



# CPARB Presentation

## Project Data Review

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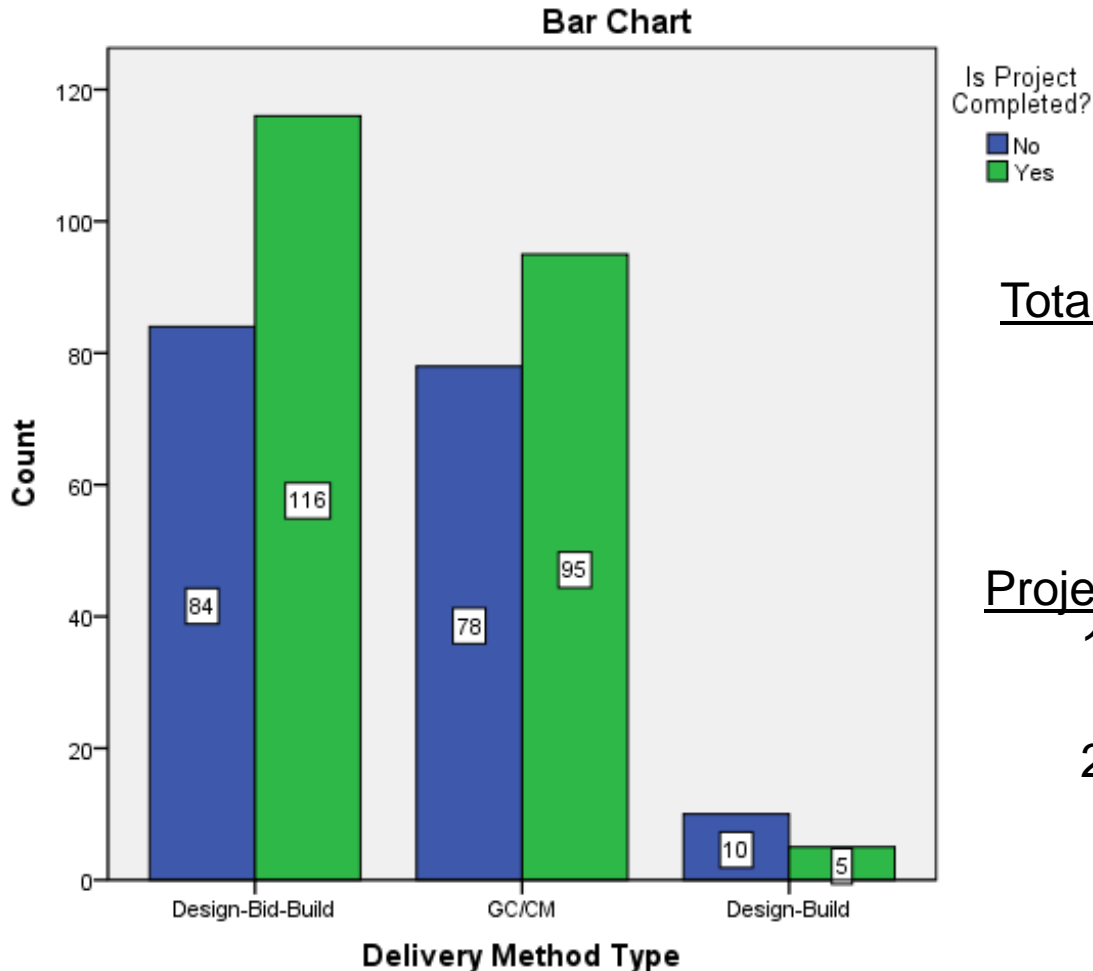
# Database Development

- Manual surveys in 2000 and 2005 collected data on GC/CM and Design-Build projects resulting in two reports.
  - Washington State Alternative Public Works Methods Oversight Committee (APWMOC) Study, Authors Septelka & Goldblatt
  - Survey of General Contractor/Construction Management Projects in Washington State for Joint Legislature Audit and Review Committee (JLARC), Authors Septelka & Goldblatt
  - Both reports are available on the CPARB website
- As a result of JLARC's 2005 audit RCW 39.10 was revised to require mandatory GC/CM and Design-Build Project reporting by agencies.

# Database Development continued

- The Department of General Administration (GA) was tasked to manage reporting and collect data.
- The on-line Project Survey was launched in 2008 and the on-line Team Survey was launched in 2010.
- The Database also contains historical project information collected from the two previous studies.

# Summary of Database



## Total of 388 Projects:

200 DBB Projects

173 GC/CM Projects

15 Design-Build Projects

## Project Date Range from :

1991 Actual Construction Start  
to

2013 Planned Construction Start

# Data Survey Types

- Project Data Survey
  - Agency is responsible for reporting data
  - Objective reporting on schedule, cost, quality, claims, diversity, competition
  - On-line reporting started in 2008
- Team Survey
  - Reported by agency's project representative, designer, contractor, subcontractors
  - Subjective on project performance
  - On-line reporting started in September 2010

# Data Collection Process

- Data is collected in two phases:
  1. At the planning stage of a project prior to GC/CM selection  
Project Survey Phase 1
  2. At project completion  
Project Survey Phase 2  
Team Surveys

# This Study

- For this study the data was reviewed to find a population of the most recent projects representing each delivery method to provided a sample that could provide meaningful statistics.
- Date Range Limits - Since completion data is not collected until project closeout current data was not available for GC/CM project procured in 2009 & 2010, and limited to some 2007 & 2008 projects that have completed.

# Not Included In Study

- Design-Build projects were limited to only 5 projects that were reported as completed and it was determined that there was not enough data to provide meaningful analysis.
- Team Survey data collection did not start until late 2010 and it was determined that there was not enough data to provide meaningful analysis.



# Limits to the Study

- Collection of data on DBB projects is not mandatory, and limited to agencies who choose to participate. Agencies are mandated to provide GC/CM and DB project data.
- DBB projects in the database are selected by an agency and might not represent all the projects built by the agency or other agencies.

# Limits to the Study continued

- Project types, complexity, size, and schedule, years built vary.
- The study results should not be perceived as a reflection of performance on all state and local projects or project types.
  - 70% of the data represent performance on WA State agency projects
  - 53% of the data represent performance on higher education facilities type projects
  - 41% of the project have a renovation element to the project

# Limits to the Study continued

- Analysis is drawing upon self-reported data and not verified by the researcher.
- Several agencies have reported issues with reporting data:
  - Difficulties in entering data
  - Questions on what data is to be entered
  - Data previously entered or reported is incorrect. (The data entered in the planning phase is locked within 24 hrs. and an agency must contact GA to change data entered)

# Population of the Study

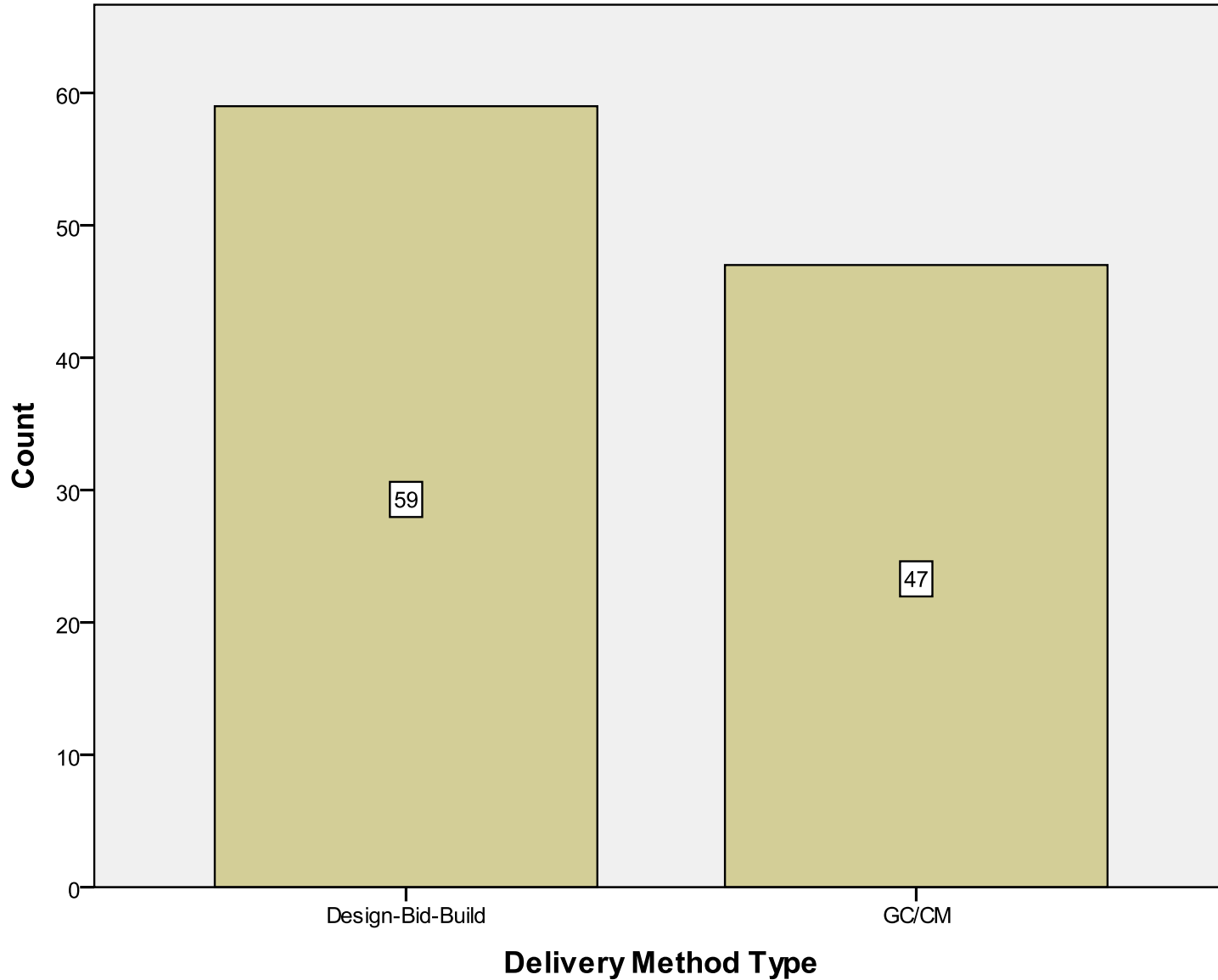
# GC/CM & DBB Data

- The database contained 211 completed projects.
  - 95 GC/CM
  - 116 DBB
- Projects were reviewed and some projects were deleted from the Study that had incomplete information or information that appeared to be in error.

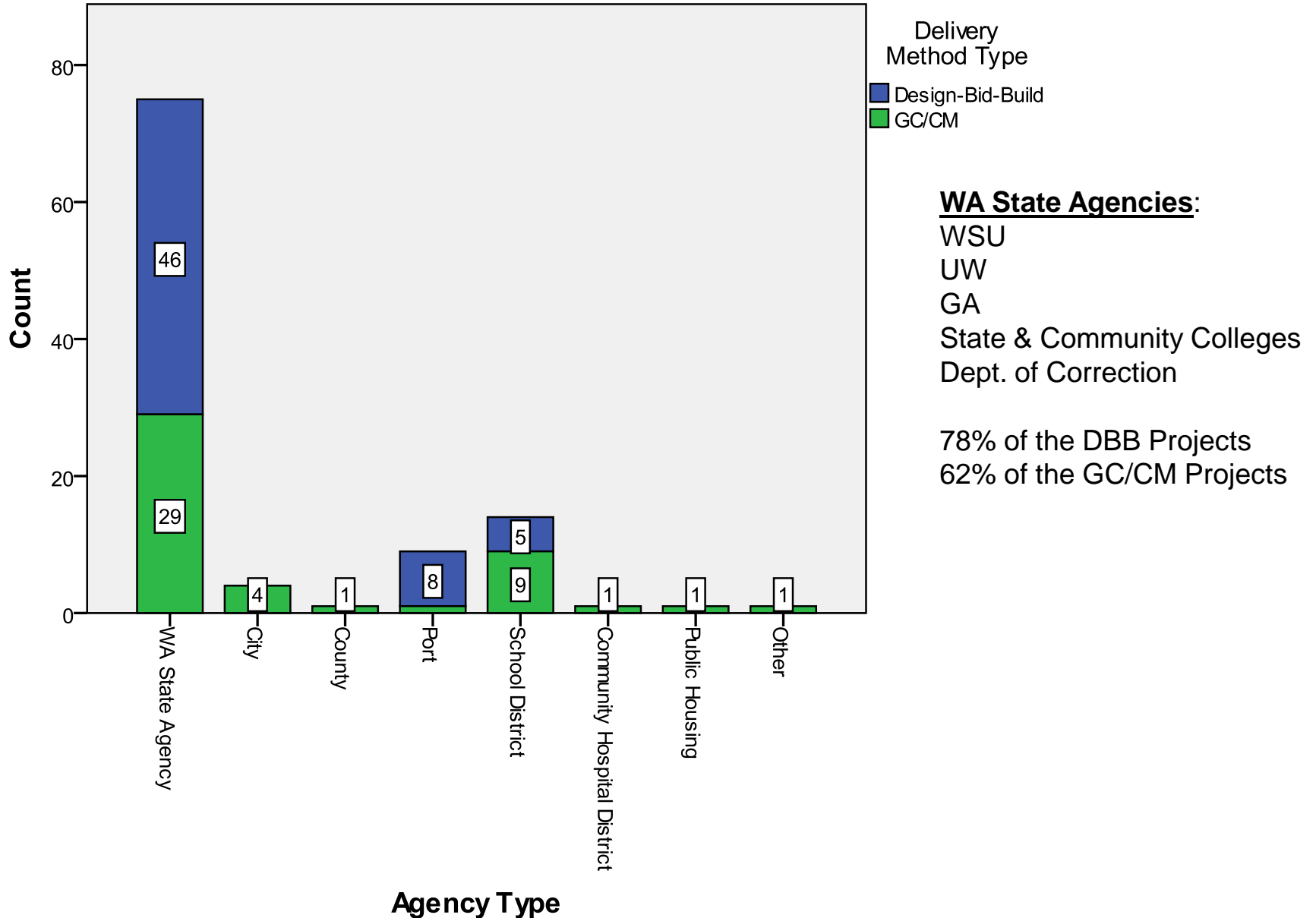
# GC/CM & DBB Data

- To provide meaningful analysis it was determined a population of a minimum of 40 projects was needed.
- Since the database contains historical data on projects built in the 1990's the study limited the pool of projects to projects with a construction finish date of 2003 or later to meet the needed population of projects for the study.

# Study Data Population

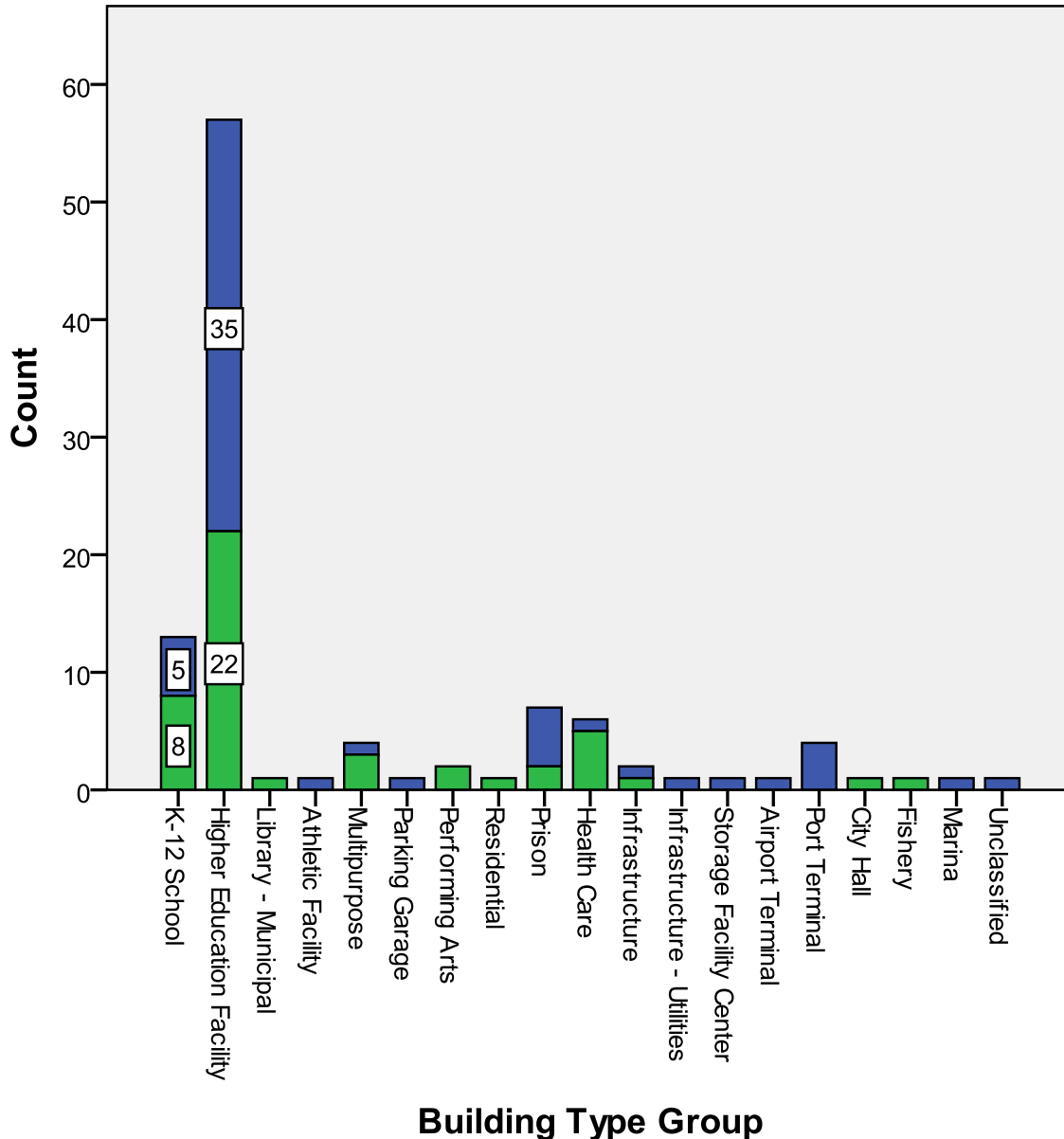


# Agencies





# Building Types



Delivery Method Type

- Design-Bid-Build
- GC/CM

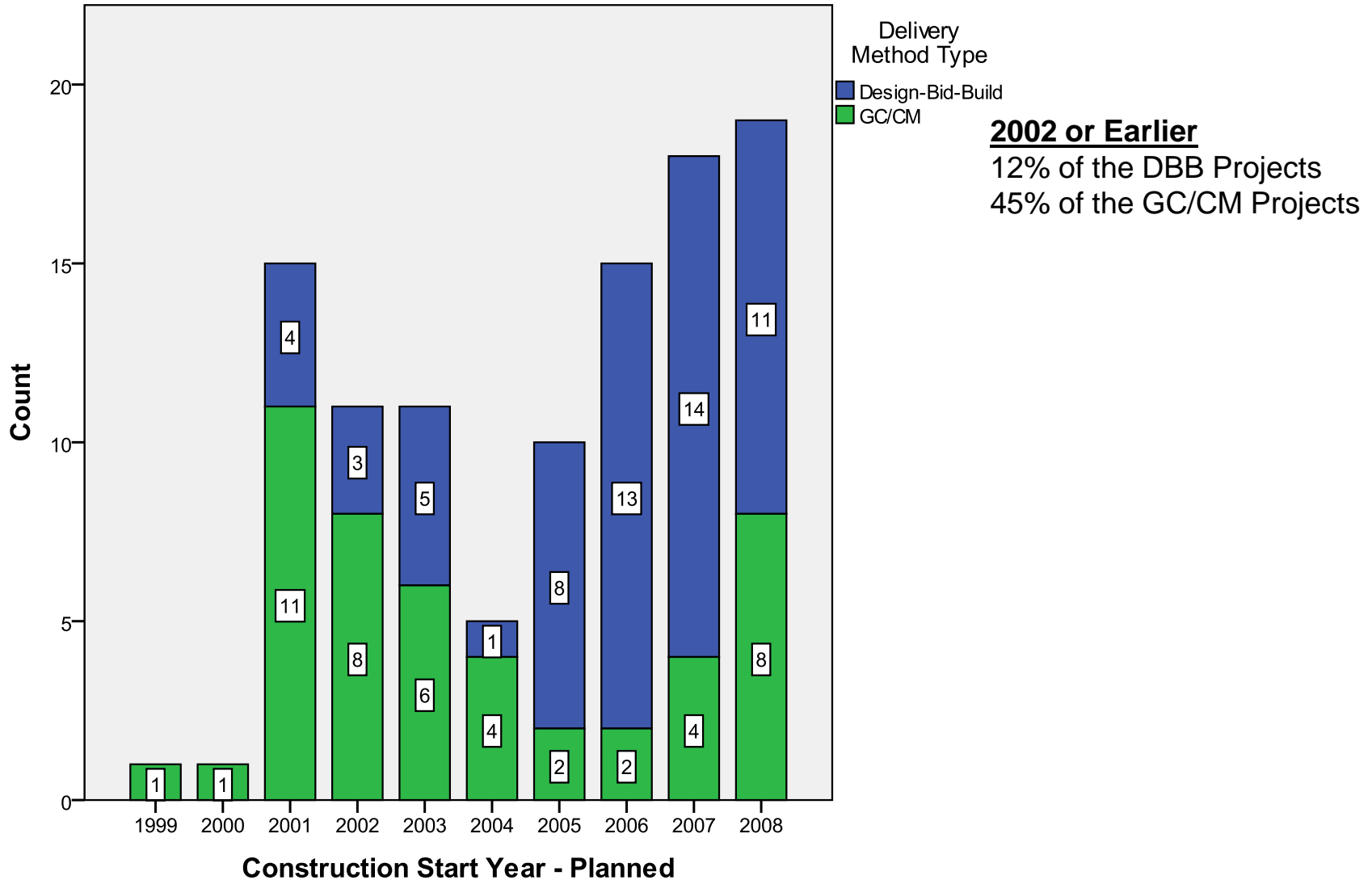
## Higher Education Facilities

59% of the DBB Projects  
47% of the GC/CM Projects

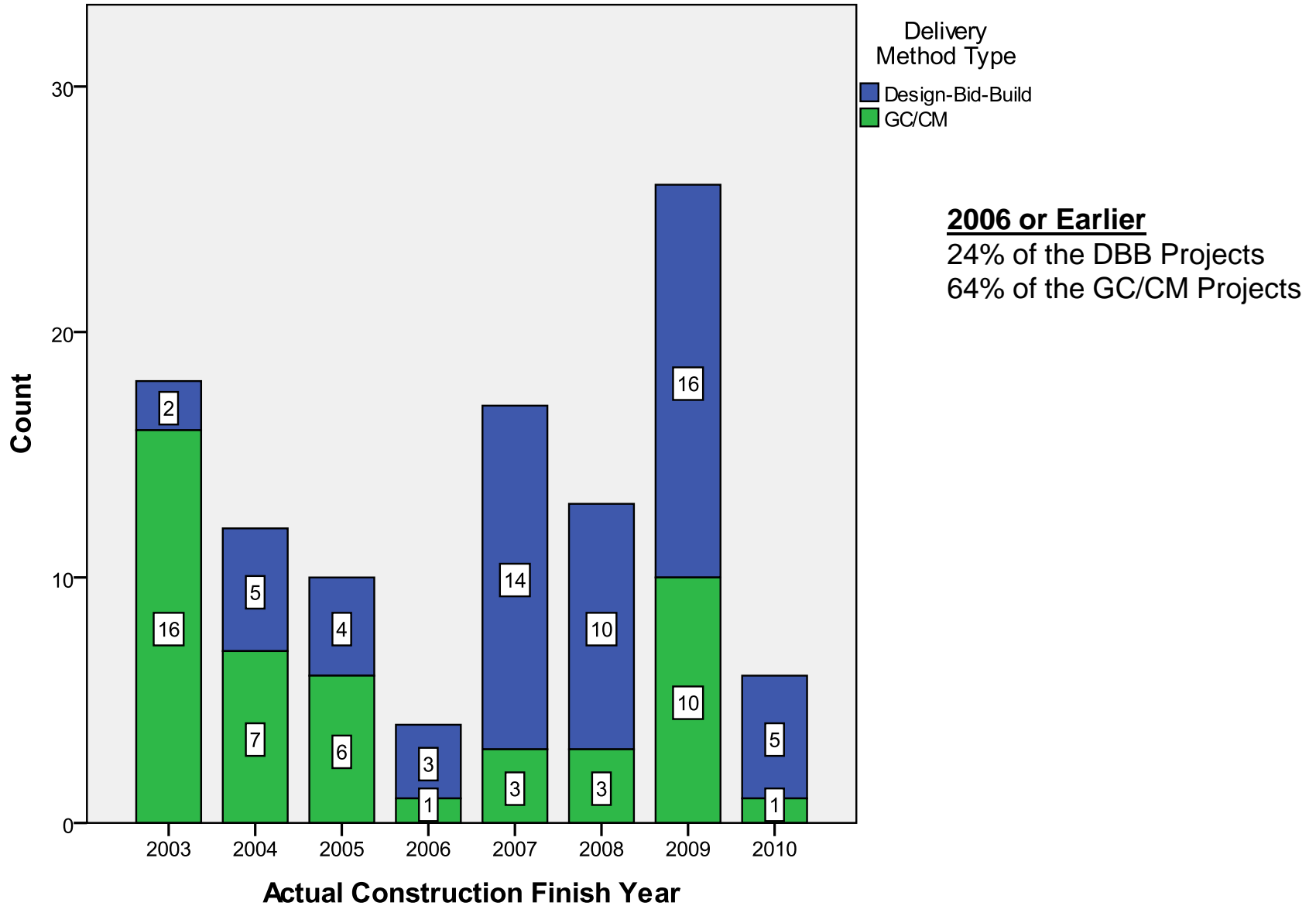
## Project with Renovation Element

46% of the DBB Projects  
38% of the GC/CM Projects

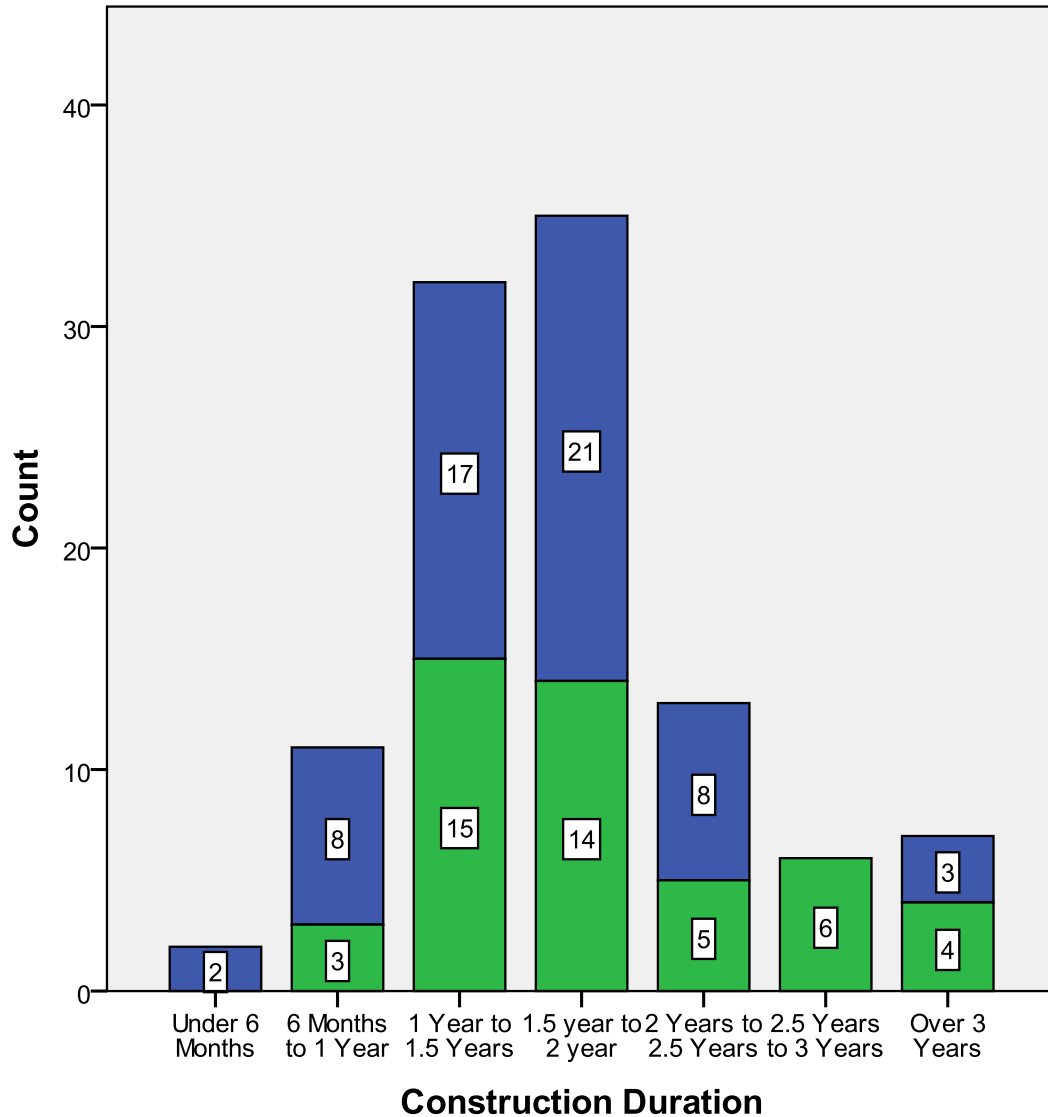
# Year - Construction Started



# Year – Construction Completed



# Construction Duration



Delivery Method Type

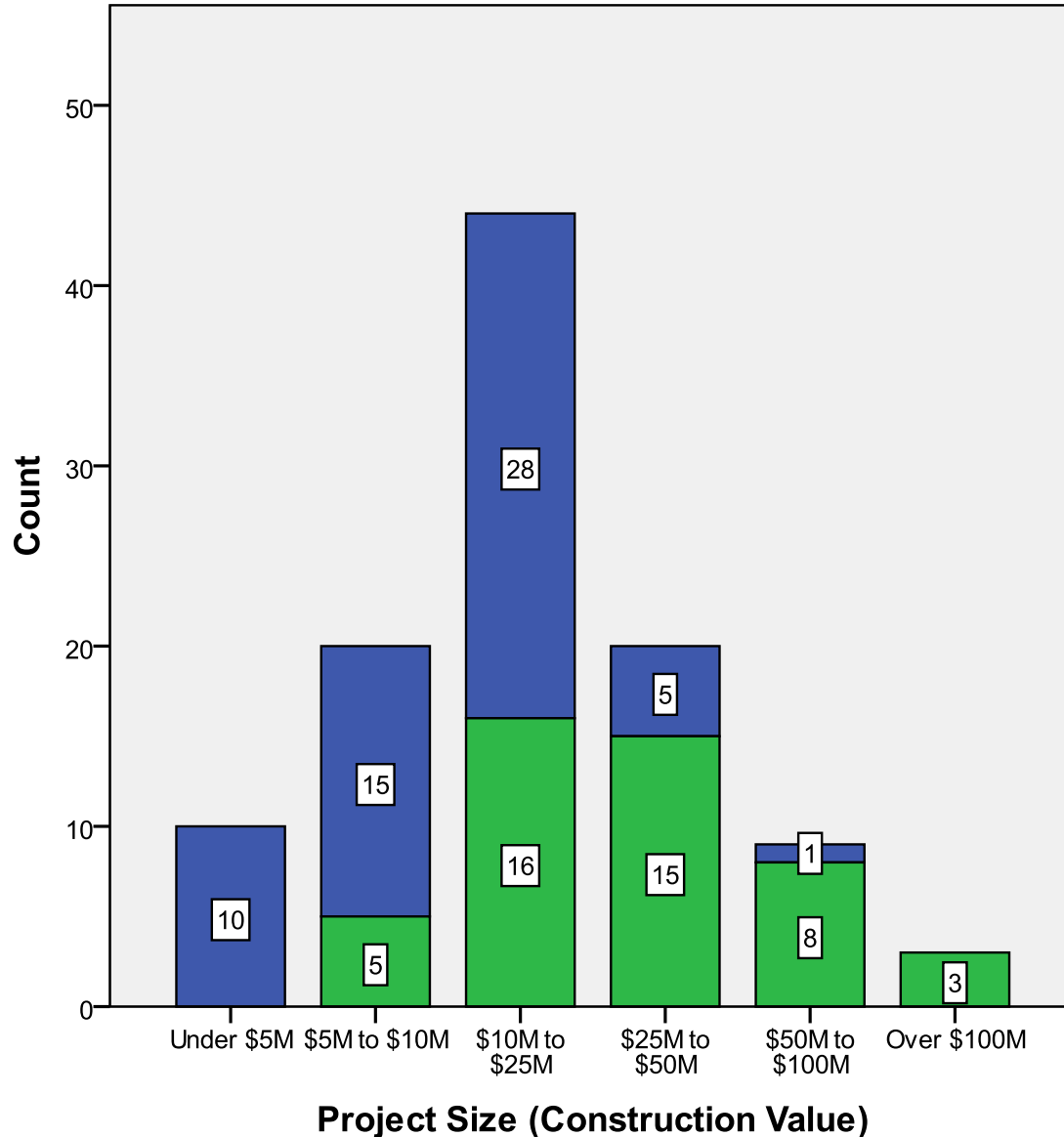
- Design-Bid-Build
- GC/CM

Under 1 year duration  
17% of the DBB Project  
6% of the GC/CM Projects

1 to 2 year duration  
65% of the DBB Project  
62% of the GC/CM Projects

Over 2 years duration  
18% of the DBB Project  
32% of the GC/CM Projects

# Construction Project Size



Delivery Method Type

- Design-Bid-Build
- GC/CM

## \$10M or Under

42% of the DBB Projects

11% of the GC/CM Projects

## \$10M to \$50M

56% of the DBB Projects

66% of the GC/CM Projects

## Over \$50M

2% of the DBB Projects

23% of the GC/CM Projects

# Data Analysis

# Data Analysis

- Data is reported using standard statistical reporting methods such as:
  - Mean (average response) The mean can misrepresent the data when evaluating a small and diverse data set.
  - Median (the response in the middle of a set of responses) The median prevents abnormal averaging that can occur when a few projects have a high or low study value. For this study the median value would depict a more accurate picture in summarizing the results.
  - Standard Deviation (measure of dispersion from the mean).
- Significant testing, where possible, was performed for predicting average performance .

# Data Analysis continued

- The project population was too small to test for significance or correlation between study sub-groups such as similar building types or between Agencies.
- Some numbers are rounded, so the totals may not agree to the sum of the numbers. Such variations are few and insignificant.
- Not every respondent answered every question, so sample sizes vary. Statistics are reported based on valid responses within each set.



# Key Performance Metrics

- Schedule
- Cost
- Contract Change
- Quality Standards
- Protest & Claims
- Supply Diversity
- GC/CM Competition

# Summary of Results

- The averages of the performance metrics should not be perceived as a reflection of all state and local projects.
- Variables may impact project delivery performance in meaningful ways. For instance, data relative to expanded scope of work or work element overruns may indicate the ability of the delivery system to accommodate or handle changes during stages of the project life cycle.
- The data reflect base building time and cost only. It is recognized that a job may grow in scope for several reasons that may or may not lead to cost or schedule growth.

# Summary of Results continued

- **Schedule Performance**

- Schedule growth was not significantly different in comparing all GC/CM and DBB projects. The construction growth median indicated there was no (0%) schedule growth for either delivery method, but results varied when cross studied by the length of project duration.
- GC/CM projects were 47% faster in speed of project delivery compared to DBB projects and 34% faster in speed of construction delivery, but both varied when cross studied by project square foot size groups.
- Subjective results indicated that 97% of the GC/CM projects in the study met the Agency's schedule expectations out performing DBB projects by 7.4%.

# Summary of Results continued

- **Cost Performance**

- Project cost growth for all projects was not significantly different in comparing GC/CM and DBB projects, but when comparing within the \$10M to \$25M size group the median for GC/CM cost growth was slightly less with a negative (-)1.8% cost growth.
- Subjective results indicated that 96.7% of the GC/CM projects in the study met the Agency's cost expectations out performing DBB projects by 9%.
- GC/CM projects performed slightly higher in overall intensity of delivery.

# Summary of Results continued

- **Contract Changes**

- The contract change ratio was not significantly different between GC/CM and DBB Project, but there was a slight difference in change types between delivery method (Owner adding scope was higher on GC/CM and Design E&O and Unforeseen Conditions was lower).

- **Quality Performance**

- Subjective results indicated 100% of the GC/CM projects in the study met the Agency's quality standards expectations out performing DBB projects by 7%.

# Summary of Results continued

- **Protest & Claims**

- There were no selection protests reported on GC/CM projects, 5% of the DBB projects reported a selection protest.
- Each delivery method reported two projects resulting in claims costing the Agency. The average Settlement Cost Ratio was higher on DBB projects by 7.27%.

# Summary of Results continued

- **Supplier Diversity**

- Contractor outreach was under 50% for either delivery method. GC/CM contractor outperformed DBB contractors by 11.9%.
- Agencies provided outreach on 53% of the GC/CM projects and 47% of the DBB projects.
- Goals Summary
  - Only 7 GC/CM projects reported data on goals and \$ amount paid limiting results. DBB project count varied from 38 to 28.
  - 4 of the 7 GC/CM projects (57%) met a percentage of their goals and 18 out of 28 DBB (64%) projects met a percentage.

# Summary of Results continued

- **GC/CM Competition**

- The data on competing firms was reviewed for all GC/CM projects in the historical database to look at GC/CM procurement selection trends over time.
- 4 Firms have won 58% of the GC/CM projects since 1991
- No change in % when analyzing competition between pre 2005 with post 2005
  - 4 Firms out of 21 (19%) won 59% of 76 GC/CM projects from 1991-2005
  - 4 Firms out of 13 (31%) have won have won 56% of 23 GC/CM projects from 2006-2008



# Schedule

# Schedule Measures

- One of the expected benefits of GC/CM is to fast-track a project when an aggressive project schedule must be met by an agency.
- Four scheduling metrics were used to define the time taken by the design and construction team to deliver the facility.
  - Project schedule growth (design & construction)
  - Construction schedule growth
  - Project delivery speed (design & construction)
  - Construction speed

# Schedule Growth %

*Schedule growth* is the percentage by which the schedule grew over the life of the project. A value of 0% or less means the project met or finished ahead of the planned schedule. A value **greater than 0% means the time increased from the planned schedule.**

$$\text{Schedule Growth (\%)} = \frac{\text{Total Time} - \text{Total As-Planned Time}}{\text{Total As-Planned Time}} \times 100$$

Where:

*Total Time* is the period from the as-built design start date to the as-built construction end date.

*Total As-Planned Time* is the period from the as-planned design start to the as-planned construction end date.

## Report



Delivery Method Type		Mean	N	Std. Deviation	Median	Minimum	Maximum
Design-Bid-Build	Schedule Growth - Design & Construction (%)	11.8362	57	24.42935	1.6730	-28.26	101.57
	Schedule Growth - Construction (%)	16.4491	56	35.82367	.0000	-44.20	146.09
GC/CM	Schedule Growth - Design & Construction (%)	4.6517	45	16.69445	1.8956	-37.85	42.57
	Schedule Growth - Construction (%)	6.7179	45	23.15357	.0000	-40.69	85.71

# Design & Construction

## Schedule Growth - Summary

- The average (mean) indicated GC/CM project had less schedule growth  
GC/CM 6.7% compared to DBB 16.4% (9.7% diff.)
- But the median indicated that GC/CM was slightly higher  
GC/CM 1.89% compared to DBB 1.67% (0.22% diff.)
- % of projects that met or finished ahead of time  
GC/CM 45% verse DBB 50%

**Statistical testing indicated there was not a significant difference between delivery methods for Project Schedule Growth**

# Construction Schedule Growth - Summary

- The average of all projects indicated GC/CM project had less schedule growth  
GC/CM 4.8% compared to DBB 11.8% (7% diff.)
- But the median indicated that GC/CM and DBB had no (0%) construction schedule growth.
- % of projects that met or finished ahead of time  
GC/CM 52% verse DBB 56%

**Statistical testing indicated there was not a significant difference between delivery methods for Construction Schedule Growth**

# Review by Project Duration

- Data can be skewed by the disparity in length of time and delivery method data per time (more DBB projects had a construction duration under a year).
- Reviewing performance by duration varied.
  - 1 to 2 years the median results indicated a 0% schedule growth for either delivery method.
  - Over 2 years the median for both delivery methods indicated schedule growth. Overall project growth was slightly higher (1.5%) for GC/CM but lower for construction schedule growth (0.6%).
- Caution should be used in making any conclusions about the results due to the small number of projects in each project size category.

# Schedule Results by Construction

## Duration

Construction Duration		Schedule Growth - Design & Construction (%)		Schedule Growth - Construction (%)	
		DBB	GC/CM	DBB	GC/CM
Under 1 Year	Mean	18.7997	.0000	5.8613	.0000
	N	10	3	9	3
	Median	11.5819	.0000	2.2989	.0000
1 Year - 2 Year	Mean	10.3950	1.2189	16.6410	-.5896
	N	37	28	36	28
	Median	.0000	.0000	.0000	.0000
Over 2 Years	Mean	10.2052	12.5140	24.4840	22.7723
	N	10	14	11	14
	Median	9.0328	10.5427	18.0867	17.4869

# Schedule Results by Project Size Group

		Schedule Growth - Design & Construction (%)		Schedule Growth - Construction (%)	
		DBB	GC/CM	DBB	GC/CM
Under \$5M	Mean	31.6441		22.9462	
	N	10		10	
	Median	31.7670		7.2999	
\$5M to \$10M	Mean	14.4655	-2.6581	37.9043	2.5217
	N	15	5	14	5
	Median	8.6183	.0000	18.6190	.0000
\$10M to \$25M	Mean	4.5283	1.3220	6.5377	-1.1419
	N	26	16	26	16
	Median	.0000	-.2911	.0000	.0000
\$25M to \$50M	Mean	2.2610	6.7778	-10.7571	11.4089
	N	5	14	5	14
	Median	.0000	4.1735	-1.3169	.2232
\$50M to \$100M	Mean		9.5917		10.1352
	N		7		7
	Median		4.5556		5.5276



# Schedule Growth Does Not Necessary Indicate Poor Performance

Note: The data in reviewing schedule growth only reflect base building time only. It is recognized that a job may grow in scope for several reasons that may or may not lead to schedule growth. The schedule growth metric only measures whether or not the job was completed on schedule, not to track changes.

# If actual design start or finish dates differ from planned please explain.

		Delivery Method Type			
		Design-Bid-Build		GC/CM	
		Count	Layer Column Valid N %	Count	Layer Column Valid N %
Design Schedule	Added scope	10	37.0%	6	30.0%
	AE performance	2	7.4%	2	10.0%
	Funding	6	22.2%	6	30.0%
	Internal review delays	4	14.8%	3	15.0%
	Permitting	7	25.9%	1	5.0%
	Program changes	7	25.9%	4	20.0%
	Unrealistic planned design schedule	5	18.5%	2	10.0%
	Selection delays/protests	2	7.4%	0	.0%
	Other	12	44.4%	8	40.0%

Note: Multiple responses were allowed.

Note: Green represents the 2 highest responses within delivery method.

# If actual construction start or finish dates differ from planned please explain.

		Delivery Method Type			
		Design-Bid-Build		GC/CM	
		Count	Layer Column Valid N %	Count	Layer Column Valid N %
Construction Schedule	Added scope	12	34.3%	6	24.0%
	Contractor performance	5	14.3%	6	24.0%
	Funding	5	14.3%	5	20.0%
	Internal review delays	1	2.9%	3	12.0%
	Permitting	4	11.4%	2	8.0%
	Program changes	6	17.1%	3	12.0%
	Unrealistic planned design schedule	4	11.4%	1	4.0%
	Selection delays/protests	0	.0%	1	4.0%
	Other	24	68.6%	7	28.0%

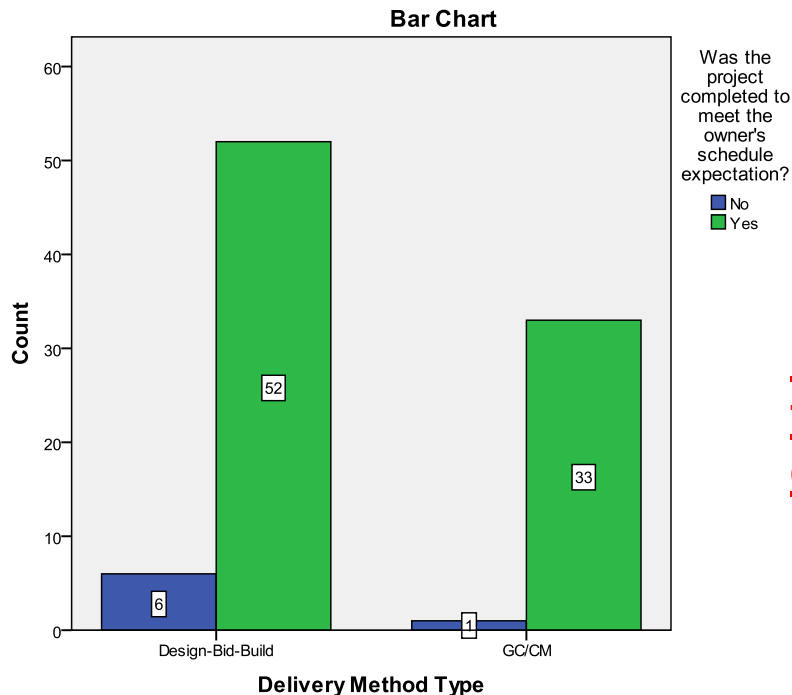
Note: Multiple responses were allowed.

Note: Green represents the 2 highest responses within delivery method.

# Was the project completed to meet the owner's schedule expectation?

Was the project completed to meet the owner's schedule expectation? \* Delivery Method Type Crosstabulation

			Delivery Method Type	
			Design-Bid-Build	GC/CM
Was the project completed to meet the owner's schedule expectation?	No	Count	6	1
		% within Delivery Method Type	10.3%	2.9%
	Yes	Count	52	33
		% within Delivery Method Type	89.7%	97.1%



**Owners had a 7.4% higher response that GC/CM projects met their expectations**

# Delivery Speed

*Delivery speed* is the rate at which the project team designed and built the facility. The **higher number represents a better performance**. *Delivery speed* was defined as the facility gross square footage divided by the design and construction as-built time.

$$\text{Delivery Speed (sf/day)} = \frac{\text{Area (sf)}}{\text{Total Time (days)}}$$

Where:

*Total Time* is the period from the as-built design start date to the as-built construction end date.

Sq Ft Size Code	DBB			GC/CM			Median %
	Mean	N	Median	Mean	N	Median	GC/CM to DBB
Under 50,000 SF	27	23	26	31	9	24	-8%
50,000 to 100,000 SF	55	21	53	76	12	80	34%
100,000 to 150,000 SF	123	5	121	86	8	81	-49%
150,000 to 200,000	137	2	137	161	10	147	6%
Total All Projects	115	55	46	102	46	86	47%

Statistical testing of all projects indicated that GC/CM delivered project at least 47% faster than DBB, but further breakdown into project sq ft ranges showed variances.

Caution should be used in making any conclusions about the results due to the small number of projects in each size category. Size categories above 200,000 sq ft where not shown due to small number of projects.

# Construction Speed

*Construction speed* was the rate at which the construction team built the facility. The **higher number represents a better performance**. *Construction speed* was defined by the formula:

$$\text{Construction Speed (sf/day)} = \frac{\text{Area (sf)}}{\text{Construction Total Time (days)}}$$

Sq Ft Size Code	DBB			GC/CM			Median %
	Mean	N	Median	Mean	N	Median	GC/CM to DBB
Under 50,000 SF	67	23	58	73	9	66	13%
50,000 to 100,000 SF	135	21	123	136	12	129	4%
100,000 to 150,000 SF	241	4	244	196	8	211	-16%
150,000 to 200,000	241	2	241	243	10	225	-7%
Total All Projects	236	54	108	179	46	166	35%

Statistical testing of all projects indicated that GC/CM delivered project at least 35% faster than DBB, but further breakdown into project sq ft ranges showed variances.

Caution should be used in making any conclusions about the results due to the small number of projects in each size category. Size categories above 200,000 sq ft where not shown due to small number of projects.

Cost

# Cost Measures

- One of the expected benefits of early involvement of the GC/CM is constructability, value engineering, and budget control during design to help find and eliminate cost changes issue during construction.
- Three metrics where used to benchmark cost performance:
  - Project cost growth (design & construction)
  - Construction cost growth
  - Intensity (a hybrid of cost and schedule measures)



# Cost Growth %

## Design & Construction – All Projects

*Cost growth* provides an indication of the growth of project costs over the life of the job. A value of 0% or less means the project met or finished under the budgeted cost. **A value greater than 0% means costs increased from the budget.**

$$\text{Cost Growth (\%)} = \frac{\text{Final Project Cost \$} - \text{Budgeted Project Cost \$}}{\text{Budgeted Project Cost \$}} \times 100$$

Where:

*Final Project Cost* was the final design cost plus the final cost of construction.

*Budgeted Project Cost* was the budgeted design cost plus the budgeted cost of construction.

### Report

#### Cost Growth %

Delivery Method Type	Mean	N	Std. Deviation	Median	Minimum	Maximum
Design-Bid-Build	5.0774	56	42.39724	.0000	-85.50	256.11
GC/CM	3.8146	45	13.28431	.4315	-14.10	74.65

#### Construction Cost Growth

Delivery Method Type	Mean	N	Std. Deviation	Median	Minimum	Maximum
Design-Bid-Build	8.8687	58	45.09649	.0000	-90.59	281.23
GC/CM	4.8386	45	14.62953	.4242	-6.40	88.49

# Design & Construction Cost Growth – Summary All Projects

- The average (mean) indicated GC/CM project had less cost growth  
GC/CM 4.8% compared to DBB 8.8% (4% diff.)
- But the median indicated that GC/CM was slightly higher  
GC/CM 0.42% compared to DBB 0.0 %
- % of projects that met or finished under budget  
GC/CM 43% verse DBB 68%

**Statistical testing indicated there was not a significant difference between delivery methods for Project Cost Growth**

# Construction Cost Growth – Summary All Projects

- The average (mean) indicated GC/CM project had less cost growth  
GC/CM 3.8% compared to DBB 5.0% (1.2% diff.)
- But the median indicated that GC/CM was slightly higher  
GC/CM 0.43% compared to DBB 0.0 %
- % of projects that met or under budget  
GC/CM 43% verse DBB 62%

**Statistical testing indicated there was not a significant difference between delivery methods for Construction Cost Growth**

# Review by Project Size Group

- Since the data is skewed by the disparity of project size and delivery method data per size (more DBB projects in the test population are small projects under \$10M).
- Testing in a project size group between \$10M to \$25M the results indicated that GC/CM had slightly less project cost growth compared to DBB (1.8%).
- Caution should be used in making any conclusions about the results due to a small number of projects in each project size category.

# Cost Results by Project Size Group

		Cost Growth %		Construction Cost Growth	
		DBB	GC/CM	DBB	GC/CM
Under \$5M	Mean	42.3365		51.3206	
	N	10		10	
	Median	13.2341		21.4878	
\$5M to \$10M	Mean	.8321	3.5184	3.2352	6.4467
	N	15	5	15	5
	Median	-1.3504	3.3363	.0006	.7023
\$10M to \$25M	Mean	-1.5805	-.2680	2.4979	.0220
	N	24	15	26	15
	Median	.0000	-1.8984	.0000	-1.8572
\$25M to \$50M	Mean	1.4261	3.2917	2.3425	4.1223
	N	5	15	5	15
	Median	.9917	.7404	1.6152	1.3948
\$50M to \$100M	Mean		14.1004		16.3207
	N		7		7
	Median		.7207		1.4568

# Cost Growth Does Not Necessary Indicate Poor Performance

Note: It is recognized that a job may grow in scope for several reasons that may or may not lead to cost growth. The cost growth metric only measures whether or not the job was completed on budget, not to track changes.

# If actual design costs differ from budgeted please explain.

		Delivery Method Type			
		Design-Bid-Build		GC/CM	
		Count	Layer Column Valid N %	Count	Layer Column Valid N %
Design Costs	AE performance	4	12.9%	2	14.3%
	Funding	2	6.5%	2	14.3%
	Internal review delays	3	9.7%	0	.0%
	Permitting	2	6.5%	2	14.3%
	Program changes	10	32.3%	3	21.4%
	Unrealistic budget	6	19.4%	2	14.3%
	Selection delays/protests	0	.0%	0	.0%
	Market Conditions	1	3.2%	2	14.3%
	Escalation	1	3.2%	1	7.1%
	Other	12	38.7%	7	50.0%

Note: Multiple responses were allowed.

Note: Green represents the 2 highest responses within delivery method.

# If actual construction costs differ from budgeted please explain.

		Delivery Method Type			
		Design-Bid-Build		GC/CM	
		Count	Layer Column Valid N %	Count	Layer Column Valid N %
Construction Costs	Added scope	25	59.5%	9	39.1%
	AE performance	6	14.3%	3	13.0%
	Funding	2	4.8%	2	8.7%
	Internal review delays	2	4.8%	0	.0%
	Permitting	0	.0%	1	4.3%
	Program changes	7	16.7%	2	8.7%
	Unrealistic budget	5	11.9%	0	.0%
	Selection delays/protests	0	.0%	0	.0%
	Market Conditions	10	23.8%	5	21.7%
	Escalation	4	9.5%	3	13.0%
	Other	21	50.0%	12	52.2%

Note: Multiple responses were allowed.

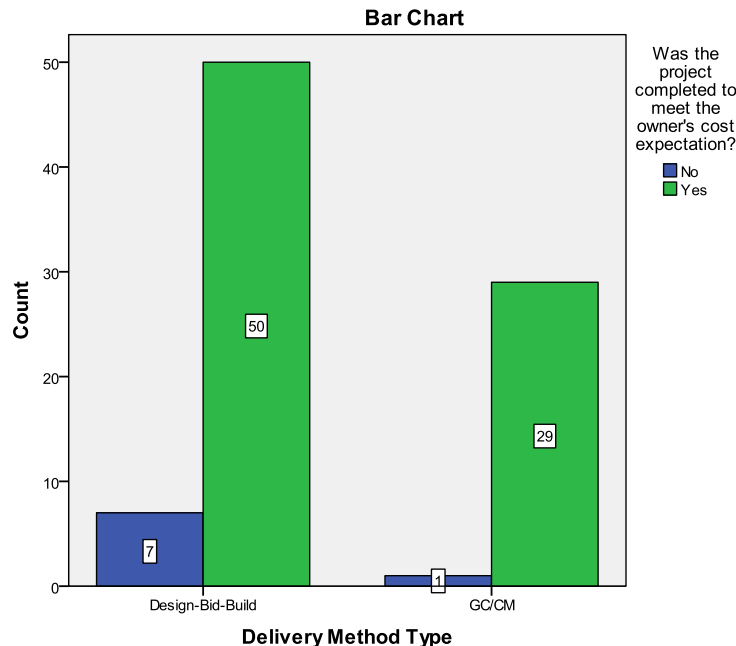
Note: Green represents the 2 highest responses within delivery method.



# Was the project completed to meet the owner's cost expectation?

Was the project completed to meet the owner's cost expectation? \* Delivery Method Type Crosstabulation

			Delivery Method Type	
			Design-Bid-Build	GC/CM
Was the project completed to meet the owner's cost expectation?	No	Count	7	1
		% within Delivery Method Type	12.3%	3.3%
	Yes	Count	50	29
		% within Delivery Method Type	87.7%	96.7%



**Owners had a 9% higher response that GC/CM projects met their quality expectations**

# Intensity of Delivery

*Intensity of delivery* indicates the unit cost of design and construction work put in place in a facility per unit time. **A higher Intensity indicates a better outcome in terms of cost and schedule.** Intensity accounts for the higher level of activities required for certain complex facilities than in simpler facilities with the same building area.

$$\text{Intensity of Delivery } (\$/\text{sf})/\text{day} = \frac{\text{Unit Cost } (\$/\text{sf})}{\text{Total Time (days)}}$$

Report



Intensity of Delivery

Delivery Method Type	Mean	N	Std. Deviation	Median	Minimum	Maximum
Design-Bid-Build	220.3053	54	1617.07978	.2213	.01	11883.31
GC/CM	548.9594	46	3719.53474	.2867	.07	25227.66

**The data indicates that GC/CM projects performed slightly higher in overall intensity of delivery**

# Contract Changes

# Contract Changes Order Ratio

A mathematical relationship called the *change-order ratio* (COR) is the standard industry factor most often used to analyze or benchmark projects. The COR is the total dollar amount of contract changes divided by the original construction contract dollar amount.

$$\text{Change Order Ratio (COR)} = \frac{\text{Contract Change Amount \$}}{\text{Original Construction Contract Amount \$}}$$

## Report

Delivery Method Type		Change Order Ratio - Total Changes	Change Order Ratio - Owner/Scope	Change Order Ratio - Design Errors	Change Order Ratio - Unforeseen Conditions	Change Order Ratio - Schedule	Change Order Ratio - Regulatory	Change Order Ratio - Other
Design-Bid-Build	Mean	.1158	.0368	.0291	.0286	.0022	.0110	.0071
	N	49	46	46	46	18	38	5
	Std. Deviation	.10387	.05783	.03093	.04339	.00460	.03057	.01536
	Median	.0867	.0241	.0213	.0134	.0000	.0033	.0000
	Minimum	.02	.00	.00	.00	.00	.00	.00
	Maximum	.49	.27	.14	.22	.02	.19	.03
GC/CM	Mean	.1071	.0519	.0223	.0163	.0053	.0050	-.0037
	N	39	40	38	37	11	36	7
	Std. Deviation	.09260	.06602	.02397	.02101	.00588	.00854	.03183
	Median	.0843	.0423	.0178	.0063	.0047	.0024	.0000
	Minimum	.04	.04	.00	.00	.00	.00	-.04
	Maximum	.46	.37	.13	.09	.02	.03	.05

# Contract Change Summary

- There was not a significant difference in the median between the delivery methods in overall total change orders  
DBB 8.67% - GC/CM 8.43% (0.24% diff.)
- There was a difference in comparing change types:
  - Scope changes were higher on GC/CM Projects  
DBB 2.41% - GC/CM 4.23% (1.82% diff.)
  - Design errors and unforeseen conditions were slightly higher on DBB Projects (Total diff. 1.06%)  
Design Errors - DBB 2.13% - GC/CM 1.78%  
Unforeseen Conditions - DBB 1.34% - GC/CM 0.63%

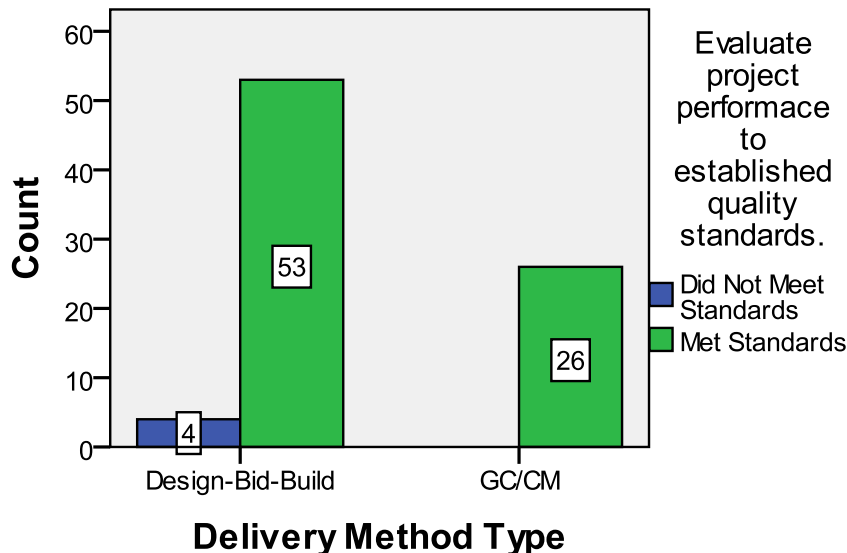
# Quality Standards

# Quality Standards

Evaluate project performance to established quality standards. \* Delivery Method Type Crosstabulation

			Delivery Method Type	
			Design-Bid-Build	GC/CM
Evaluate project performance to established quality standards.	Did Not Meet Standards	Count	4	0
		% within Delivery Method Type	7.0%	.0%
	Met Standards	Count	53	26
		% within Delivery Method Type	93.0%	100.0%
Total	Count	57	26	
	% within Delivery Method Type	100.0%	100.0%	

**Bar Chart**



**100% of the GC/CM projects in the study met the Quality Standards expectations of the Agency versus 93% of the DBB projects.**

# Protest & Claims



# Selection Protests

Was there a selection protest that impacted the project schedule? \* Delivery Method Type  
Crosstabulation

			Delivery Method Type	
			Design-Bid-Build	GC/CM
Was there a selection protest that impacted the project schedule?	No	Count	55	33
		% within Delivery Method Type	94.8%	100.0%
	Yes	Count	3	0
		% within Delivery Method Type	5.2%	.0%
Total		Count	58	33
		% within Delivery Method Type	100.0%	100.0%

**100% of the GC/CM projects in the study had NO Selection Protests versus 95% of the DBB projects.**

# Formal Claims

Where there any formal Claims? (Do not include protests, just formal claims) \* Delivery Method Type Crosstabulation

			Delivery Method Type	
			Design-Bid-Build	GC/CM
Where there any formal Claims? (Do not include protests, just formal claims)	No	Count	57	37
		% within Delivery Method Type	96.6%	86.0%
	Yes	Count	2	6
		% within Delivery Method Type	3.4%	14.0%
Total		Count	59	43
		% within Delivery Method Type	100.0%	100.0%

**3.4% of the DBB projects in the study reported there was a Formal Claim made on a project verses 14% of the GC/CM projects.**

# Claim Summary

					If yes, how was the claim settled?				
Delivery Method	Project	Year Completed	Number of Claims	Claim Settlement Amount - Total	Within Team	Dispute Review Board	Mediation	Arbitration	Litigation
Design-Bid-Build	1	2004	1	\$5,000,000			X		
	2 *	2005	2	\$350,000	X				
GC/CM	1	2003		\$160,000					
	2	2004		\$ -					
	3	2004		\$ -					
	4	2003	1	\$ -	X				
	5	2005	2	\$1,094,896		X			
	6	2009	1	\$25,000					X

\* PM Noted - This was a difficult project with severe unforeseen site conditions. The contractor also had scheduling issues amongst the subcontractors. This was a LEED certified project and was awarded a Gold certification.

Projects Represented::

8 Different Agencies

2 GC/CM Contractors represented 4 of the 6 projects reporting a formal claim.

# Claim Results - Adding Cost to Agency

		Settlement			
Delivery Method	Project	Total added cost to public entity	Amount of added cost	Project Final Const Cost	%
Design-Bid-Build	1	Yes	\$4,250,000	\$37,138,116	11.44%
	2	Yes	\$350,000	\$14,672,758	2.39%
GC/CM	1	No		\$30,221,394	
	2	No		\$40,150,000	
	3	No		\$115,757,000	
	4	No		\$19,628,564	
	5	Yes	\$1,094,896	\$28,417,669	3.85%
	6	Yes	\$25,000	\$43,971,916	0.06%

**100% of the DBB projects reported the claim added cost to the Agency verses only 33% of the GC/CM projects.**

**DBB average Settlement Ratio to project cost was 7.92% verses 0.65% for GC/CM projects.**

# Supplier Diversity

# Supply Diversity Outreach - Contractor

Did the Prime Contractor have a participation program that included outreach for Sub-contracting with MWBE Firms? \* Delivery Method Type Crosstabulation

			Delivery Method Type	
			Design-Bid-Build	GC/CM
Did the Prime Contractor have a participation program that included outreach for Sub-contracting with MWBE Firms?	No	Count	35	15
		% within Delivery Method Type	63.6%	51.7%
	Yes	Count	20	14
		% within Delivery Method Type	36.4%	48.3%
Total	Count	55	29	
	% within Delivery Method Type	100.0%	100.0%	

**GC/CM Projects had a 11.9% higher response that the Contractor had a MWBE Sub-contractor Outreach Program**

# What Type of Outreach - Contractor

		Delivery Method Type			
		Design-Bid-Build		GC/CM	
		Count	%	Count	%
Advertising	No	51	86.4%	39	86.7%
	Yes	8	13.6%	6	13.3%
Contacted OMWBE, NMBC, or SBA	No	50	84.7%	34	75.6%
	Yes	9	15.3%	11	24.4%
Organized Outreach	No	59	100.0%	43	95.6%
	Yes	0	.0%	2	4.4%
Electronic Notification	No	55	93.2%	43	95.6%
	Yes	4	6.8%	2	4.4%
Other	No	56	94.9%	45	100.0%
	Yes	3	5.1%	0	.0%

Note: Green represents the 2 highest responses within delivery method.

# Supplier Diversity Outreach - Owner

Did the Public Owner conduct outreach to include qualified certified MWBE firms in subcontracting opportunities? \* Delivery Method Type Crosstabulation

			Delivery Method Type	
			Design-Bid-Build	GC/CM
Did the Public Owner conduct outreach to include qualified certified MWBE firms in subcontracting opportunities?	No	Count	29	13
		% within Delivery Method Type	52.7%	46.4%
	Yes	Count	26	15
		% within Delivery Method Type	47.3%	53.6%
Total		Count	55	28
		% within Delivery Method Type	100.0%	100.0%

**GC/CM Projects had a 6.3% higher response that the Public Owner had a MWBE Outreach Program**



# What Type of Outreach - Owner

		Delivery Method Type			
		Design-Bid-Build		GC/CM	
		Count	%	Count	%
Advertising	No	44	74.6%	35	77.8%
	Yes	15	25.4%	10	22.2%
Contacted OMWBE, NMBC, or SBA	No	49	83.1%	43	95.6%
	Yes	10	16.9%	2	4.4%
Organized Outreach	No	57	96.6%	45	100.0%
	Yes	2	3.4%	0	.0%
Electronic Notification	No	55	93.2%	45	100.0%
	Yes	4	6.8%	0	.0%
Other	No	55	93.2%	41	91.1%
	Yes	4	6.8%	4	8.9%

Note: Green represents the 2 highest responses within delivery method.

# Amount Paid & Number of Certified MWBE Firms

Report



MWBE Ratio Paid/Contract

Delivery Method Type	Mean	N	Std. Deviation	Median	Minimum	Maximum
Design-Bid-Build	.3314	38	1.75314	.0079	.00	10.81
GC/CM	.0402	6	.06495	.0000	.00	.15
Total	.2917	44	1.62953	.0071	.00	10.81

**The median amount paid on GC/CM is 0.0% and DBB is 0.7%**

Report

Number of certified MWBE Firms

Delivery Method Type	Mean	N	Std. Deviation	Median	Minimum	Maximum
Design-Bid-Build	2.03	38	2.124	1.00	0	7
GC/CM	4.57	7	7.743	.00	0	21
Total	2.42	45	3.583	1.00	0	21

**The median number of MWBE on a GC/CM is 0 and DBB project is 1**

**Note: Under 7 GC/CM Projects in the Study reported data in the above two categories**

# Regulatory or Mandatory Requirements (Federal)

Were there regulatory or mandatory requirements rather than goals? \* Delivery Method Type Crosstabulation

			Delivery Method Type		Total
			Design-Bid-Build	GC/CM	
Were there regulatory or mandatory requirements rather than goals?	No	Count	51	27	78
		% within Delivery Method Type	92.7%	96.4%	94.0%
	Yes	Count	4	1	5
		% within Delivery Method Type	7.3%	3.6%	6.0%
Total		Count	55	28	83
		% within Delivery Method Type	100.0%	100.0%	100.0%

**Note: Only 5 projects in the Study reported that the project had regulatory or mandatory requirements**

# Meeting Goals

- GC/CM – 7 Projects in the Study
  - Data was only reported on 7 GC/CM Projects
  - None of the GC/CM Projects met their total MWBE goals
  - 1 project exceeded its WBE goal
  - 1 project had no goals
  - 4 projects met a percentage of their goal
- DBB – 28 Projects in the Study
  - 18 projects met a percentage of their goals
  - 2 projects exceeded its goal in a category
  - 4 projects met 0% of their goals (only 9% of the projects that had a goal)
  - 4 projects had no goals

# GC/CM Competition

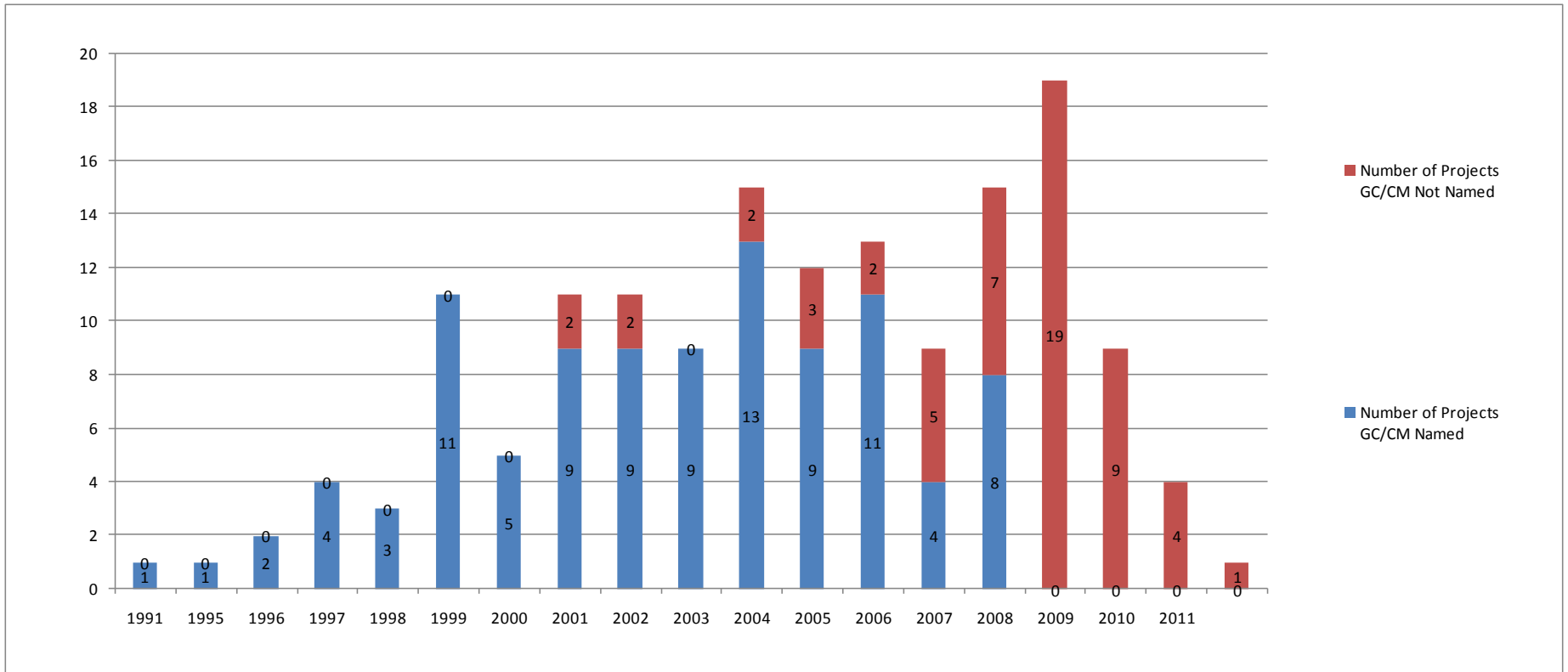
# Firms Competing on GC/CM Projects

- The data on winning firms was reviewed for all GC/CM projects in the historical database to look at GC/CM procurement selection trends.
- Since online data is entered at the completion of a project the analysis on GC/CM market competition is limited to projects procured in 2008 or earlier. Data is not available for projects procured in 2009 and 2010, and limited on 2007 and 2008 projects.

# GC/CM Competition

- Historical Database – Total Project -116
  - 86 Firms Proposed
  - 27 Firms Have Been Successful (For Joint Ventures both firms were counted)
  - Number of Attempts
    - Mean 5.95                      Median 2.0
    - High 53                              Low 1
  - Success Ratio (win/total attempts)
    - Mean 13.4%                      Median 0%
    - High 100% (3 firms 1<sup>st</sup> Attempt) Low 0% (59 firms)

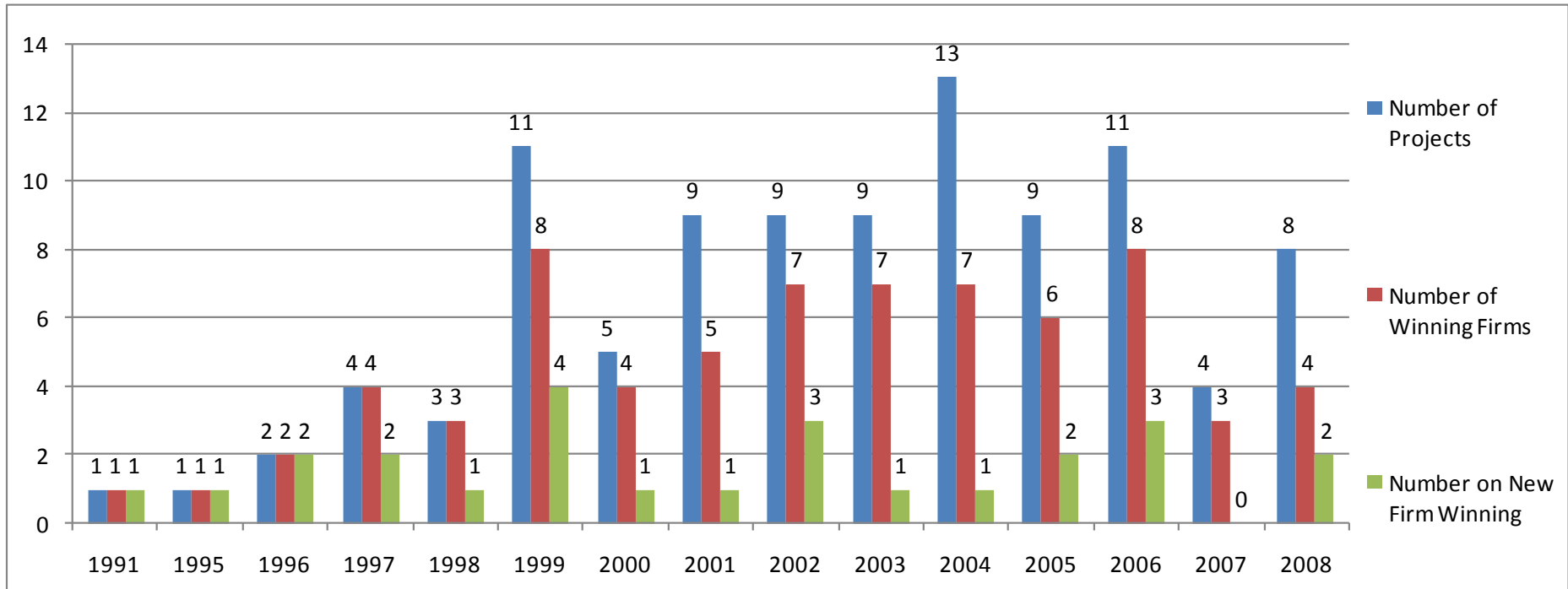
# Number of Projects



*Note :The year is the planned construction start, actual GC/CM procurement and award would have occurred earlier.*



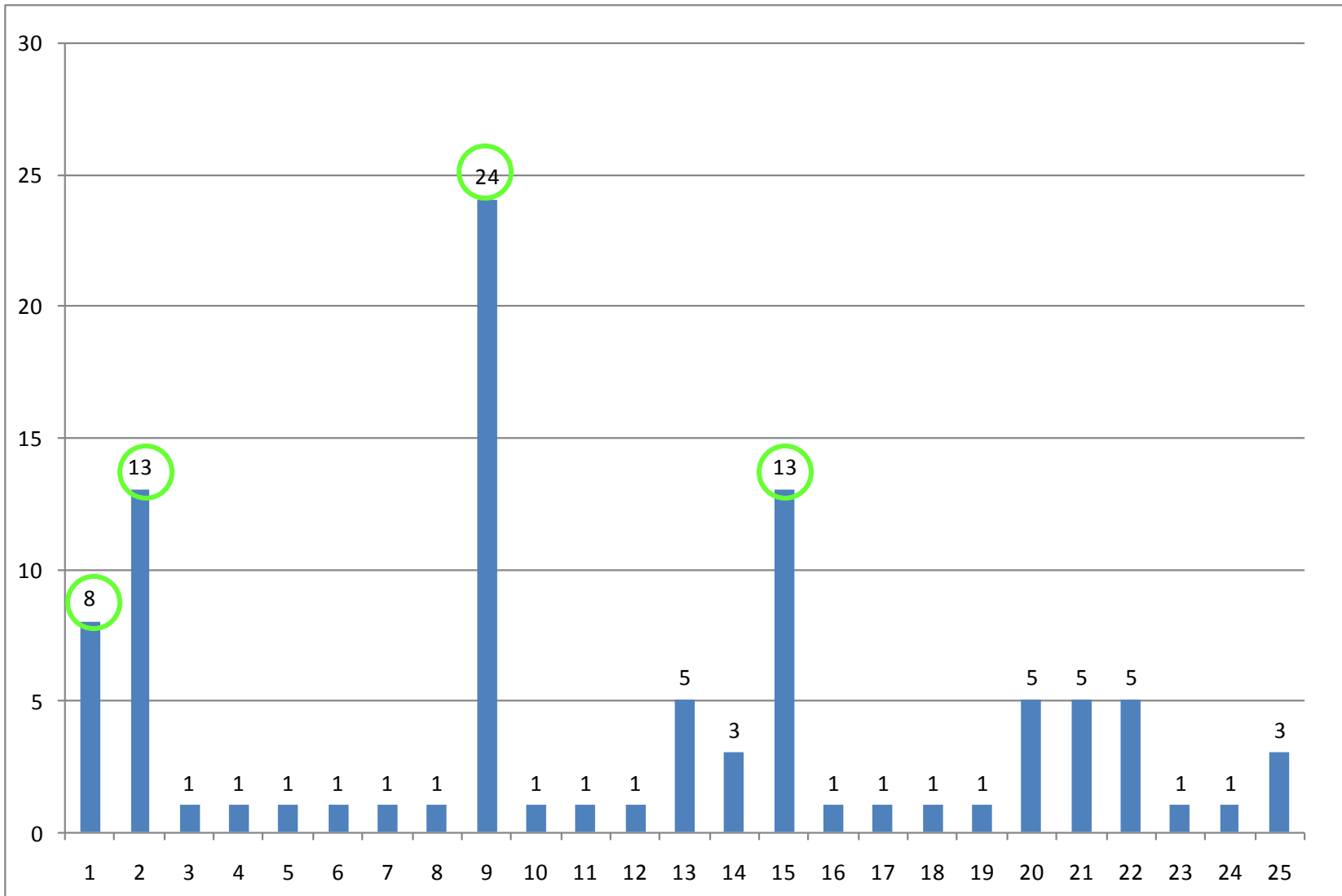
# GC/CM Firms Winning Projects per Year



Total - 99 projects  
 Year data was not provided on 17 projects,  
 thus those project were dropped in the trend  
 analysis

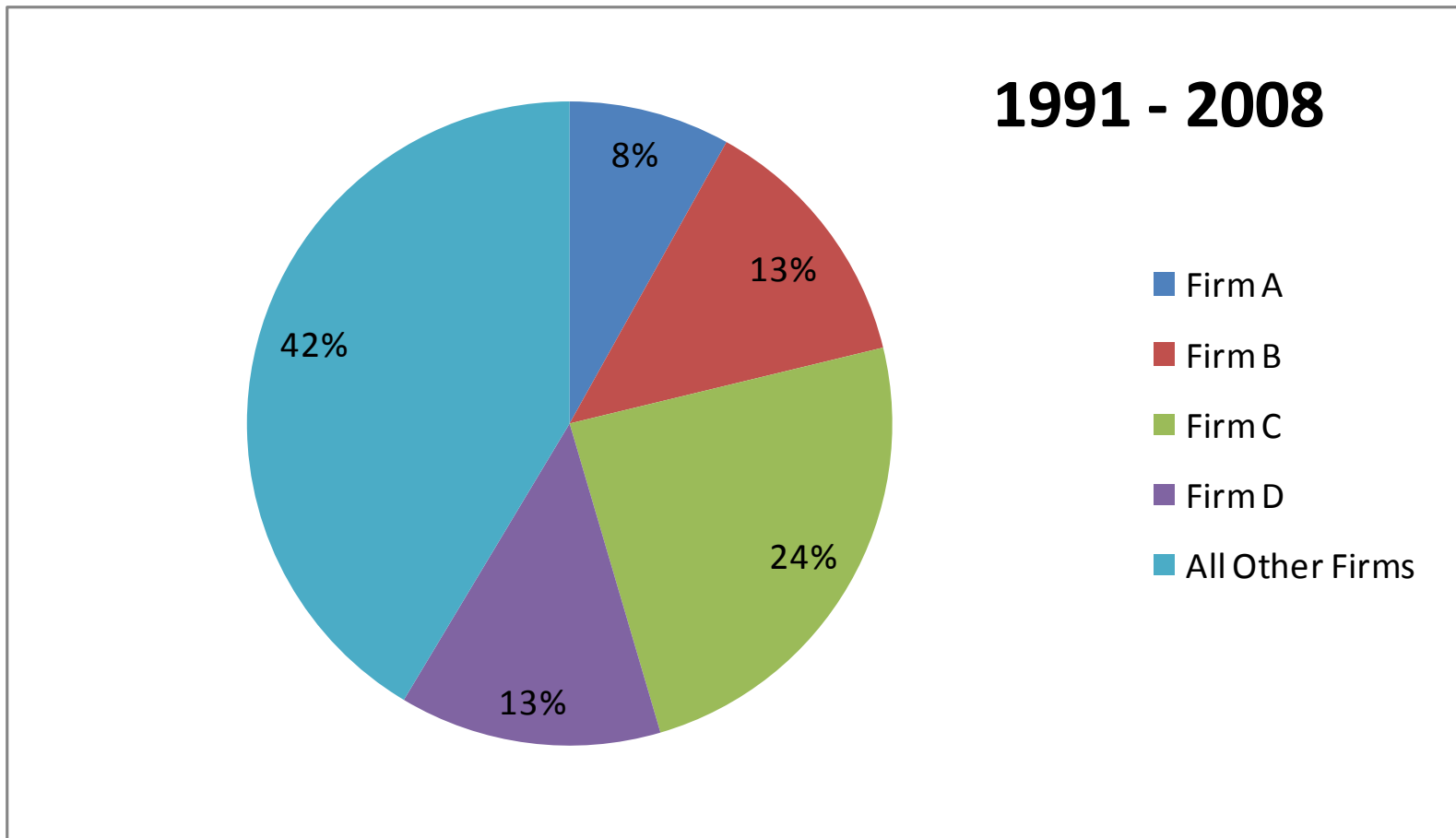
*Note :The year is the planned  
 construction start, actual GC/CM  
 procurement and award would  
 have occurred earlier.*

# 25 Firms Have Successfully Won GC/CM projects Since 1991

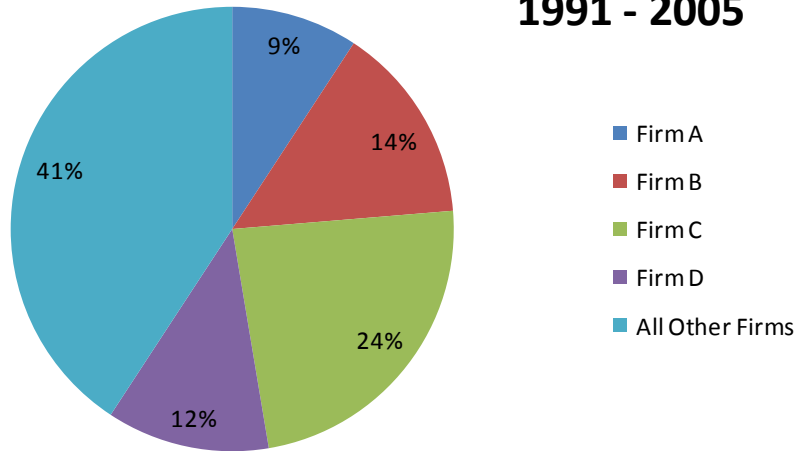


# 4 Firms have won 58% of the 99 GC/CM projects since 1991

- Total winning firms - 25

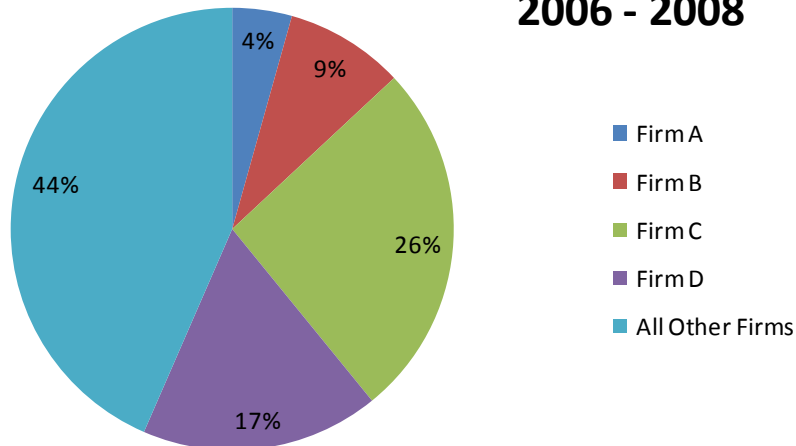


### 1991 - 2005



4 Firms out of 21 (19%) have won 59% of 76 GC/CM projects from 1991-2005

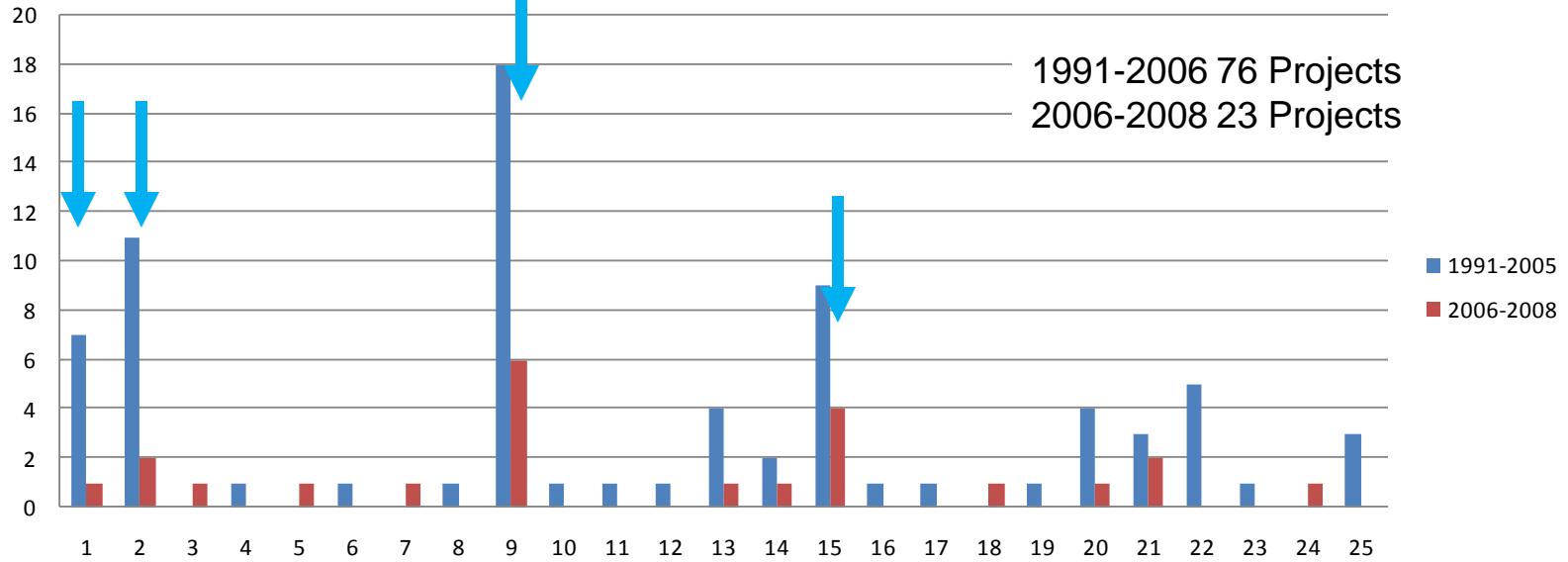
### 2006 - 2008



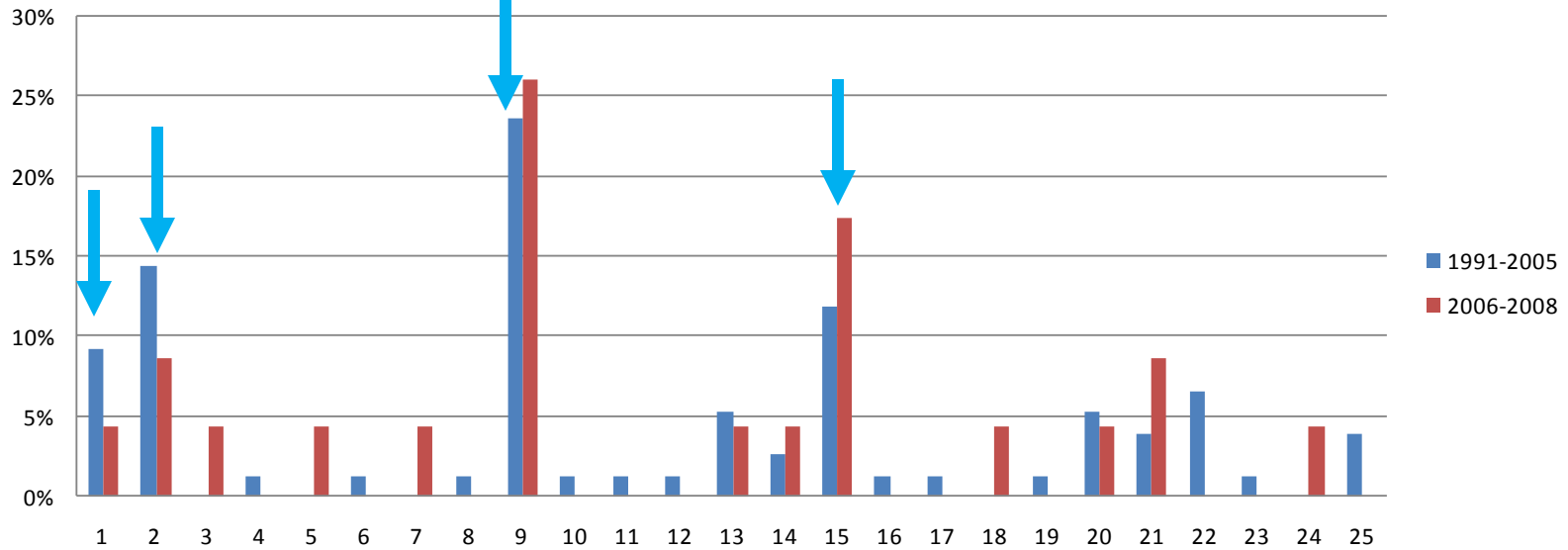
4 Firms out of 13 (31%) have won 56% of 23 GC/CM projects from 2006-2008

*Note : Only 44% of the projects in 2007 named the selected GC/CM firm, and only 53% of the 2008 projects.*

### Number of Project Won by Firm



### Project Winning Percentage by Firm



# Number of Firms Bidding

## Report

Total number of firms competing in the prime contractor selection

Delivery Method Type	Mean	N	Std. Deviation	Median	Minimum	Maximum
Design-Bid-Build	4.55	58	1.749	4.00	2	11
GC/CM	4.98	43	2.231	5.00	2	11
Total	4.73	101	1.969	4.00	2	11

# Closing

- For future studies it is important that all agencies make it a priority to collect the necessary DBB and GC/CM project information and report accurate data to CPARB through the online Project Survey. This will allow a robust collection of data for future studies on project delivery performance.
- It is also important that agencies, contractors, designers, and subcontractors participate in the Team Survey at the completion of a project. Please contact the Agency's Project Representative for a project specific on-line survey link.
- Project and Team Survey instruction is available online at: <http://www.ga.wa.gov/cparb/DataCollection.htm> or contact David Edison, at (360) 902-7351 or by email at [easmail@ga.wa.gov](mailto:easmail@ga.wa.gov).

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