WHY GUESS? BENCHMARKING CONSTRUCTION METRICS

Presentation to MAPPA 2008
Educational Conference and Annual Meeting
"Partners in Success“
October 5 - 8, 2008

Michael Benham, Spectrum Strategies
Tim Shepard, Ohio State University
Presentation Overview

• Gathering the Data: Construction Cost Benchmarking Study
• Using the Data: OSU Capital Planning and Programming
• Maintaining the Data: Toward an On-going Construction Cost Database
Gathering the Data

Construction Cost Benchmarking Study
Study Objectives

• Establish a set of construction project metrics
  – “Traditional” building types,
  – Medical Space Types
• Construction costs, plus
  – Efficiency ratios (gross-to-net floor area)
  – Finishing levels
  – Soft costs
  – “Multi prime” states vs. “Non-multi-prime”
  – Actual construction cost vs. Original estimate
Project Team

- Ohio State University Facility Design & Construction
- Spectrum Strategies
  - Division of the national architectural and engineering firm Harley Ellis Devereaux (HED).
  - Formed in 1998 to provide facility and real estate services beyond those offered by the traditional A&E practice.
  - Services include facilities benchmarking
- Kirk Associates - construction estimating and facilities economics
Construction Cost Survey

- Traditional academic projects
- Health care projects
- Identical except for space type breakdown
- Sent to:
  - Big Ten universities
  - The OSU Academic Peer Group
  - All major Ohio and New York universities
Construction Cost Survey

INTRODUCTION

This survey is being conducted on behalf of the Ohio State University and is directed to those responsible for the design and construction of new or renovated facilities at your institution.

The Ohio State University is seeking cost-related and other information regarding projects recently built by other universities. This data will be used to help develop and/or evaluate budgets for OSU capital projects.

Organizations contributing to this effort by filling out this survey will receive copies of the data we collect from other institutions, for projects in the same space-use category.

If you provide data for multiple project types, you will be entered into the data we collect for each of those project types, for all institutions contacted. Approximately 25 institutions are being contacted as part of this effort.

Our target date for completion of these surveys is Tuesday, December 4th, 2007.

Please direct any questions regarding this survey to Michael Santam of Spectrum Strategies.

Phone: 240-262-1346
Email: msantam@spectrumstrategies.com

CONTACT INFORMATION

Who from your organization is the main contact person for this survey?

1) Name: 
   Title: 
   Organization: 
   Address: 
   City: 
   State: 
   Zip: 
   Phone: 
   E-mail: 

Please complete a separate project form for each project you are submitting data on. If you have additional projects to report on, please do so by selecting the next project tab below...

PROJECT INFORMATION

2) Project Owner: 
3) Project Name / Description: 
4) Project Location - City: 
5) Project Location - State: 
6) Construction Start Date: 
7) Construction Completion Date: 
8) Which selection best describes the project setting?
   1) High Density Urban 
   2) Urban 
   3) Suburban 
   4) Rural

9) Number of Floors: At or Above Grade: 
   Number of Floors: Below Grade: 
10) Building Area: Gross Square Feet: 
   Usable Area: Net or Assignable Square Feet: 
11) Space Type Breakdown for this Project

<table>
<thead>
<tr>
<th>Space Type Category</th>
<th>% of Total Project Square Footage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom</td>
<td></td>
</tr>
<tr>
<td>Wood Lab</td>
<td></td>
</tr>
<tr>
<td>Dry Lab</td>
<td></td>
</tr>
<tr>
<td>Athletic Lab</td>
<td></td>
</tr>
<tr>
<td>Dormitory</td>
<td></td>
</tr>
<tr>
<td>Parking</td>
<td></td>
</tr>
<tr>
<td>Faculty / Administrative</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Project Total</td>
<td></td>
</tr>
</tbody>
</table>

12) Please indicate what percentage of the project, based on square footage, falls into each category below:

% New Construction
% Addition
% Renovation

13) Space Type Breakdown for this Project

14) Please complete a separate project form for each project you are submitting data on. If you have additional projects to report on, please do so by selecting the next project tab below...
### Construction Cost Survey (Cont’d)

15) If this project was primarily renovation of an existing facility, which of the following best describes the level or extent of the renovation?

<table>
<thead>
<tr>
<th>Level of Renovation</th>
<th>Box</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor or no changes to finishes</td>
<td>□</td>
</tr>
<tr>
<td>Moderate changes to finishes</td>
<td>□</td>
</tr>
<tr>
<td>Major or complete changes to finishes</td>
<td>□</td>
</tr>
</tbody>
</table>

Enter the appropriate number in this box:

16) Which of the following best describe the finishing level of this project?

<table>
<thead>
<tr>
<th>Finishing Level</th>
<th>Box</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average, Economy</td>
<td>□</td>
</tr>
<tr>
<td>Normal or Average</td>
<td>□</td>
</tr>
<tr>
<td>Premium / High End</td>
<td>□</td>
</tr>
</tbody>
</table>

Enter the appropriate number in this box:

17) What was the contract type / delivery method used to implement the project?

<table>
<thead>
<tr>
<th>Contract Type / Delivery Method</th>
<th>Box</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional (Design-Bid-Build)</td>
<td>□</td>
</tr>
<tr>
<td>Construction Manager at Risk</td>
<td>□</td>
</tr>
<tr>
<td>Construction Manager - Fixed Fee</td>
<td>□</td>
</tr>
<tr>
<td>Design-Build</td>
<td>□</td>
</tr>
<tr>
<td>Fast Track</td>
<td>□</td>
</tr>
</tbody>
</table>

Enter the appropriate number in this box:

18) Does your State require multiple prime contract arrangements in the delivery of large projects?

- [ ] Yes
- [ ] No

Select One:

19) What LEED certification level has this project achieved?

<table>
<thead>
<tr>
<th>LEED Certification Level</th>
<th>Box</th>
</tr>
</thead>
<tbody>
<tr>
<td>No LEED Certification</td>
<td>□</td>
</tr>
<tr>
<td>LEED Certified</td>
<td>□</td>
</tr>
<tr>
<td>LEED Silver</td>
<td>□</td>
</tr>
<tr>
<td>LEED Gold</td>
<td>□</td>
</tr>
<tr>
<td>LEED Platinum</td>
<td>□</td>
</tr>
</tbody>
</table>

Enter the appropriate number in this box:

20) Please briefly describe other project conditions that had a significant impact on the project cost.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Box</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition 1</td>
<td>□</td>
</tr>
<tr>
<td>Condition 2</td>
<td>□</td>
</tr>
<tr>
<td>Condition 3</td>
<td>□</td>
</tr>
</tbody>
</table>

Enter the appropriate number in this box:

21) What were the originally estimated (at the time of capital program development) construction costs for this project?

- [ ] $________ dollars
- [ ] Year Budgeted: _______

22) At what stage of project planning did you develop the budget estimate provided above?

<table>
<thead>
<tr>
<th>Stage of Planning</th>
<th>Box</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Budget phase</td>
<td>□</td>
</tr>
<tr>
<td>2) Feasibility design</td>
<td>□</td>
</tr>
<tr>
<td>3) Project development</td>
<td>□</td>
</tr>
<tr>
<td>4) Construction drawings</td>
<td>□</td>
</tr>
</tbody>
</table>

Enter the appropriate number in this box:

23) What were the actual construction costs for the project?

- [ ] $________ dollars
- [ ] Year(s) Spent: _______

24) Are site costs included in the overall construction cost provided above?

- [ ] Yes
- [ ] No

Select One:

25) If site costs are included, please indicate (if possible) the amount of those costs and the site acreage.

<table>
<thead>
<tr>
<th>Site Costs</th>
<th>Box</th>
</tr>
</thead>
<tbody>
<tr>
<td>$________ dollars</td>
<td>□</td>
</tr>
<tr>
<td>Size of site: _______ acres</td>
<td>□</td>
</tr>
</tbody>
</table>

Enter the appropriate number in this box:

26) Project Photographs - we would very much appreciate a project photograph or two...

- [ ] Yes
- [ ] No

Photos Attached?

If you have additional projects to report on, please do so by selecting the next project tab below.

Thanks very much! Please send the completed survey form to:

Michael Graham  
Spectrum Strategies  
23615 Northwestern Highway - Suite 200  
Southfield, MI 48034  

Phone: 248-203-1645  
Email: mtheman@spctrumstrategies.com
Survey Process

• Initial mail-out (via email)
• Joint cover letter
• Telephone follow-up.
• Additional follow-up, later, with those who committed.
• Critical targets / additional contacts from the OSU
• Clarification follow-up
• Copies of the survey results
• Of the 33 institutions contacted, results were received from 13 of them, a response rate of about 40 percent.
Other Data Sources

• Spectrum Strategies
  – affiliate of the architectural and engineering firm Harley Ellis Devereaux
  – access to A/E project information

• Kirk Associates
  – cost estimating services
  – database of projects

• Contractors and other sources
Adjustments to the Data / Quality Control

• Data adjusted to account for:
  – Regional differences in the cost of construction
  – Differences (typically increases) in the cost of construction over time

• R. S. Means* to convert costs to 2007 Columbus, OH dollars

• Project size
  – Traditional projects - $10 M +
  – Health care projects - $5M +

• Constructed in last ten years

* 2007 Building Construction Data, 65th Annual Edition
Other Adjustments

• Estimated costs for projects not yet completed.
• Elimination of “outliers”
• Removal of site-related costs
• Deletion of records with missing data
• Therefore, “n” changes
Included in Cost Data

- Construction costs unless otherwise noted
- Includes the cost of the work, general conditions, and contractors’ fees
- Not included: A/E fees, testing, furniture and equipment, and project management fees incurred by the owner
Construction Cost, by Project Type

Academic Space Types

(The numbers next to the bars indicate the number of each project type in the sample)
Construction Cost, by Facility Type

Health Care Space Types

(The numbers next to the bars indicate the number of each project type in the sample)
Construction Cost Ranges by Laboratory Type

- Animal Lab: $400 - $800
- Engineering: $200 - $400
- Medical Science: $1,200 - $1,400
- Science: $600 - $800

High, Low, Average
Efficiency Ratios by Space Type

Academic Space Types

Net-to-Gross Square Foot Ratio

- Athletic
- Classroom
- Dormitories
- Faculty / Admin
- Laboratories
- Library
- Rec / Student Services
- Theatre/Museum

High
Low
Average
Efficiency Ratios by Laboratory Type

![Graph showing efficiency ratios by laboratory type.]
Cost per Gross Square Foot: LEED vs. Non-LEED

Academic Space Types

Buildings in Sample = 175
Buildings in Sample = 10

No LEED
LEED Certified+
Cost per Gross Square Foot: LEED vs. Non-LEED

Health Care Space Types

Buildings in Sample = 58
Buildings in Sample = 8

No LEED
LEED Certified+
Cost per Gross Square Foot: Multi-Prime States vs. Non-Multi-Prime States

Health Care Space Types

Buildings in Sample = 54
Buildings in Sample = 12

- Not Multi-Prime
- Multi-Prime
New vs. Renovation vs. Addition
All Space Types

Buildings in Sample = 188  Buildings in Sample = 17  Buildings in Sample = 38

$  / Gross Square Foot

$350

$300

$250

$200

$150

$100

$50

$-
Impact of Project Setting

All Space Types

$ / Gross Square Foot

- High-Density Urban
- Urban
- Suburban
- Rural
Impact of Finish Levels

All Space Types

Austere, Economy: $350
Normal or Average: $200
Premium / High End: $250

$ / Gross Square Foot
Impact of Finish Levels

Classrooms

Average $ / Gross Square Foot

Austere, Economy: $300
Normal or Average: $250
Premium / High End: $225

3 11 2
Impact of Finish Levels

Health Care Facilities

Average $ / Gross Square Foot

Austere, Economy
Normal or Average
Premium / High End

$ -
$50
$100
$150
$200
$250
$300
$350
$400

17
25
7
Impact of Finish Levels

Academic Laboratories

Average $ / Gross Square Foot

- Austere, Economy: $400
- Normal or Average: $250
- Premium / High End: $300

1 13 12
Using the Data

OSU Capital Planning and Programming
Maintaining the Data
Toward an On-going Construction Cost Database
Higher Education Construction Project Roundtable

A proposed forum for the exchange of construction-related data and ideas.
IMAGINE HAVING AT YOUR FINGERTIPS....

• Construction information for many project types at any university or college in the country
• Gross-to-net ratio by project type.
• Soft costs as a percentage of project costs.
• Impact of project setting (urban, suburban, rural), LEED Certification, Delivery Method, and other factors on project costs and time-to-complete.
• Detailed cost information for specialized building types such as engineering labs, dormitories, student centers, nano-technology labs, animal labs, auditoriums, medical schools, or sports arenas.
• Costs and details for specific project components such as electrical systems, HVAC systems, security systems.
• Project delivery systems, and how that decision varies by project size and type.
• Cost impacts of special features such as high-end finishes or innovative energy conservation measures.
• And much more....
MEMBERS-ONLY WEB-BASED SYSTEM

Available anywhere, any time. Enter data with ease, and edit it as frequently as you like.

Financial tab allows instant on-screen adjustments for inflation and project location, ensuring “apples-to-apples” comparison.

Avoid input screen clutter – use “drill-downs” to enter project details.

Drop-down menus speed data input and help maintain accuracy of data.

Drag and drop project photos and documents into the database.
POTENTIAL “DEEP DIVE” STUDIES

• Security Systems and Practices
• Costs of LEED Certification
• Energy Conservation Features and Practices
• Conference and Training Features
• Special Project Types
• Building Automation Systems
• Project Delivery Methods
• Commissioning Practices
## Construction Project Fact Sheet

### Project Details

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Owner</td>
<td>Andrews University</td>
</tr>
<tr>
<td>Project Name</td>
<td>Performing Arts Center</td>
</tr>
<tr>
<td>Project Location</td>
<td>[Location Details]</td>
</tr>
</tbody>
</table>

### Cost Analysis

<table>
<thead>
<tr>
<th>Category</th>
<th>Actual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Cost Breakdown Details]</td>
<td></td>
</tr>
</tbody>
</table>

### Building Photos

- ![Building Photo 1](image1)
- ![Building Photo 2](image2)
- ![Building Photo 3](image3)

### Project Contact Information

<table>
<thead>
<tr>
<th>Name</th>
<th>[Contact Information]</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Contact Details]</td>
<td></td>
</tr>
</tbody>
</table>

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*Note: Actual contact information and project details will be filled in based on provided data.*
BUILT-IN DATA SUMMARIES

Impact of Delivery Method

- Traditional (Design - Bid - Build)
- Construction Mgr at Risk
- Construction Mgr - Fixed Fee
- Design - Build Fast Track

New vs. Renovation vs. Addition

Buildings in Sample = 188
Buildings in Sample = 17
Buildings in Sample = 38

Efficiency Ratios by Space Type

Academic Space Types
<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Role</th>
<th>Contact Name</th>
<th>Title</th>
<th>Name</th>
<th>Organization</th>
<th>Address</th>
<th>City</th>
<th>State</th>
<th>Zip</th>
<th>Phone</th>
<th>Email</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>211</td>
<td>Classroom</td>
<td>Music</td>
<td>Ann Johnson</td>
<td>Professor</td>
<td>John Doe</td>
<td>University of XYZ</td>
<td>123 Main St, City, State</td>
<td>123</td>
<td>XYZ</td>
<td>12345</td>
<td>555-123456</td>
<td><a href="mailto:john.doe@xyz.edu">john.doe@xyz.edu</a></td>
<td>Notes</td>
</tr>
<tr>
<td>192</td>
<td>Classroom</td>
<td>Science</td>
<td>Dr. Smith</td>
<td>Professor</td>
<td>Jane Smith</td>
<td>University of XYZ</td>
<td>456 Main St, City, State</td>
<td>456</td>
<td>XYZ</td>
<td>67890</td>
<td>666-789012</td>
<td><a href="mailto:jane.smith@xyz.edu">jane.smith@xyz.edu</a></td>
<td>Notes</td>
</tr>
</tbody>
</table>

**Export to Excel for Custom Reports and Analysis**

- Export query: `Academic-AllData-OSULDataset` to...
- Save as: `Excel-2007-2010` or `.xls`
BENEFITS

• Develop faster and more credible preliminary cost estimates for your users.
• More confidently develop your five-year capital improvement plan.
• Perform reality checks of cost estimates provided by design staff and contractors.
• Respond to question and challenges by your management, financial analysts and governing boards.
• Improve your ability to complete projects on-budget and on-schedule.
HOW IT WORKS

• Members subscribe to the Construction Project Forum by paying a small fee and pledging to supply project data

• Subscription fee is offset by project contributions to encourage submittals

• Members enter data using a simple web-based data collection tool

• Data can be entered and / or edited at any time during the data collection window

• Annual database “snapshots” are supplied to members in the form of standard reports and data tables

• Spectrum Strategies publishes Annual Construction Costs Benchmarks report – data and expert interpretation

• Annual Construction Cost Forum: members review results and share best practices

• At any time, members may call for special purpose “deep-dive” studies, i.e. special detailed surveys on topics of interest.
Issues

• Current sources for this data?
• Will your institution benefit?
• Critical mass for participation
• Fees
• Willingness to contribute projects
QUESTIONS? FEEDBACK?

DILBERT, DO YOU HAVE THE BENCHMARK RESULTS?

DO YOU WANT THE TEN-MINUTE EXPLANATION OF WHY THE DATA ARE USELESS, OR A SIMPLE "HERE YOU GO"?

I'M IN SALES. HERE YOU GO.