to produce correct results
  - Use of multiple “worst case” factors can result in high “final” square foot costs.

Current Strategies for Scope Control Identified by the Department of General Services

- **Scope control during planning**
  - Obtain approved Programs of Requirement (POR) from User Agencies and OMB prior to project funding
  - Work with Regional Services Centers to select site prior to project funding
  - Work with Real Estate to acquire selected site prior to project funding
- **Scope control during design**
  - Scope Review (against the approved POR) at each design submission (typically 15%, 30%, 60% and 95% design levels)
  - Major User-requested scope changes must have OMB approval.
- **Scope control during construction**
  - Major User-requested scope changes must have OMB approval.

Wrap-Up

- **Confirmation of follow-up items**
- **Time frame for next meeting**

Reporting of Project Progress
Issues and Mitigation Strategies

Projects that are behind schedule or over budget

1. **Project name: Silver Spring Civic Building**
   - Issue: Construction completion has been delayed due to combination of Contractor and Design Document issues
   - Mitigation strategy: Working with contractor to expedite completion by July 2010.
2. **Project name: East Germantown Fire Station**
   - Issue: Construction completion has been delayed due to Contractor performance issues
   - Mitigation strategy: Working with contractor to complete in Spring 2010.
3. **Project name: Clarksburg Fire Station**
   - Issue: Start of design has been delayed pending site acquisition; one parcel may need to go to condemnation.
   - Mitigation strategy: Expedite Site acquisition.

Reporting of Project Progress
Issues and Mitigation Strategies

Projects that are behind schedule or over budget

4. Project name: Burtonsville Fire Station Addition

1. Issue: Start of construction was delayed due to SPA, Forestation and permitting issues.
2. Mitigation strategy: None; construction is on schedule

5. Project name: Female Facility Upgrades

- Issue: Start of construction was delayed due to coordination of issues with Volunteers
- Mitigation strategy: None; construction is scheduled to start in October 2009.

6. Project name: Travilah Fire Station Addition

- Issue: Changes in site and potential changes in Scope has delayed design and increased costs.
- Mitigation strategy: None; design to new site and scope.

Reporting of Project Progress
Issues and Mitigation Strategies

Projects that are behind schedule or over budget

7. **Project name: Wheaton Rescue Squad Relocation**
    1. Issue: Start of construction was delayed due to Volunteer's Design and Financing issues.
    2. Mitigation strategy: None; schedule dependent on Volunteers.
8. **Project name: Glen Echo Fire Station Renovation**
    - Issue: Start of design has been delayed while project scope is coordinated with Volunteers.
    - Mitigation strategy: Expedite scope coordination to extent possible
9. **Project name: Glenmont Fire Station Replacement**
    - Issue: Start of design has been delayed pending acquisition of land from WMATA; available land may require adjustment of scope.
    - Mitigation strategy: Expedite site acquisition.

Reporting of Project Progress
Issues and Mitigation Strategies

Projects that are behind schedule or over budget

10. Project name: 6th District Police Station

1. Issue: Start of construction was delayed due to Developer delays.
2. Mitigation strategy: None; Watkins Mill Extension being prepared for bidding; precursor to Police Station project.

11. Project name: 3rd District Police Station

- Issue: Start of design had been delayed due to site acquisition and need for site planning / coordination with DHCA housing project. Master planning of site increased design costs.
- Mitigation strategy: None; design is proceeding.

12. Project name: Animal Shelter

- Issue: Progress of design has been delayed by changes in scope, site (SPA) issues and discussion period with U.S. Humane Society. Budget has significantly increased due to increased scope.
- Mitigation strategy: Coordinate with MNCPPC to expedite site and SPA issues. Request additional funding for present scope.

Reporting of Project Progress
Issues and Mitigation Strategies

Projects that are behind schedule or over budget

13. Project name: North County Maintenance Depot

1. Issue: Design has been placed on hold pending site selection re-evaluation – caused by Environmental concerns with present site in SPA.
2. Mitigation strategy: Expedite new site selection process – to allow design to start again..

14. Project name: Transfer Station Improvements II (Gude Landfill)

- Issue: Design has been placed on hold pending ongoing State site environmental evaluation.
- Mitigation strategy: None; awaiting State environmental evaluation of site.

15. Project name: Montgomery Mall Transit Center

- Issue: Project is on hold pending Developer's decision to move forward with mall expansion project.
- Mitigation strategy: None.

Reporting of Project Progress
Issues and Mitigation Strategies

Projects that are behind schedule or over budget

16. Project name: Indoor Air Quality - EMOC

1. Issue: Design had been placed on hold pending decision to proceed with project in light of Smart Growth Initiative. Actual bids exceeded budget.
2. Mitigation strategy: Funds were transferred from another IAQ project to allow construction contract award; construction is underway.

17. Project name: Data Center Rehabilitation

- Issue: Design took longer than the one year provided in the PDF.
- Mitigation strategy: None; construction is in progress.

18. Project name: Brookville Service Park II

- Issue: Permitting took 6 months longer than expected due to various issues.
- Mitigation strategy: None; construction started in July 2009.

Reporting of Project Progress
Issues and Mitigation Strategies

Projects that are behind schedule or over budget

19. Project name: Silver Spring Transit Center

1. Issue: Delays in permitting and coordination with WSSC, Pepco, MTA and WMATA have significantly delayed construction progress. Costs have also risen due to the delay and design changes.
2. Mitigation strategy: Working with contractor to minimize delays; requesting additional funds.

20. Project name: Silver Spring Library

- Issue: Design has taken longer due to significant changes in Scope and intensified interaction with the Public and Council.
- Mitigation strategy: To expedite the start of construction, DGS will design and award a foundation package first.

21. Project name: North Bethesda Community Recreation Center

- Issue: Design is on hold pending site acquisition via agreement with Developer.
- Mitigation strategy: None.

Reporting of Project Progress
Issues and Mitigation Strategies

Projects that are behind schedule or over budget

22. Project name: White Oak Community Recreation Center

1. Issue: Design has taken longer due to site issues including obtaining Park Permit from MNCPPC, the owner of the site.
2. Mitigation strategy: Moving forward with issuance of contractor RFP in October 2009 while resolving permit issues.

23. Project name: North Potomac Community Recreation Center

- Issue: Project scope has been significantly affected due to discovery of extensive wetlands on the project site.
- Mitigation strategy: Working with Department of Recreation on options for the site.

24. Project name: Mid-County Community Recreation Center

- Issue: Construction completion has been delayed due to: contractor performance, redesign of access road to resolve neighbor's complaint and spalling masonry block walls.
- Mitigation strategy: Working to resolve all issues to obtain completion of construction by end of 2009.

Reporting of Project Progress
Issues and Mitigation Strategies

Projects that are behind schedule or over budget

25. Project name: Wheaton Community Recreation Center - Rafferty

1. Issue: Start of Design has been delayed pending acquisition of adjacent land and execution of MOU with developer.
2. Mitigation strategy: Expedite MOU execution to allow design to start.

26. Project name: Neighborhood Recreation Centers (Plum Gar, Scotland, Good Hope and Ross Boddy)

- Issue: PDFs were developed by Council without a corresponding scope, schedule and budget. Need to work with Department of Recreation and Communities to develop scopes of work prior to start of design.
- Mitigation strategy: Expedite process to the extent possible.