Office of Financial Management
STATE OF WASHINGTON

HIGHER EDUCATION CAPITAL FACILITIES FINANCING STUDY

TECHNICAL APPENDICES

December 2008

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120 Lakeside Avenue
Suite 200
Seattle, Washington 98122
P (206) 324-8760

www.berkandassociates.com

Principals: Bonnie Berk and Michael Hodgins
Project Manager: Heather Rogers
Project Team: Bonnie Berk, Julia Bosch, Allegra Calder, Natasha Fedo, Emily Heatherington, Malia Langworthy, Julia Warth

WASHINGTON STATE OFFICE OF FINANCIAL MANAGEMENT
HIGHER EDUCATION CAPITAL FACILITIES FINANCING STUDY

TECHNICAL APPENDICES

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Legislators

Representative Bill Fromhold
Representative Fred Jarrett
Senator Karen Fraser

Legislative Staff

Jack Archer, House Republic Caucus, Capital Budget Committee
Susan Howson, Staff Coordinator, House Capital Budget Committee
Steve Masse, Fiscal Analyst, House Capital Budget Committee
Nona Snell, Fiscal Analyst, House of Representatives
Tim Yowell, Fiscal Analyst, Senate Ways and Means Committee

Office of Financial Management Staff (OFM)

Chris Alejano, Governor's Policy Office, Higher Education
Harvey Childs, Capital Budget Analyst
Wolfgang Opitz, Deputy Director
Tom Saelid, Senior Budget Assistant
Jim Schmidt, Forecasting Division
Rich Struna, Capital Budget Analyst
Marc Webster, Budget Assistant, Education Department

Department of Natural Resources

Bonnie Bunning, Executive Director of Policy and Administration
Bruce Mackey, Lands Steward
Bob Van Schoorl, Budget Director
Jim Smego, Risk Manager, Financial Management Division

State Investment Board

Liz Mendizabal, Public Affairs Director
Diana Will, Asset Allocation

Joint Legislative Audit and Review Committee (JLARC)

Karen Barrett, (formerly JLARC)
Karl Herzog, Department of Transportation, (formerly JLARC)
Keenan Konopaski, Audit Coordinator

Department of Revenue

Mark Craig, Assistant Director, Legislation and Policy Division
Brad Flaherty, Assistant Director, Property Tax Division
Mary Welsh, Assistant Director, Research Division

Department of General Administration

Riley Bedford, Cost Engineer, Engineering and Architectural Services
John Lynch, Assistant Director, Engineering and Architectural Services

Washington State Treasurer's Office

Sue Melvin, Debt Administration

Department of Information Services

Leonard Lewis, Wheeler Project, Project Development Analyst

Higher Education Coordinating Board

Pam Mead, Director, Fiscal Policy

Council of Presidents

Terry Teale, Executive Director

University of Washington

Carolyn Busch, Higher Education Policy Analyst
Eric Hausman, Director of Facilities Services
Randy Hogins, Government Relations Director
Chris Malins, Senior Associate Treasurer
Denis Martynowych, Principal Facilities Planner
John Palewicz, Director, Capital Projects Office
Dave Szatmary, Vice Provost, Educational Outreach

Washington State University

Deborah Carlson, Associate Budget Director
Larry Ganders, Director, Government Relations
Richard Heath, Senior Associate Vice President of Administrative Services
Barry Johnston, Assistant Vice President for Business and Finance
Joan King, Executive Director of Budget and Planning
Greg Royer, Vice President for Finance and Business

Central Washington University

Richard Corona, Vice President for Business and Financial Affairs
Shelly Johnson, Budget Director
Bill Vertrees, Assistant Vice President, Facilities Management

Eastern Washington University

Mary Voves, Vice President for Business Affairs

Western Washington University

Renee Roberts, Director, Capital Budget

The Evergreen State College

John Hurley, Vice President for Finance and Administration

State Board for Community and Technical Colleges

Connie Broughton, Assistant Director, eLearning
Cable Green, Director, eLearning
Tom Henderson, Director, Capital Budget

South Seattle Community College

Kurt Buttleman, Vice President, Administrative Services

Centralia College

Steve Ward, Vice President, Finance and Administration

Other

Eric Meng, Consultant, Meng Analysis
Mike Roberts, Consultant to the Joint Legislative Task Force on School Construction

Other States:

California

Fred Harris, California Community College
Kevin Woolfork, California Postsecondary Education Commission

Colorado

Ryan Stubbs, Capital Assets Coordinator, Colorado Commission on Higher Education

Connecticut

Scott Ciecko, Senior Associate, Finance, Connecticut Department of Higher Education
Ed Klonoski, President, Charter Oak State College

Maryland

Geoffrey Newman, Director of Finance Policy, Maryland Higher Education Commission

Massachusetts

Michael Hoyle, Vice-Chancellor of Fiscal Policy, Department of Higher Education

New Jersey

Roger Anderson, Executive Director, New Jersey Education Facilities Authority

Texas

Susan Brown, Texas Higher Education Coordinating Board
Gary Johnstone, Texas Higher Education Coordinating Board

Wisconsin

David Miller, Associate Vice President for Capital Planning and Budget, University of Wisconsin System
List of documents reviewed

Appendix B:
List of Documents Reviewed

APPENDIX B: LIST OF DOCUMENTS REVIEWED

Capital Projects Financing

Capital Financing: Partnerships and Energy Savings Performance Contracts Raise Budgeting and Monitoring Concerns, U.S. General Accountability Office, December 2004.

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Other States

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The Growing Imbalance: Recent Trends in U.S. Postsecondary Education Finance, Delta Project on Post Secondary Education Costs, 2008.

Revenue Sources

Annual Report, Washington State Department of Natural Resources, 2006, 2007.

Annual Report, Washington State Investment Board, 2002, 2003, 2004, 2005, 2006, 2007.

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A Legislative Guide to Washington State Property Taxes, 2007.

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Inside Higher Ed, "Space Constraints," Elizabeth Redden, July 22, 2008.

Inside Higher Ed, "Spatial Change," Elizabeth Redden, July 24, 2008.

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Update on Space and Utilization Policy in Higher Education. California Postsecondary Education Commission Report 04-13, September 2004.

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Tuition Study, Higher Education Coordinating Board, 2007.

Appendix C: Comparative Assessment of Capital Funding in Other States

APPENDIX C: COMPARATIVE ASSESSMENT OF CAPITAL FUNDING IN OTHER STATES

This section summarizes the various approaches to funding capital facilities in eight states. For the most part, state contributions towards higher education facilities come from the General Fund, with the exception of a corporate income tax in Maryland and local property taxes in California, Maryland, Texas, and Wisconsin. All states interviewed are struggling with the rising costs of capital projects, operations, and maintenance.

Approach to Comparative State Assessment

ESHB 3329 required that the higher education capital facility financing study include a review of the methods used to fund higher education in other states, with particular emphasis on Washington's Global Challenge States. To address the requirements of ESHB 3329 and to evaluate the potential for alternative higher education revenue sources and cost management strategies for Washington's public institutions, interviews were conducted with representatives from six of the Global Challenge States (described below), plus Texas and Wisconsin. Representatives from higher education coordinating boards or systems, and state government agencies were interviewed along three dimensions (the complete interview protocol can be found at the back of this section):

- Revenue sources and approaches, trends, and strategies for funding capital facilities
- Options and strategies to manage facility construction and maintenance expenditures
- Cost benchmarks in use or under consideration, for budgeting and financial planning purposes

The Global Challenge States

In 2005, the Legislature passed SB 5441, creating the Washington Learns Steering Committee. Chaired by Governor Christine Gregoire, Washington Learns conducted an 18-month review of the State's entire education system. As part of this review, Washington Learns compared education measures in Washington against seven other states, collectively known as the Global Challenge States. The seven states were selected based on their ranking in the Progressive Policy Institute's 2002 New Economy Index. The Index ranked states based on 21 indicators related to their potential to perform in the new economy. Washington was ranked second on the Index behind Massachusetts.

The Global Challenge States are composed of the top eight states which, in ranked order, are:

- Massachusetts
- Washington
- California
- Colorado
- Maryland
- New Jersey
- Connecticut
- Virginia

All seven other Global Challenge States were contacted and all but Virginia were interviewed. In addition to these states, Texas and Wisconsin were also interviewed. Texas was mentioned by two interviewees as an example of a state that uses local funding and coordinates project efforts as a cost management strategy. Wisconsin was selected because of its large public university system and its use of public-private partnerships and municipal ownership of community college facilities.

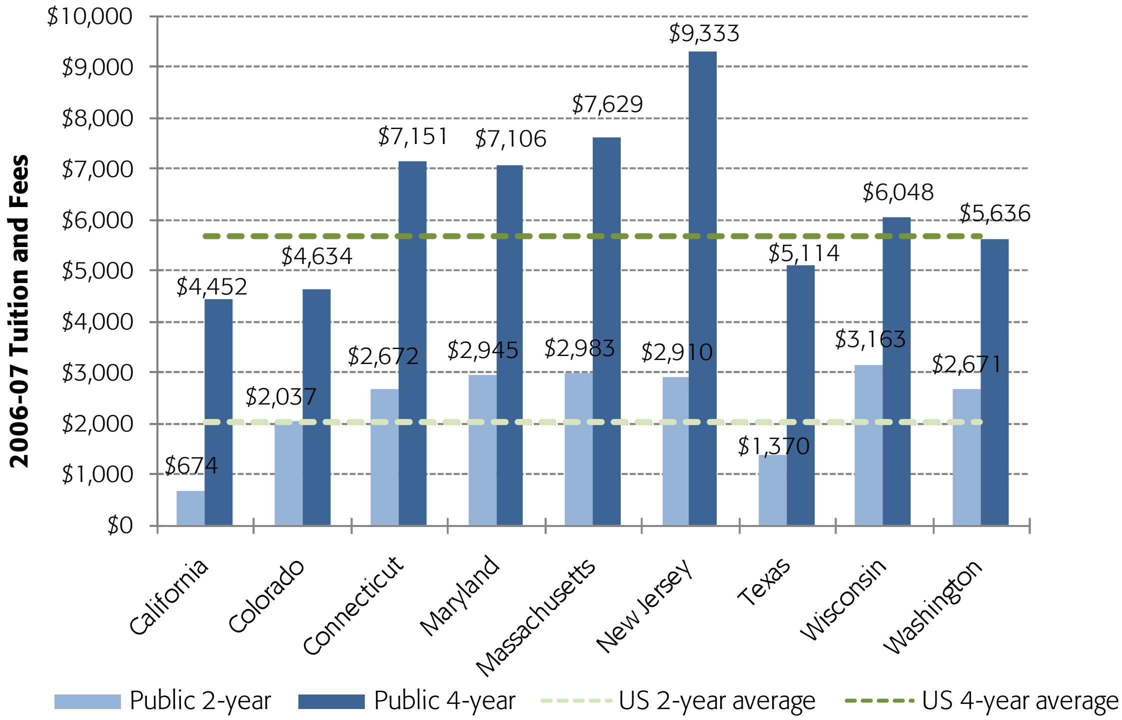
Exhibit C1
Population and Fall 2006 Enrollment

	Total Population	Enrollment at Public 2-year Colleges	Enrollment at Public 4-year Institutions
California	36,457,549	1,421,282	626,283
Colorado	4,861,515	77,956	153,945
Connecticut	3,502,309	46,489	65,987
Maryland	5,618,344	116,940	143,981
Massachusetts	6,437,193	85,557	106,607
New Jersey	8,724,560	154,085	154,289
Texas	23,904,380	547,190	546,949
Wisconsin	5,556,506	115,179	157,067
Washington	6,395,798	185,651	111,397

Source: American Community Survey, 2006; Chronicle of Higher Education Almanac, 2007-08; and Berk & Associates, 2008.

Exhibit C1 shows the total population and fall 2006 enrollments at public two-year and four-year institutions for each of the states surveyed. Maryland, Wisconsin, and Massachusetts are most similar to Washington with respect to total population and enrollment at public four-year institutions. Washington is the fifth ranked state in terms of total population but has the third highest enrollment at public two-year colleges.

Exhibit C2
Public Institution In-state Tuition and Fees



Source: Chronicle of Higher Education, *Almanac of Higher Education 2007-08;* and Berk & Associates, 2008.

Exhibit C2 shows the average in-state tuition and fees for 2006-07 for the two-year and four-year institutions by state. The key points are as follows:

- Wisconsin had the highest average two-year tuition and fees at $3,163, followed by Massachusetts ($2,983), and Maryland ($2,945).
- New Jersey has the highest average four-year tuition and fees at $9,333, followed by Massachusetts ($7,629), and Connecticut ($7,151).
- Of the nine states, Washington has the sixth highest two-year tuition and fees and the sixth highest four-year tuition and fees.

State-by-State Summaries

California

California has 143 public institutions of higher education organized in three systems.

	Number of Campuses or Institutions	Student Enrollment
University of California	10	209,171
California State University	23	417,112
California Community Colleges	110	1,421,282
Total	**143**	**2,047,565**

Source: University of California, 2008; California State University, 2007; Chronicle of Higher Education Almanac, 2008; and Berk & Associates, 2008.

University of California (UC). The UC system capital budget includes state, federal, and private funds. The UC system received approximately $3 billion in state funding for operations for 2008-09. Federal funds are used for research facilities, as are the majority of private funds. As an independent state entity, the UC system is authorized to issue bonds. Lease revenue bonds (also called Garamendi bonds) are issued for revenue generating facilities and some G.O. Bonds are issued for mixed-use buildings. The UC system also receives some funding from state issued G.O. Bonds.

California State Universities (CSU). The CSU system receives almost all of its capital funds from the State. Because the CSU institutions are primarily instructional and not research oriented, there is no federal funding for facilities. CSU is technically allowed to issue Garamendi bonds on revenue-generating facilities; however, this must be done through the State Department of Finance and is rare.

California Community Colleges (CCC). The CCC system receives approximately 45% of its funding from the State, 40% from local property taxes, and 5% from fees. All funds are placed into the district's general fund and may be used for capital projects. The CCC institutions can issue local G.O. and lease-revenue bonds to finance building projects, provided the bond measure receives a 55% approval rate. CCC districts cannot assess impact fees on their own behalf.

Capital Process

The California Postsecondary Education Commission (CPEC) makes budget and policy recommendations regarding higher education programs and capital facilities to the Legislature. The State allocates funding using the following hierarchy of priorities: health and safety, functional obsolescence, workload, and program improvement. Cost benchmarks and a formula are used to determine funding for individual projects. The Department of Finance oversees capital projects and distributes money as needed during a project.

Revenue Sources and Financing Mechanisms

Capital facilities are primarily funded using G.O. Bonds with debt service paid from the General Fund. In the past 20 years, only one bond issue in the mid-1990s was rejected by California voters. However, a $6 billion bond scheduled for the November 2008 election was pulled from the ballot due to the current economic crisis.

Tidelands oil revenues were used to fund higher education during the 1960s and 1970s, but these funds have mostly disappeared and are no longer a major source of funding. There is no student generated revenue used to fund capital projects.

Public-private partnerships. As available state funds for capital facilities decline, public-private partnerships are gaining acceptance from the public and the Legislature and may increase.

Cost Management

Process improvements. The State is making efforts to expedite the planning process for capital projects, especially for similar facilities. Recently, the State started bundling projects together to save on costs. This is particularly effective when interest rates are low at the time of the bond issue. There has also been a move towards value-engineering, the practice of approving funding for a project in its entirety at application, rather than approving each project phase.

Facility sharing. Institutions in different systems partner on programs and share facilities.

Space utilization. For a project to be funded, it must meet the space utilization standards applicable to the system. California uses two sets of space utilization standards. The standards used by the CSU and the CCC systems were developed in 1975, while the standards used by the UC system were developed in the early 1990s.

In 1990, CPEC issued a report proposing more flexible space utilization standards. Among other things, these standards count student use hours for the entire campus as opposed to each individual facility. Because the UC system is an independent state entity, it was able to adopt the revised space standards of the early 1990s without the approval of the Legislature. Since the Legislature did not formally adopt the 1990 recommendations, the CSU and CCC systems are still subject to the more restrictive standards established in the 1970s. The CSU and CCC standards are such that it is easier to receive funding for lab space, thus many institutions build labs for use as classroom spaces.

CPEC conducted a survey of 34 states related to higher education space utilization policies in 2002-2003. The survey found that just over half (18) of the states had space standards and most of the states had adopted or revised their guidelines in the past 15 years.[1] Space standards were expressed in terms of the number of hours per week a room is in use and an occupancy rate, the average percentage of occupied seats during a given hour. Classroom hours per week ranged from a low of 23 in Pennsylvania for Community Colleges with 126 or more classrooms, to a high of 58.5 in Florida for all Community Colleges.

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[1] California Postsecondary Education Commission, *Update on Space and Utilization Policy in Higher Education*. Commission Report 04-13, September 2004.

Colorado

Colorado has 27 public institutions of higher education.

	Number of Campuses or Institutions	Student Enrollment
4-year Colleges	12	153,945
2-year Colleges	15	77,956
Total	**27**	**231,901**

Source: Chronicle of Higher Education Almanac, 2007-08; Berk & Associates, 2008.

Capital Process

The Colorado Commission on Higher Education reviews and prioritizes capital project requests for the coming fiscal year before sending them on for approval by the Legislature and Governor. The Commission prioritizes capital projects by examining each institution's space needs as outlined in its five-year master plan. Due to budget constraints, the State only funds facilities that are used for instructional purposes. The Commission attempts to equitably distribute funds, and has recently begun considering the contribution that an institution can make toward capital projects using student fees, tuition, or private donations. If an institution has no funds to contribute, the State may fund 100% of project costs, whereas the State will contribute less to an institution with available funds.

Revenue Sources and Financing Mechanisms

Colorado is not allowed to issue long term debt, so state-issued bonds are not used to fund capital facilities. The State recently received approval to use federal mineral lease revenues to issue COPs to fund capital projects. Revenue from the COP must be used within three years of issuance, but can be paid back over twenty years, similar to a bond.

Aside from the mineral lease revenues, all funding for capital projects comes out of the State's capital construction account, funded by the state General Fund. Thus, higher education projects compete against other state buildings and transportation for funding.

Institutions. Each institution is authorized to bond against revenue streams, such as tuition and fees. The research institutions can also levy capital fees to help fund projects. Some institutions receive private donations to fund capital facilities. Instructional buildings that are privately funded are eligible for operations and maintenance funding from the State. Auxiliary buildings, such as dorms, built with donations or revenue bonds are ineligible for this funding.

Public-private partnerships. Institutions are beginning to pursue public-private partnerships. A campus in Denver is considering partnering with a downtown hotel for their hotel management school, while others are considering combining academic space with office and retail. Local partnerships are also forming to share athletic facilities in a community. Completed partnership projects are largely residential dormitories where the private partner developed the facility and pays rent back to the institution in exchange for the land.

Cost Management

The Office of the State Architect has a representative at each of the institutions and provides oversight once a project is funded. Costs are managed on a project by project basis; however, the authorization of COPs was intended to manage construction costs by paying for a large number of projects at one time.

Cost benchmarks. Colorado does not have any formal benchmarks for evaluating capital projects. Each institution is required to get a third party review of their project proposal before it is submitted to the Commission to ensure cost reasonableness. The Governor's office also sets a statewide allowable inflation percentage, but many institutions use different rates according to local circumstances.

Energy cost management. The Governor has ordered all state institutions to draft a plan to reduce energy costs by 20% over the next ten years. All capital projects must pursue LEED certification if the cost of certification can be recouped by energy and maintenance savings over the next five years.

Space utilization. The State has space standards guidelines for classrooms (30 hours per week) and lab space (20-30 hours per week), but these are not used in funding decisions. Each institution must include space utilization estimates in its facilities master plan, which the Commission then uses to compare projects among institutions. However, these figures are not used to rank projects.

Online learning. Most of the institutions in Colorado have some type of online learning program. Online programs are a means of increasing access and generating extra revenue. These programs require institutions to upgrade their technology and equipment to deliver effective distance learning, and are not generally viewed as cost-saving.

Connecticut

Connecticut has 21 public higher education institutions and one distance learning institution, Charter Oak State College, which is entirely online. The University of Connecticut is the only research institution, and has five campuses.

	Number of Campuses or Institutions	Student Enrollment
University of Connecticut	5	28,677
Connecticut State University	4	37,310
Community-Technical Colleges of Connecticut	12	46,489
Total	**21**	**112,476**

Source: University of Connecticut, 2007; Connecticut State University System, 2007; Chronicle of Higher Education Almanac, 2007-08; and Berk & Associates, 2008.

Capital Process

Every biennium, institutions in the Connecticut State University and Community-Technical Colleges of Connecticut systems request G.O. Bonds from the Legislature for building, renovation, equipment, and other related costs. The University of Connecticut funds all of its own projects through the 21st Century UConn Bonds. The Connecticut Department of Higher Education (CDHE) reviews and recommends projects for approval by the Department of Operations Management. Operations Management sends the budget request to the Legislature. Each month the State Bonding Commission meets to determine which bond funds to release. Even if a bond is approved for an institution, the institution will not receive the money until the bond is released by the Commission and the Governor. The Commission considers the prioritization recommendations of CDHE as well as legislative priorities. Project funding is approved upfront even if the project is phased.

Revenue Sources and Financing Mechanisms

All revenue to support capital projects is generated by the State or by the individual institutions; no funding is provided to any of the systems from local jurisdictions.

Institutions. The universities are authorized to bond against tuition and fees. As mentioned above, the University of Connecticut funds all of its own projects through the 21st Century UConn bonds. The Connecticut State Universities have just begun to issue their own bonds. Bonding at the institutional level allows schools to schedule capital projects 10-15 years out because they will not have to wait for the Commission to release bond funds.

Public-private partnerships. The institutions have partnered with the private sector on academic programs. At this point, no partnerships involving capital projects have been pursued.

Cost Management

The State Public Works Department provides management oversight for all state funded projects, in conjunction with the project management teams from the relevant system.

Cost benchmarks. The Public Works Department issues annual cost benchmarks to the institutions to assist them with budgets and cost estimates.

Online learning. The Connecticut Legislature established Charter Oak State College in 1973 to provide assistance to adults working towards associate's and bachelor's degrees. At that time, the College was a credit aggregator and did not directly offer courses. The College, accredited by the Connecticut Board of Governors for Higher Education, began offering online courses in 1998 and now offers more than 150 video and online courses, and associate's and bachelor's degrees in both Arts and Science and several certificate programs. The College now serves about 30,000 students each year, about 40% of these students reside outside Connecticut.

Enrollments at Charter Oak have been growing at 20% each year, and the interviewees noted that the institution has not done much marketing. The increased demand was attributed to adults who want to complete a degree or retrain, and need more flexibility and lower costs than are found at many traditional institutions.

Cost Advantages

- Charter Oak has only one building used to house its administrative offices.
- One of the principal space savings noted by the College was faculty offices. Since all faculty members are off site, there is no faculty office space.
- Charter Oak pays its faculty based on the number of students enrolled in a course.
- Charter Oak saves costs by using aggregating resources, such as eTutoring.org, which allows participating institutions to share tutoring resources. Institutions allocate a percentage of tutor time to the collaborative based on their students' usage. Similarly, when institutions develop courses alone or in collaboration for use by other institutions, it allows all institutions to broaden their course offerings.

Costs and Challenges

- Charter Oak has a central database in its administrative location. The online model requires a learning management system, such as Blackboard, 24/7 technology support, and in person or online training for faculty. Charter Oak operates a help desk for its students 16 hours each day.
- Distance learning is not infinitely scalable. Charter Oak tries to limit class sizes for course with new faculty or those that are conversation intense. More experienced faculty may have classes of up to 35 students, but 25 students is a more typical class size.

In addition to Charter Oak State College, where courses are only offered online, the University of Connecticut, Connecticut State Universities, and the Community-Technical Colleges also offer online courses.

Maryland

Maryland has 31 public higher education institutions. St. Mary's College and Morgan State University are public four-year institutions that are outside of the University System of Maryland.

	Number of Campuses or Institutions	Student Enrollment
University of Maryland	13	135,069
Community Colleges of Maryland	16	116,940
St. Mary's College	1	2,065
Morgan State University	1	6,847
Total	**31**	**260,921**

Source: University System of Maryland, 2008; Maryland Association of Community Colleges, 2008; Morgan State University, 2008; St. Mary's College, 2008; and Berk & Associates, 2008.

Capital Process

For the 11 institutions in the University System of Maryland, the Board of Regents of each school collaborates to compile a system-wide list of capital projects for funding. The community colleges, St. Mary's College, and Morgan State University also submit a prioritized list compiled by representatives from the individual colleges.

The Maryland Higher Education Commission (MHEC) reviews the list of capital projects submitted by each system, St. Mary's College, and Morgan State University, then recommends a list of projects for funding to the Executive Budget Department. The Capital Debt Affordability Committee determines what level of spending the State can afford for the upcoming year based on the estimated facilities needs of the state agencies. The Budget Department takes this into account when deciding which higher education capital projects to fund. The State initially provides funding for four years of a project, with the understanding that a project may take five or six years to complete and may require more funding.

Revenue Sources and Financing Mechanisms

Capital projects are funded through state-issued G.O. Bonds. Institutions are authorized to bond against tuition, fees, and other revenue sources using Academic Revenue Bonds.

Higher Education Investment Fund. During a special legislative session in 2007, the Governor established the Higher Education Investment Fund (HEIF). To fund the HEIF the Governor proposed a 1% increase in corporate income tax with half of the new revenue going to the HEIF and the other half dedicated to transportation. This has provided roughly $70 million in revenues for higher education and will be up for renewal during the 2009 legislative session. If the dedicated revenue stream is not re-approved, the money to be placed in the fund will be under the discretionary control of the Legislature.

Donations and public-private partnerships. Donations given to the higher education institutions are often used for scholarship programs. Facilities that are funded through private donations are eligible for operations and maintenance funding from the State, but this is not guaranteed. Public-private partnerships are generally pursued for auxiliary buildings, such as dormitories, since the State only funds academic buildings.

Local taxes. Fifteen of the sixteen community colleges receive some local tax revenues, primarily generated from property taxes.

Cost Management

The State requires each institution to complete a construction estimate worksheet at project submittal. This sheet includes cost data and is used to assess each project.

Online learning. The University of Maryland University College (UMUC) is a University System of Maryland institution dedicated to continuing education for adult learners. Undergraduate and graduate degrees and certificates can be completed entirely online or in classroom locations throughout Maryland and the Washington D.C. area. In 2007, there were 32,000 U.S. students, 19,581 of whom were Maryland residents, and 38,288 students from 22 countries. UMUC enrolls close to 60,000 active duty military, reserves, dependants and veterans and offers courses at 150 military institutions. The school offers more than 100 bachelor's and master's degrees programs for adult students in an effort to broaden career opportunities and maximize economic and intellectual contributions.

UMUC is a member of Maryland Online (MOL), an online consortium of public and private four- and two-year higher education institutions. MOL facilitates the programs online, but degrees and certificates are awarded by the participating institution offering the program.

Massachusetts

Massachusetts has 29 public institutions of higher education.

	Number of Campuses or Institutions	Student Enrollment
University of Massachusetts	5	58,939
Massachusetts State Colleges	9	47,668
Community Colleges of Massachusetts	15	85,557
Total	**29**	**192,164**

Source: University of Massachusetts, 2007; Massachusetts Department of Higher Education, 2008; Chronicle of Higher Education Almanac, 2007-08; and Berk & Associates, 2008.

Capital Process

The Department of Higher Education (DHE) acts as a coordinating board for the higher education institutions in Massachusetts. The DHE reviews project proposals using each institution's physical infrastructure master plan and input from the institutions. The DHE recommends projects to the Administration and Finance Department and the Department of Capital Asset Management (DCAM) for approval and funding.

Revenue Sources and Financing Mechanisms

Typically, the State issues G.O. Bonds to fund specific projects. However, the Governor issued a $1 billion bond in 2008 after the completion of each institution's physical infrastructure master plans created a statewide list of projects. Aside from the $1 billion bond issue, there is no dedicated revenue stream for higher education in Massachusetts. DCAM issues G.O. bonds for all other state capital projects as well, and higher education institutions are eligible to apply for these funds, but must compete against all other state agencies, including the Department of Transportation.

The nine Massachusetts State Universities are authorized to issue bonds through the Massachusetts Building Authority for revenue generating facilities, such as dorms or dining halls. The Massachusetts Building Authority issues bonds for the nine state colleges.

Cost Management

If the project is over $1 million, DCAM acts as project manager. If it is under $1 million the school may manage the project itself or ask DCAM to manage.

Cost benchmarks. DCAM tracks all of the costs for capital projects at higher education institutions. DCAM uses a detailed costing system to build square foot cost estimates for construction and renovation projects, but they do not benchmark by facility type.

Space utilization. A space utilization study was conducted as part of the 2007 master planning process. The intent of the study was to provide an assessment of the adequacy of general purpose and specialized instruction space at each institution. Space standards were established using four metrics: scheduling window, the span of daytime hours during which a course may be scheduled; room utilization rate, the percent of the scheduling window for which a space is scheduled; seat occupancy rate, the percent of room capacity that is occupied when the room is scheduled; and square feet per station. Institutions were measured against the benchmarks shown below for each metric.

	Community Colleges	4-year Colleges
Scheduling window	30 hours/week	40 hours/week
Room utilization rate		
General purpose space	67%	67%
Specialized instructional space	50%	50%
Seat occupancy rate		
General purpose space	67%	67%
Specialized instructional space	80%	80%
Square feet per station	"consistent with industry norms"	

Source: Massachusetts Board of Higher Education, Utilization Study Summary, 2007; Berk & Associates, 2008.

The study resulted in recommendations related to capital, such as new or modified space, and non-capital, such as scheduling, underutilized spaces, and room configuration. Information from the study is used to inform planning decisions; capital project funding is not currently contingent upon meeting space utilization requirements.

Online learning. UMass Online was created in 2001 as the distance learning arm of the five University of Massachusetts campuses, and offers online only and blended courses, which combine classroom time with online components. UMass Online offers 80 degrees and certificates and over 1500 individual courses. Enrollment for fiscal year 2008 was 33,900, a 26.2% increase over the previous year, while revenues increased 31.9% to $36.9 million. The 15 community colleges collaborate in Massachusetts College Online, which allows students to enroll in classes at any of the community colleges and earn credit at their home institution. The emphasis of distance learning programs in Massachusetts is increased access, rather than capital cost savings.

New Jersey

There are 31 public higher education institutions in New Jersey. The three research institutions are Rutgers, the University of Medicine and Dentistry of New Jersey, and the New Jersey Institute of Technology.

	Number of Campuses or Institutions	Student Enrollment
Research Universities	3	64,421
State Colleges and Universities	9	89,868
Community Colleges	19	154,085
Total	**31**	**308,374**

Source: New Jersey Commission on Higher Education, 2007; Chronicle of Higher Education Almanac, 2007-08; Berk & Associates, 2008.

Capital Process

The State of New Jersey does not provide any funding for higher education capital facilities.

Revenue Sources and Financing Mechanisms

Tuition is the main revenue source for schools and is high relative to other states. Only 30% of applicants are accepted at a New Jersey public institution, and as a result of this high demand, the schools are able to charge relatively high tuition.

The New Jersey Educational Facilities Authority (NJEFA) is a conduit issuer of bonds on behalf of the higher education institutions. Originally, NJEFA was established to assist institutions with revenue-generating facilities. As the State progressively funded fewer and fewer academic facilities, NJEFA began to assist institutions with these types of facilities. All of the schools bond against tuition revenues, fees, grants, or gifts using their own credit.

Public-private partnerships. Only the research institutions are authorized to partner with the private sector. The other state and community colleges are lobbying to get authorization for partnerships. Partnerships are not necessarily seen as a source of revenue but as a means of speeding up the project procurement process. Projects are still subject to the State's public works laws.

Cost Management

Since there is no State oversight or funding for capital projects, there are no statewide benchmarks, space utilization standards, or other cost management practices.

Online learning. In the past, emphasis was placed on online courses as a means of increasing tuition revenues without increasing space needs. However, this has not proven to be effective for the New Jersey institutions and the focus has shifted to programs like corporate trainings that happen at non-traditional times.

Texas

Texas has 101 public institutions of higher education. Universities include nine institutions in the University of Texas system, and ten in the Texas A&M system.

	Number of Campuses or Institutions	Student Enrollment
Universities	35	497,195
Community Colleges	50 districts with multiple campuses	547,190
Health Related Institutions	9	16,735
Technical Colleges	4	13,153
State Colleges	3	6,807
Total	**101**	**1,081,080**

Source: Texas Higher Education Coordinating Board, 2007; Berk & Associates, 2008.

Capital Process

The Texas Higher Education Coordinating Board (THECB) provides guidance to the higher education institutions on capital project proposals and degree programs and reviews all Tuition Revenue Bond project proposals. Each Board of Regents approves a list of projects to be included in the system's capital expenditure plan, which is then sent on to the THECB. The THECB reviews and categorizes the projects for approval by the legislature.

Revenue Sources and Financing Mechanisms

There are two funds dedicated to higher education in Texas: the Permanent University Fund (PUF), which feeds the Available University Fund (AUF), and the Higher Education Assistance Fund (HEAF). Portions of these funds may be used by the systems to fund capital projects, in addition to bond revenues.

The **Permanent University Fund** supports 21 institutions in the University of Texas and the Texas A&M systems. The PUF consists of approximately 2.1 million acres of land and generates revenues from oil and gas royalties. These revenues are then invested, and returns on those investments are deposited into the AUF. Two-thirds of the amount released from the AUF is appropriated to the University of Texas System, and one-third is appropriated to the Texas A&M System.

The **Higher Education Assistance Fund** was established by the legislature to provide appropriations to university systems not eligible to receive income from the PUF. Each year the legislature determines how much will be appropriated. The HEAF has seen a steady increase in funds in recent years.

The University of Texas System and the Texas A&M System can bond against PUF income. All systems are allowed to bond against tuition using Tuition Revenue Bonds with the approval of the Legislature and the THECB. Even though individual institutions pledge the tuition, Tuition Revenue Bonds can only be issued by the systems. Recently, the legislature authorized the use of General Revenue funds for bond repayment, rather than tuition. Institutions may also issue their own revenue bonds subject to THECB approval.

Local taxes. The community colleges are divided into tax districts and are supported by local property tax dollars. In addition to Tuition Revenue Bonds, the community colleges can issue local bonds with voter approval.

Public-private partnerships. Most public-private partnerships involve housing-related capital projects. There have been a few examples of partnerships for other facilities, such as a health-related institution partnering with a hospital district to lease back a facility for the school's use.

Cost Management

Project costs are tracked at the system or institution level. The State administers tracking forms throughout the project to assess progress, but does not provide any oversight. An update on total project cost is provided to the State upon project completion and there is a proposal to update this report with more detailed construction cost information.

Cost Benchmarks. The THECB conducts a construction and renovation study every year using the past five years of project cost data. The THECB estimates the average cost per square foot for each building type based on construction costs only (other associated costs are not factored in), and produces an acceptable cost range. The cost ranges are used to assess the cost reasonableness of each institution's project proposals. If a project falls outside of the range, the institution may be asked to provide supplementary information to explain the overages. Often, cost discrepancies are attributed to regional cost differences related to labor or materials. The THECB commented that state law authorizes most, if not all, procurement practices and leaves the decision about which practice to use up to each institution.

Space utilization. Texas uses a space utilization calculation that is expressed as hours per week per classroom or lab. The current standards are 38 hours per week per classroom and 25 hours per week per lab. Institutions are asked to meet these standards, but they are not part of the project review process and are not strictly enforced.

Shared facilities. There are many examples of systems sharing facilities. There is a teaching center which combines universities, community colleges, and even independent colleges in a shared space, as well as system centers which offer multiple programs in one space. Universities will also partner with community colleges to offer a university class in the community college facility.

Online learning. Texas A&M offers 20 degree programs online, including master and doctorate degrees. The UT system offers online courses, degrees, and certificates through its University of Texas TeleCampus (UTTC). UTTC works with all 15 UT campuses to develop courses and programs for distance learners. Students enroll at the institution offering their desired program through UTTC. Certificate and graduate degree programs are completed online, while most of the bachelor degree programs are hybrid programs that include online instruction and time on campus.

Wisconsin

The four-year universities and two-year colleges are part of the University of Wisconsin system with a single Board of Regents, and the Technical Colleges are another system. A representative from the University of Wisconsin system was interviewed for this study, so the following analysis addresses capital facilities funding for the four-year universities and two-year colleges only.

	Number of Campuses or Institutions	Student Enrollment
4-year Universities	13	157,067
2-year Colleges	13	12,639
Technical Colleges	16	102,540
Total	**42**	**272,246**

Source: University of Wisconsin System, 2007; Wisconsin Technical College System, 2007; and Berk & Associates, 2008.

Capital Process

Wisconsin helps fund academic and teaching facilities. Each four-year institution submits a project proposal to the University of Wisconsin system office, which then prioritizes the submitted projects using a 100-point scoring system. In addition to the scoring sheet, other factors may be taken into consideration by the system, such as whether an institution recently had a large project funded. The prioritized list is submitted to the Department of Administration, which has statutory authority over facilities construction. The Department determines how much money is available for higher education capital facilities and allocates accordingly.

Revenue Source and Financing Mechanisms

The State issues G.O. Bonds on behalf of the University of Wisconsin four-year institutions, using General Fund revenue to service the debt. Neither the individual schools nor the Board of Regents is authorized to issue bonds. As a result, the institutions are subject to the biennial funding cycle, which can become problematic for construction projects that do not follow the same schedule.

The two-year colleges' capital facilities are owned by the municipality in which the school is located. The municipality issues municipal bonds to build or renovate community college facilities. The State pays for instruction, moveable equipment and furniture, and operations and maintenance at each institution.

Energy cost-saving bond. The 2007-09 budget included a $30 million bond for energy cost-saving projects. In order for a project to be approved, the savings in energy costs must be sufficient to repay the bond in 10 years or less. $22 million of the bond has already been allocated. This fund is separate from the general capital facilities funds produced by the State's G.O. Bonds, and consequently does not compete with other capital projects.

Public-private partnerships. The State's restrictive process has prompted many institutions to partner with private entities on capital projects. Partnerships allow institutions to follow a compressed project schedule and potentially save money. The majority of these partnerships are with the institutions' foundations and the resulting facilities are gifted to the schools. For example, the University of

Wisconsin Madison Alumni Research Foundation used $100 million in royalties from discovery patents to build research related facilities, and the University of Wisconsin Milwaukee Real Estate Foundation has built several dormitories for the school. There are also examples of partnerships with private developers, though the resulting facilities are often ultimately purchased from the developer, which requires state approval and a bond issue. The institutions are not allowed to have capital debt, so they cannot lease a facility from the developer. The partnerships generally require a great deal of legal work on behalf of the system and institution, but have been successful in providing efficient, cost-effective projects.

Cost Management

The Department of Administration oversees all state-funded capital projects in the University of Wisconsin system. The institutions pay the Department 4% of the project costs for its services.

Cost benchmarks. The Department of Administration produces cost per square foot guidelines for a variety of facilities. These guidelines are based on past project costs for similar facilities and Engineering News Record data. This methodology causes some problems when there is no precedent for a proposed facility or when the most recent project cost was artificially high or low, depending upon the construction market at the time. If a proposed budget estimate is outside of the approved range, the institution must provide a justification.

Space utilization. Space standards are used to evaluate the budget requests of each institution. The institutions produce 6-year plans for the University of Wisconsin system, in addition to the 20-year plans they maintain on their own. The system provides each institution with estimation and assessment tools to identify space issues and solutions. The tools include modeling and programmatic needs assessments to establish the most efficient use of space. No single department or program has ownership over a specific space; consequently, spaces may be reassigned to improve efficiencies and decrease construction needs. The institutions are expected to meet a 35 hours per week space standard, but this is averaged over the entire campus to allow less efficient space to be offset by highly efficient space.

Online learning. Each institution has an online learning program, and many are also engaged in collaborative online learning with other University of Wisconsin institutions. Online learning is not viewed as a cost-saving strategy, but as cost avoidance. The student body is growing as a result of the online learning option and the institution’s ability to reach new students, but there has not been a decrease in students on campus. There are also capital needs for the programming of online learning and recently an entire floor of a new facility built on the Platteville campus was dedicated to offices for the distance learning program to meet the needs of online adult students.

Summary Matrix of Revenue Sources

As shown in Exhibit C3**,** the majority of states rely on general funds to pay for capital facilities projects at their institutions of higher education.

Exhibit C3
Summary of Revenue Source by State

	State General Fund	Natural Resources	Local Property Tax	Corporate Income Tax
California	●		Community Colleges only	
Colorado*	●	●		
Connecticut	●			
Maryland			Community Colleges only	●
Massachusetts	●			
New Jersey				
Texas	●	●	Community Colleges only	
Wisconsin	●		Community Colleges only	

Note: *Money from the General Fund is transferred to the Capital Construction Fund.
Source: Stakeholder interviews, 2008; and Berk & Associates, 2008.

- Texas uses proceeds from the investment of gas and oil royalties.
- Colorado uses mineral lease revenue to issue COPs.
- Community colleges in California, Maryland, Texas, and Wisconsin receive funding from local bond issues, paid for by property taxes.
- Maryland receives half of 1% of the state's corporate income tax for higher education projects.

Summary of Cost Management Strategies

All states interviewed struggle with the rising costs of capital projects and ongoing operations and maintenance.

Process improvements can help manage costs at the state level. California has implemented several process changes, such as bundling projects for a single bond issue, and approving all funding at application rather than at each phase. In Colorado, Connecticut, Massachusetts, and Wisconsin, state agencies or offices provide oversight and/or manage higher education capital projects.

Savings can be gained from energy efficiency projects. Colorado is requiring all state institutions to create a plan to reduce energy costs by 20% in the next ten years. Wisconsin issued a $30 million bond for energy cost-saving projects sufficient to repay the bond in ten years or less. Many individual institutions are also looking to energy efficiency projects and upgrades as a way to manage costs.

Space utilization standards are primarily used for planning purposes. California, Colorado, Connecticut, Massachusetts, Texas, and Wisconsin all have space utilization standards, though they are expressed differently. Project approval is contingent on meeting the standards in California and Wisconsin. Wisconsin requires additional explanation and documentation to approve a project that does not meet the standards. Wisconsin also uses average utilization standards for an entire campus, as opposed to just the facility in question. Thus, even if the facility doesn't meet the standards, if it contributes to the campus as a whole meeting the standard, the project can be approved. The other states do not currently tie the standards to approval or funding, and most use them for planning purposes only.

Cost benchmarks are used to assess cost reasonableness. Of the states surveyed, Connecticut, Massachusetts, Texas, and Wisconsin use cost benchmarks as part of their capital process. Most of these benchmarks are produced by the oversight agency, such as the Department of Capital Asset Management in Massachusetts or the Department of Public Works in Connecticut. Benchmarks are typically expressed in terms of cost per square foot ranges for different facility types and are primarily used to assess cost reasonableness and create a basis for dialogue around construction costs. In all cases, there is flexibility if an institution submits a justification and additional information.

Online learning is not seen as a cost saving strategy. All of the states surveyed have online learning courses and programs. All of the interviewees spoke about online programs as a means to increase access and expand course offerings and not as a cost-saving strategy.

Public-private partnerships are an innovative financing mechanism that can accelerate project timelines, thereby reducing costs. Wisconsin's restrictive process has prompted many institutions to partner with private entities on capital projects. These partnerships allow institutions to complete a project in a shorter timeframe, which often saves money. Many states have used partnerships to develop dormitory projects and are beginning to explore academic facility projects.

Interview Questions for Other States

General

1. Please provide an overview of your state's higher education system.
2. What is the state's role in funding higher education facilities?
3. What are your current greatest challenges with the financing of higher education capital facilities?
4. What amount of oversight and control does your state have when funding higher education facilities?

Revenue Sources

5. What revenue sources does your state use to fund capital projects for higher education institutions?
6. What financing mechanisms does your state use in higher education capital project funding?
7. What revenue sources do the individual institutions use in funding their capital facility projects?
8. What financing mechanisms do the individual institutions use in higher education capital project funding?
9. Do any local tax revenues support local higher education capital needs? (sales taxes, property taxes, impact fees, real estate excise taxes, LIDs, etc.)
10. Are there any revenue sources that you are aware of in other states or countries that might be beneficial to research?

Cost Management Strategies

Benchmarks

11. Does the State use any construction cost per square foot benchmarks to estimate costs, evaluate, or prioritize capital facilities proposals?
12. Do the institutions track actual construction costs? Do they share this information with the state?

Other Cost Management Practices

13. What practices does the State employ to manage construction costs? For example, bundling projects during the bidding process, procurement process improvements, alternative public works contracting practices, etc?
14. Have any of the institutions in your system recently initiated any other facilities related capital cost management strategies? This might include asset management systems, program changes, etc.?
15. Were any of these cost management strategies initiated expressly to limit or reduce the amount of State funding required to support your capital program?
16. Do institutions offer distance learning courses and/or programs?

17. Does the state have specific utilization standards for classroom or lab space (for example, student hours used per week) that it uses to evaluate capital facilities projects?

Final Thoughts

18. Who else in your state (at individual institutions or other state agencies) should we be talking to about these issues?
19. What about other states? Are there any states or public higher education institutions you're aware of that have been innovative with respect to revenue sources and cost reduction strategies for capital projects?

Appendix D:
List of Funds

APPENDIX D: CAPITAL PROJECT FUNDS AND RELATED REVENUE STREAMS

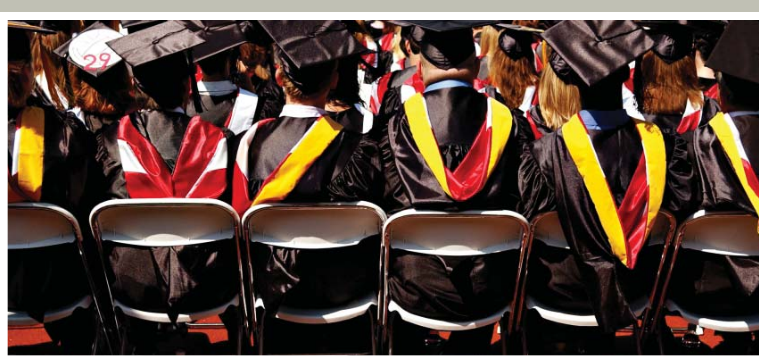
Fund	Revenue Sources
State Revenues Only	
056 State Higher Education Construction Account	▪ G.O. Bond Proceeds
057 State Building Construction Account	▪ G.O. Bond Proceeds ▪ Miscellaneous Revenue
173 State Toxics Control Account	▪ Hazardous substance tax and fees ▪ Hazardous Waste Cleanup Recoveries
253 Education Construction Account	▪ Lottery Revenue ▪ Interest Earnings ▪ Miscellaneous Revenue
355 State Taxable Building Construction Account	▪ State Taxable Bond Proceeds ▪ Miscellaneous Revenue
357 Gardner Evans Bonds	▪ G.O. Bond Proceeds (dedicated for higher education capital needs from 2003 through 2009)
Mix of State and Institutional Revenues	
060 Capital Projects Account (CTCs)	▪ Trust Land Timber Sales and Lease Revenue and Related Interest ▪ Tuition Building Fees
061 Capital Projects Account (EWU)	▪ Trust Land Timber Sales and Lease Revenue and Related Interest ▪ Tuition Building Fees
062 WSU Building Account (WSU)	▪ Trust Land Timber Sales and Lease Revenue and Related Interest ▪ Tuition Building Fees
063 Capital Projects Account (CWU)	▪ Trust Land Timber Sales and Lease Revenue and Related Interest ▪ Tuition Building Fees
064 UW Building Account (UW)	▪ Trust Land Timber Sales and Lease Revenue and Related Interest ▪ Metro Tract Property Net Income ▪ Tuition Building Fees
065 Capital Projects Account (WWU)	▪ Trust Land Timber Sales and Lease Revenue and Related Interest ▪ Tuition Building Fees
066 Capital Projects Account (TESC)	▪ Trust Land Timber Sales and Lease Revenue and Related Interest ▪ Tuition Building Fees
147 Plant Account (Each CTC creates their own)	▪ Gifts and grants to individual CTC ▪ Contract revenue ▪ Fee revenue ▪ Interest
01L Higher Education Construction Account	▪ G.O. Bond Proceeds ▪ Grants ▪ Local donations ▪ Transferred funds
Institutional Revenues	
252 Higher Education Non-Proprietary Local	▪ Local contributions and grants ▪ Federal grants
Many funds (a fund is created per capital campaign)	▪ Private Donations
Many funds	▪ Research revenue: grant funds for "indirect costs" and rental income

Source: Berk & Associates 2008.

Office of Financial Management
STATE OF WASHINGTON

Higher Education Capital Facilities Financing Study

Expected Cost Ranges for Higher Education Capital Facilities



December 2008

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120 Lakeside Avenue
Suite 200
Seattle, Washington 98122
P (206) 324-8760

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Principals: Bonnie Berk and Michael Hodgins
Project Manager: Heather Rogers
Project Team: Bonnie Berk, Julia Bosch, Allegra Calder, Natasha Fedo, Emily Heatherington, Malia Langworthy, Julia Warth

HIGHER EDUCATION CAPITAL FACILITIES FINANCING STUDY

Expected Cost Ranges for Higher Education Capital Facilities

Contents

HIGHER EDUCATION CAPITAL FACILITIES FINANCING STUDY

TECHNICAL APPENDIX

Expected Cost Ranges for Higher Education Capital Facilities

1.0 INTRODUCTION AND PROJECT OVERVIEW

1.1 Study Background and Scope

Project Background and Legislative Intent

With ESHB 3329, the Washington State 2008 Legislature directed the Office of Financial Management (OFM) to submit a higher education capital facilities financing study to the Governor and appropriate legislative committees by December 1, 2008. The Legislature required three distinct components in the higher education financing study, one of which is the "examination of alternatives for reducing facility construction and maintenance expenditures per student through strategies such as expansion of distance learning opportunities, increased scheduling of classes during evenings and weekends, **the establishment of expected cost benchmarks by facility type**, and other means." (ESHB 3329.PL)

The larger goal of the Higher Education Capital Facilities Financing Study is to provide the Governor and the Legislature with a comprehensive review of revenue sources and cost management strategies in use in Washington State and the global challenge states, and to identify potential new revenue sources and cost saving strategies for higher education capital facilities. The analysis and recommendations in this report address only the establishment of expected cost ranges by facility type and represent one portion of the broader study.

Working Definition: "Expected Cost Ranges"

As noted above, the 2008 Legislature requested a study of "Expected Cost Benchmarks." In researching this topic nationally, several terms of practice were identified. Terms in common use include "Indicative Construction Costs," (Rider Levett Bucknall); "Cost Per Square Foot," (College Planning & Management); and "Square Foot Costs," (RSMeans). In this report, the term "Expected Cost Ranges" will be used to denote comparative cost indicators in lieu of the term "benchmarks," which has a more specific performance management meaning.

Scope of Cost Range Analysis

At the outset of this project, OFM identified several unique higher education facility types that are typically funded through the State capital budget. Facility types are broken into two categories: primary (those frequently proposed during biennial funding cycles), and secondary (other higher education facility types that may receive a small portion of State capital funds, or are proposed with less frequency). The following list of primary facility types is examined in further detail in the sections that follow, and expected cost ranges are proposed for each:

- Classroom facilities
- Science labs (teaching)
- Research facilities
- Libraries
- Administrative buildings
- Communications buildings
- Day care facilities

Role of Expected Cost Ranges in the Capital Process

The expected cost ranges for each of the facility types listed above are intended to serve as one tool to evaluate the cost reasonableness of capital project proposals. As each project is defined by a unique set of circumstances which could impact costs, the expected cost ranges described herein are not intended to set firm parameters for project costs. Instead, they are designed to be used as reference points and as tools to identify projects whose costs are substantially higher than the norm, resulting in further dialogue and clarification as part of the capital budgeting process.

Furthermore, it is important to note that these expected cost ranges focus strictly on capital costs and do not address operating costs. Since capital decisions often affect operations and management, it is recommended that a holistic life cycle approach be considered when evaluating project costs.

Given that the primary intention of ESHB 3329 was to develop an objective scoring system for higher education capital facilities, the proposed cost ranges included in this report could be incorporated into the scoring system in addition to, or in lieu of, the existing cost reasonableness criteria that require the institutions to identify comparable projects to justify proposed costs.

Data Collection Going Forward. To improve the reliability of these ranges, there is an opportunity for the State's higher education institutions to collect appropriate data on their cost experiences over time, and to use these data sets to compare and contrast with cost estimates for new projects being proposed. This concept is consistent with the recommendations contained in the January 2008 final report, *Best Management Practices for Capital Projects.* The study was commissioned by OFM in response to 2006 legislative direction to OFM to report on best management practices for financing and constructing State capital projects. The *Best Management Practices* report included several recommendations, one of which focused on reviewing completed construction projects. The report recommended that agencies be required to submit an annual report to the Governor's Office detailing the final costs of their completed projects, and how these costs compared to the original funded amounts.

1.2 Approach to Development of Expected Cost Ranges

Approach Overview

To develop the expected cost ranges described in this report, Berk & Associates relied upon a variety of data sources and inputs:

- **National**. We reviewed existing national cost ranges for construction costs related to higher education facilities.
- **Other States**. We interviewed six representatives from global challenge states (as well as individuals from Wisconsin and Texas) and reviewed these other states' benchmarking systems where they existed.
- **Washington State**. We interviewed representatives from the six public baccalaureate institutions and the State Board for Community and Technical Colleges (SBCTC). We collected data on project costs from the institutions, the Department of General Administration (GA), and the Joint Legislative Audit and Review Committee (JLARC).

Using the information and data collected from these sources, Berk & Associates conducted a project comparison analysis to arrive at recommended ranges of construction costs per square foot. This analysis is described in further detail in **Section 2.0** below.

Project Comparison Estimating

Expected cost ranges were determined using a project comparison estimating approach. This approach is typically used in the early planning stages of a project when project parameters have been established but there is little detailed information. Project comparison estimating uses cost data from past projects of similar building type, construction materials, and construction method. Using gross square footage and total cost data, a cost per square foot is calculated and adjusted to current dollars using a construction specific cost index.

Advantages and Challenges of Project Comparison Estimating

There are several advantages to the project comparison estimating method. The first is the relative simplicity; provided there is adequate project cost data, the cost per square foot ranges are easy to calculate and explain. The approach can be used when detailed cost breakdowns are unavailable and allows for fixed inputs, such as architectural and engineering fees or contingencies. The greater the number of projects, the better the estimate is likely to be as average costs per square foot can be calculated with and without outlier projects.

When the components of the total costs are unknown, or cost data is reported differently, it can be difficult to ensure that the costs per square foot for each project are truly comparable. This approach benefits greatly from standardized inputs with clear definitions. Finally, given the preliminary nature of these estimates, they are thought to have no better than a 15% to 25% accuracy rate.[1]

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[1] Scott Cullen, Estimating (Washington DC: Whole Building Design Guide, 2005)

2.0 RESEARCH AND ASSUMPTIONS

2.1 Data Sources

In order to identify appropriate inputs and better inform the development of expected facilities cost ranges, a number of sources were investigated.

Department of General Administration (GA)

Data on recent Community College projects were obtained from the Engineering and Architecture Services division of GA. The division provided information from their Project Tracking database, including campus name, project name and type, construction cost, gross square footage, base bid cost per square foot, and substantial complete date.

Joint Legislative Audit and Review Committee (JLARC)

Comparable Frameworks Studies

In 2003, JLARC collected facility inventory and condition information for all facilities in the State's Higher Education System. The study, *Higher Education Facilities Preservation Study (JLARC Report 03-1),* introduced the notion of a comparable cost framework. The 2003 Comparable Framework study translated cost information so that facilities could be compared to one another. The Comparable Framework produced an estimated maintenance and repair backlog and estimates of current replacement values for all institutions, and field tested building condition ratings. The study was subsequently updated in 2005 (*Higher Education Capital Facilities Studies: Expanding the Comparable Framework, JLARC Report 05-10*), and again in 2008.

Discussions were held with the consulting firm Meng Analysis, Inc. that conducted the analysis and developed the Comparable Framework. Discussions focused on understanding in-depth the applicability and limitations of the current replacement value, definitions, and "common denominator" indicators developed originally for JLARC and now maintained by the Higher Education Coordinating Board (HECB). Facilities metrics and replacement values were derived from information provided by the individual four-year institutions and community and technical colleges, supplemented by databases from other states, and information from RSMeans, a national cost data source.

Survey of General Contractor/Construction Management Projects in Washington State

In 2005, JLARC was tasked with reviewing the use of "general contractor/construction manager" (GC/CM) contracting procedures in major public works projects. Part of this review included a survey of several GC/CM projects in Washington State, including some higher education capital projects. This survey included information on gross square feet, construction costs, design costs, and project management costs for several projects included in the analysis in **Section 3.0** below.

Public Baccalaureate Institutions

As part of the stakeholder interview process for the Higher Education Capital Facilities Financing Study, the public baccalaureate institutions in Washington State were asked about facilities cost ranges in use for pre-design purposes and about any unique institutional or geographic factors affecting construction costs. By and large, the institutions do not rely on expected cost ranges for planning or budgeting purposes, opting instead for more rigorous, project-specific cost estimation. Below is a summary of comments from interviews with the institutions on the topic of cost estimates, any unique institutional factors, or other challenges related to cost estimates.

Central Washington University (CWU)

- CWU uses an informal cost estimating system based on RSMeans that is adjusted at every bid. Since they bid projects infrequently, there are few comparable projects to work from.
- CWU is comfortable with the current replacement values used in the Comparable Frameworks study with the exception of the adjustment to 95% of base costs used for Eastern Washington. CWU noted that distance from the Port of Seattle adds to materials costs, and contractors frequently must pay above prevailing wage due to worker shortages.
- The University cited the weather as an important factor, as the construction window in Central Washington is relatively short and any delays significantly increase costs. Costs per square foot are high because of the mechanical systems, thicker walls, and building envelopes that are necessary due to the extreme hot and cold temperatures.

Eastern Washington University (EWU)

- EWU uses average square foot costs for facility types from national data sources. They typically make some adjustments for the region.
- Projects at EWU are typically more expensive because there are fewer large contractors who can perform the work. Because it is not a very competitive market, the same contractors tend to submit bids for most projects.

Evergreen State College

- Evergreen works with Thurston County to obtain comparable cost per square foot project data from county projects, community college projects, and Saint Martin's College. Since Evergreen typically builds instructional space, comparable information is more readily available and is more likely to be accurate. Evergreen uses inflation factors as necessary.
- Evergreen noted that there are a lot of variables related to an institution's location or project needs. For example, community character may necessitate brick construction instead of concrete. New media facilities may require extensive acoustic engineering.
- Evergreen asserts that accounting for time is difficult and any delays in the construction process add to overall costs. Cost ranges are more appropriate than a fixed cost per square foot.

University of Washington (UW)

- The UW completed a Construction Cost Benchmark Study in 2006 to determine if capital costs were comparable to other institutions and to identify opportunities to reduce costs. The study was completed with the assistance of a professional cost estimator from Davis Langdon.

- The study found that the University's strong policy of shared governance affected all aspects of project delivery. Facility standards were found to be comparable to other research institutions; however, the long lead time to secure funding was noted as a reason for substantial differences between estimated and final construction costs.

Western Washington University (WWU)

- WWU maintains a thorough facilities management and backlog tracking system which includes current replacement values of all facilities and is used to calculate maintenance needs and facilities condition indices.

- WWU operates in a space-constrained environment. Obtaining surge space and engaging in community outreach with well-organized surrounding neighborhoods affects the timing and costs of capital projects.

- WWU uses standard cost per square foot indices for pre-design, then estimates costs in greater detail for phases beyond pre-design.

Washington State University (WSU)

- WSU uses cost information from the State on various facility types and has found that the best cost estimates come from recent projects.

- WSU gets three estimates for every project from an architect, a contractor, and an independent party.

- The University mentioned that construction costs are high in Eastern Washington; contractors often move their entire crew over since the commute is too far and it costs more to ship materials.

- Challenging topography is also cited as a factor, which adds to site preparation costs.

State Board for Community and Technical Colleges (SBCTC)

- SBCTC maintains data on expected ranges by building type and method of construction (Design-Bid-Build and GC/CM). Costs are estimated using maximum allowable construction costs and indirect costs based on past projects. A 70,000 square foot facility is used as a baseline with higher costs per square foot for smaller buildings and lower costs per square foot for larger buildings. Cost ranges are updated every two years.

- SBCTC noted that estimating 45% to 65% for indirect costs is reasonable for GC/CM (after backing out any land acquisition costs). However, project management fees and equipment costs can influence total project costs.

- SBCTC does not think national cost ranges are helpful. RSMeans has too many variables and does not adequately account for locations such as the San Juan Islands and the Olympic Peninsula.

Global Challenge States

Several interviews were conducted with other state education agencies to identify any cost benchmark best practices in use that might be relevant to Washington State. Eight other states were interviewed: California, Colorado, Connecticut, Maryland, Massachusetts, New Jersey, Texas, and Wisconsin. Of these eight, Connecticut, Texas, and Wisconsin have developed cost ranges for specific higher education facility types.

- **Connecticut**. Connecticut's Department of Public Works (DPW) publishes annual Capital Guidelines for higher education facilities. These guidelines group facilities into three different categories based on potential design complexity (new construction, renovation, and replacement), and provide a design fee schedule that varies depending on category, total construction cost, and type of project. In a similar fashion, a management fee schedule is also calculated. If no other documented cost estimate source is available, DPW also provides general construction cost per square foot guidelines for three different size ranges of 18 different facility types.

- **Texas.** The Texas Higher Education Coordinating Board (THECB) maintains expected construction cost per square foot ranges by higher education facility type that are based on a rolling average of five years of actual construction cost data. These ranges exist for new construction and renovation for 27 different facility types. They are updated annually and include only data from Texas higher education projects, consequently, some of the facility categories include very few projects that comprise the range. Indirect costs are not included in the analysis.

- **Wisconsin.** The Wisconsin Division of State Facilities (DSF) issues Capital Budget Cost Estimating Guidelines that include typical building efficiencies and construction cost per square foot ranges for 12 different facility types. These ranges are based on January 2005 bid costs and escalated using the Engineering News Record (ENR) Index discussed below. DSF also provides guidance on indirect fees, including ranges for design fees (based on project size and complexity), management, contingencies, equipment, and other indirect costs.

Federal Government Sources

- **U.S. Department of Veterans Affairs (VA)**. VA publishes regional costing guides by building type. While most of the cost information pertains to health care facilities, there are two types of research facilities ("Heavy: Wetlabs & Animals" and "Normal: Mix Heavy & Offices"), for which new construction and renovation construction costs per square foot are provided. These costs are adjusted to cities within the region using the Boeckh Index (see below).

- **National Science Foundation (NSF)**. NSF conducts a Congressionally-mandated Survey of Science and Engineering Research Facilities every two years, which provides data on the science and engineering (S&E) research space at U.S. colleges, universities, and nonprofit biomedical research institutions. NSF publishes numerous data tables from this survey that show square feet by type of space and institution, costs, new construction planned and started, and a variety of other metrics. For new facilities with 50% of space or more dedicated to federal research projects, the Federal Office of Management and Budget requires a comparative analysis of project costs to the NSF survey.

Other National Sources

There are several national sources of cost data that are available for purchase or by paid subscription. Some of the more prominent data sources include:

- **RSMeans**. One of the most widely cited source is RSMeans Reed Construction Data. Available by online subscription, RSMeans CostWorks has detailed facilities cost data updated on an ongoing basis with materials and labor data for 900 locations in North America. *Means Building Construction Cost Data* and *Means Square Foot Costs* publications are also available for purchase.

- **Marshall & Swift/Boeckh**. Marshall & Swift have a number of building costs and valuation tools available for purchase, including manuals, CDs, online training programs, and commercial estimating software.

- **BNi Building News**. BNi publishes building codes, legal forms and contracts, cost estimating tools and other building trades-specific reference materials. The *BNi Facilities Manager Costbook* includes labor and materials costs with regional cost modifiers, equipment costs, and cost per square foot tables. The Costbook can be custom ordered to account for local labor rates.

- **Engineering News Record/Design and Construction Resources (ENR/DCR).** The ENR/DCR *Square Foot Costbook* is based on costs from actual projects and includes illustrations and a narrative with background information for each project. The *Architects, Contractors, and Engineers Guide to Costs* provides data for material and installation costs, labor and equipment rates, and adjusted allowances for overhead and profit. It also includes prevailing wage rates for the 75 largest U.S. metropolitan areas, square foot costs, Americans with Disabilities Act costs, production and demolition rates, energy factors, purchasing costs, and equipment rental rates.

- **Rider Levett Bucknall (RLB)**. RLB is a global firm that provides cost consultancy, project management, and advisory services. RLB publishes a *Quarterly Construction Cost Report* for the U.S. and 12 metropolitan areas, including Seattle and Portland. The RLB Comparative Cost Index tracks the true bid cost of construction, which includes labor and materials costs, general contractor costs and fees, subcontractor overhead costs and fees, and applicable sales or use taxes. The Report includes material supply prices and a low and high cost per square foot for a variety of building types, including university buildings, for the nation and all 12 metropolitan areas.

- **College Planning & Management**. *The Annual College Construction Report* is published each year by College Planning & Management magazine and provides data on college construction projects completed during the previous year and discusses trends over time. College Planning and Management uses 12 regions to track projects and costs. Washington is in Region 12, along with Alaska, Idaho, and Oregon. The report includes a national summary of new buildings underway with median size, number of buildings in the sample, and low quartile, median, and high quartile costs per square foot for 10 academic building types.

- **Whitestone Research**. Whitestone Research's MARS Facility Cost Forecast System is a predictive modeling tool that includes cost data and forecasts for 210 North American cities, and replacement value estimates by building type, size, and location.

- **Stanford University.** Stanford's Department of Project Management maintains an online Benchmark Cost Modeling System available only to authorized institutional users. In order to view data, institutional users must enter at least three projects from their own institution. The purpose of the database is to help universities compare and analyze the cost of construction using detailed project data from institutions around the country. Stanford maintains benchmark cost models for the following project types: wet lab, dry lab, primarily open office, primarily private office, teaching classroom (distance learning and standard), graduate and undergraduate housing, library/museum, dining hall, parking structure, and athletic facility.

2.2 Project Selection and Assumptions

Using the above data sources that publish information free of charge, Berk & Associates gathered data points for facility types that fell within the facility type categories listed in **Section 1.1**. These data points were grouped with all available actual construction cost data provided by the four-year institutions and by GA (for community college capital construction projects). Facility types were determined based on project descriptions, and in instances where a facility contained both classrooms and laboratories it was classified as a "Science Lab (Teaching)." Although it is a free data source, College Planning & Management data were not used for this effort, because College Planning & Management's Report contains a mix of data types (budgeted costs, total costs, and construction costs).

All available data for new construction projects completed in 2000 or later with complete information in the following categories were used.

- **Construction Cost.** Construction Cost represents the bid cost for a project and is equivalent to Maximum Allowable Construction Cost (MACC). It is assumed to include all material and labor costs to construct the facility as well as the contractor's fee or profit. It does not include architecture and engineering (A/E) costs, project management, site improvements, land acquisition, equipment, or contingencies.

- **Construction Date.** Where possible, construction start and end dates were requested, as time escalation is typically calculated to the construction mid point. If only the construction end date was provided, it was assumed that the mid point occurred one year prior.

- **Gross Square Feet (GSF).** Gross square feet of the facility was required to calculate construction cost per square foot.

As available, data were also collected on the following for each of the projects considered. These data were used to develop the indirect rates discussed in detail in **Section 2.4** below.

- **Total Project Cost.** Total project cost represents the complete start to finish cost of executing the project, excluding any land acquisition costs. In addition to construction costs, A/E, project management, equipment, sales tax, and other project-related costs comprise this total.
- **Indirect Costs.** Where not explicitly broken out, total indirect costs were assumed to be the difference between total project costs and construction costs, and they were calculated as a percent of construction costs. In some instances (JLARC GC/CM project data, JLARC Comparable Frameworks current replacement value benchmarks, SBCTC cost per square foot figures, and

some project data from public baccalaureate institutions) indirect costs of A/E services, project management, and equipment were provided.

Adjustment Factors

In order to develop a data set of comparable projects, all project and benchmark data were adjusted to reflect 2008 Seattle-area costs. The adjustments were calculated along two dimensions: location and time.

Location Adjustments

Based on conversations with cost estimating professionals and facilities and construction managers at the public baccalaureate institutions, it was determined that no location adjustment was necessary for projects within Washington State for the following reasons:

- **Materials.** Given the quantity and type of materials required for larger scale institutional construction projects, there are not significant regional differences in cost within the State of Washington. Smaller local markets cannot often supply the amount of material needed, so contractors rely on the same state, national, or international markets for materials.

- **Labor**. State-funded construction projects are typically subject to prevailing wage regulation. This prohibits contractors from taking advantage of labor rates that might be cheaper locally. Furthermore, for large projects that cannot feasibly be staffed with local labor, a construction crew must be brought in from further away, requiring additional expenses like per diems or temporary housing.

For data coming from sources that didn't include any Washington-specific data (Texas Higher Education Coordinating Board, Wisconsin Division of State Facilities, and Connecticut Department of Public Works), RSMeans 2008 location factors for commercial construction were used to adjust the data to the Seattle-area equivalent.

Time Escalation

All data points were adjusted to 2008 dollars. The adjustment was made from the year in which the mid point of construction fell using the Engineering News Record (ENR) Seattle-area construction cost index. RSMeans historical cost indices could have also been used for the same purposes, and show a slightly higher average annual inflation rate for the period 2000 through 2008 (4.6% versus 3.7% using the ENR index).

2.3 Methodology for Comparative Analysis of Construction Costs

Once all of the project data were adjusted to reflect 2008 Seattle-area construction costs, they were plotted by facility category on axes of size (GSF) and total construction cost. A least squares regression analysis was performed to calculate a best fit line using the independent variable of size to predict total construction cost and arrive at a construction cost per square foot figure. Using this method, as opposed to an average, has the advantage of normalizing differences in total facility size, assuming the line is a good fit (i.e. a separate analysis of costs per square foot of small, medium, and large facilities).

A more accurate method would look at facilities of a similar total size to calculate the expected construction costs per square foot, but given the limited availability of closely comparable projects, the best fit approach described here was chosen.

The R^2 variable is an indicator of goodness of fit. It describes how well the variation in construction costs can be described by facility size. An R^2 variable of one would represent a perfect fit, and an R^2 of .9 (for example) indicates that 90% of the variance in construction costs can be explained by facility size. In the analysis the follows, facility types that have a larger number of data points and an R^2 closer to one have more robust results.

2.4 Application of Indirect Costs

Given that indirect costs can vary substantially depending upon complexity of design, contracting method, and other factors, and given that good data on actual indirect costs were sometimes difficult to procure for all projects, indirect rates are considered separately, then applied to the construction cost to arrive at the total project cost.

Elements of the Indirect Rate

The following cost elements are normally included in indirect rates, and the C100 form requires separate identification of these items when budgeting capital projects.

- **Architecture and Engineering (A/E)**. These costs include all of the A/E design elements included in the project. Industry professionals suggest 10% of construction costs as a ceiling for design costs, though this will run higher with world-renowned architects and highly complex projects.

- **Project Management**. These costs include all of the project management costs and fees. Under a GC/CM procurement method, these costs will run higher because the General Contractor is assuming more of the risk of cost overruns.

- **Sales Tax**. Sales tax on construction contracts is another indirect cost that might run 5%-8% of construction costs, depending upon project composition and geographic location.

- **Furniture, Fixtures, and Equipment (FF&E)**. FF&E costs can vary greatly depending upon facility type. They will be higher for research facilities with specialty equipment, and they also run higher for libraries and science labs.

- **Contingency**. Contingency covers unexpected events and helps projects react to some of the factors listed in **Section 4.2** above. It can range from 5% up to 25% in rare instances like tunneling projects with many risk factors and unknowns. Higher contingencies sometimes reflect projects that have not been thoroughly scoped.

Exhibit 1
Indirect Costs: Industry Standards, Actual Experience, and Indirect Rate Used in the Expected Cost Ranges

	Industry Standards				
Indirect Costs	**Min**	**Max**	**Average**	**Actual**	**Selected**
Design	8%	10%	9.0%	15.0%	10.0%
Project Management	3%	8%	5.5%	4.6%	5.5%
Sales Tax	6%	9%	7.5%		7.5%
FF&E	5%	10%	7.5%	5.8%	6.0%
Contingency	5%	20%	12.5%		12.5%
Total Indirect Cost	27%	57%	42.0%	38.8%	**41.5%**

Source: UW, WWU, JLARC, SBCTC, Berk & Associates 2008

Exhibit 1 depicts the range of industry standards for indirect costs discussed above. The Actual indirect percentages represent the median from Washington State higher education projects for which these data were available, with the total indirect rate being computed from 24 Washington State projects included in the analysis that follows.

The Selected column represents the costs that are included in the total expected facility cost per square foot ranges described below. In most instances, industry averages were used and adjustments were made to reflect actual experience. The exception is design costs. Actual experience was not relied upon in this instance as it was only readily available for a small number of GC/CM projects. The resulting total (41.5%) falls within the industry norm.

3.0 EXPECTED COST RANGES BY FACILITY TYPE

This Section introduces the cost ranges by facility type proposed in this study, and the data and analysis from which these expected cost ranges were derived. For each facility type, the following is presented:

- **An analysis of state higher education capital projects and national and state expected cost ranges.** A sample of capital projects from community and technical colleges, the four-year baccalaureate institutions, and in some cases other Washington State capital projects is presented, along with other state and national cost ranges to identify a range, median, and weighted average of construction costs per square foot.

  These data points are then plotted along axes of gross square feet and 2008 construction costs to test standard deviation and identify a line of best fit. Along with each graph, the R^2 value is reported to indicate how well the best fit line approximates the real data points. R^2 values range from zero to one, where high values (those closer to one) indicate a closer approximation.

- **A recommended cost range.** Using an indirect cost rate of 41.5%, as described in **Section 2.4** above, total project costs were calculated from the base construction costs. A recommended range is presented as a benchmark for higher education classroom facilities. The range is bounded by one standard deviation above and below the best fit value.

3.1 Classroom Facilities

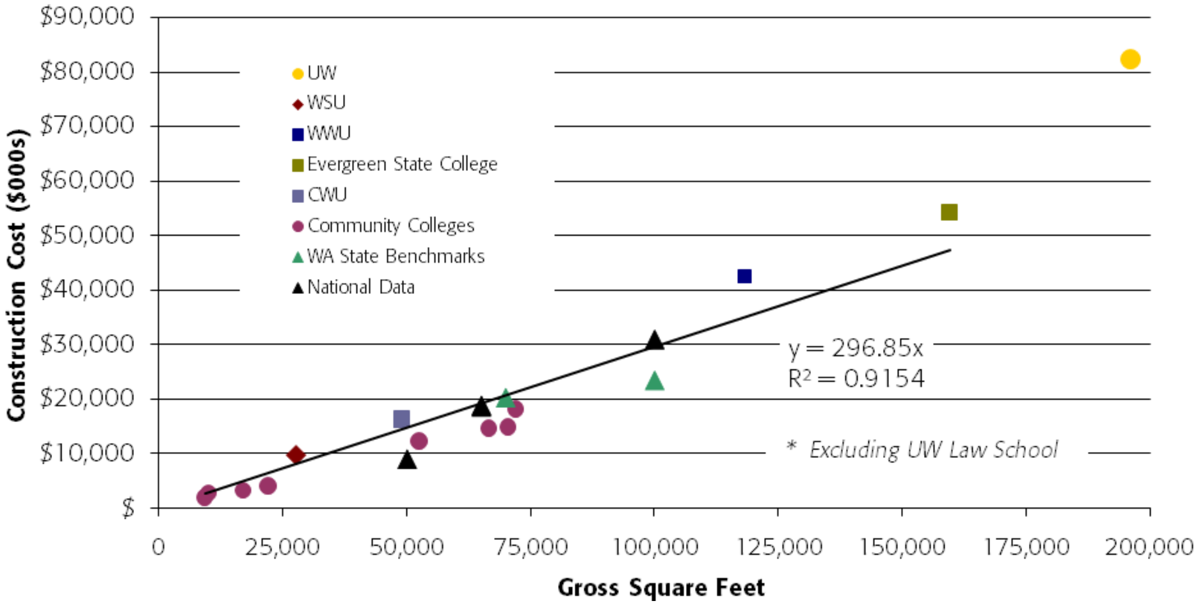
Classroom facilities represent the bulk of the new construction capital projects proposed for State funding. **Exhibit 2** presents the 18 data points for classroom facilities, which include eight community college projects, four projects from four-year baccalaureate institutions, and six cost ranges from Washington State and national sources. **Exhibit 3** takes those data points and plots the construction costs by gross square footage to estimate a line of best fit, with an R^2 value of over 91%.

Exhibit 2
Classroom Facilities – Project Experience and Existing Cost Ranges

Institution	Facility Name	Gross SQFT	Construction Mid Point Year	Construction Cost ($000)	2008 Adjusted Construction Cost ($000)	Construction Cost/ SQFT 2008
UW	William Gates Hall - School of Law	196,000	2002	$62,643	$82,228	$420
WSU	Education Addition	27,700	2004	$8,328	$9,719	$351
TESC	Seminar II Building Construction	159,524	2001	$40,950	$54,217	$340
CWU	Snoqualmie Hall	49,000	2002	$12,442	$16,332	$333
WWU	Academic Instructional Center	118,111	2007	$39,876	$42,552	$360
Tacoma Community College	Classroom and Administration Building	10,000	2003	$2,367	$2,988	$299
Grays Harbor College	General Classrooms	72,000	2004	$15,736	$18,364	$255
Olympic College	Olympic College Poulsbo	52,500	2002	$9,493	$12,461	$237
Olympic College	Library and Classroom Building	9,250	2002	$1,582	$2,077	$224
Centralia College	Instructional Building	66,602	2002	$11,271	$14,795	$222
Spokane Falls Communty College	Business and Social Sciences Building	70,533	2006	$13,629	$15,000	$213
Lower Columbia College	Classroom Addition	17,000	2002	$2,615	$3,433	$202
Clark College	Stout Hall Replacement	22,023	2003	$3,345	$4,223	$192
JLARC - Comparable Framework	CRV Benchmark (General Classroom)	100,000	2002	$17,900	$23,496	$235
SBCTC	Classroom/Office (Median)	70,000	2008	$20,300	$20,300	$290
Rider Levett Bucknall	University Building (Low)	100,000	2007	$29,000	$30,946	$309
Connecticut Dept of Public Works	Academic Buildings w/o Labs	65,000	2008	$18,862	$18,862	$290
Texas THECB	Classroom, General	65,000	2007	$17,409	$18,578	$286
Wisconsin DSF	Classroom/Lecture Building (Average)	50,000	2005	$8,008	$9,007	$180

Source: GA, WSU, JLARC, SBCTC, RLB, THECB, DSF, and Berk & Associates, 2008

Exhibit 3
Classroom Facilities – Best Fit



Source: Berk & Associates, 2008

The line of best fit equals $297 per square foot for Washington State classroom facility projects. Community college projects generally fall below this benchmark, and projects constructed by the public baccalaureate institutions represented here are consistently above the line. UW's William Gates Hall—School of Law project is an obvious outlier and was not included in estimating best fit. The cost ranges considered here all fall on or closely near the $297 per square foot trend, with the exception of the JLARC Comparable Framework benchmark, which at $235 per square foot is considerably lower.

The median per square foot cost of the above projects is $270, and the weighted average cost per square foot is $282 (considering facility size), as shown in **Exhibit 4**. The total cost per square foot range shown below was calculated by applying an indirect cost rate of 41.5% to the construction cost per square foot range.

Exhibit 4
Expected Cost Range – Classrooms

	Construction Costs / SQFT	Total Costs / SQFT
Classrooms		
Median	$270	
Weighted Average (GSF)	$282	
Best Fit	$297	
Recommended Range	$239 - $354	$339 - $501

Source: Berk & Associates, 2008

3.2 Science Labs (Teaching)

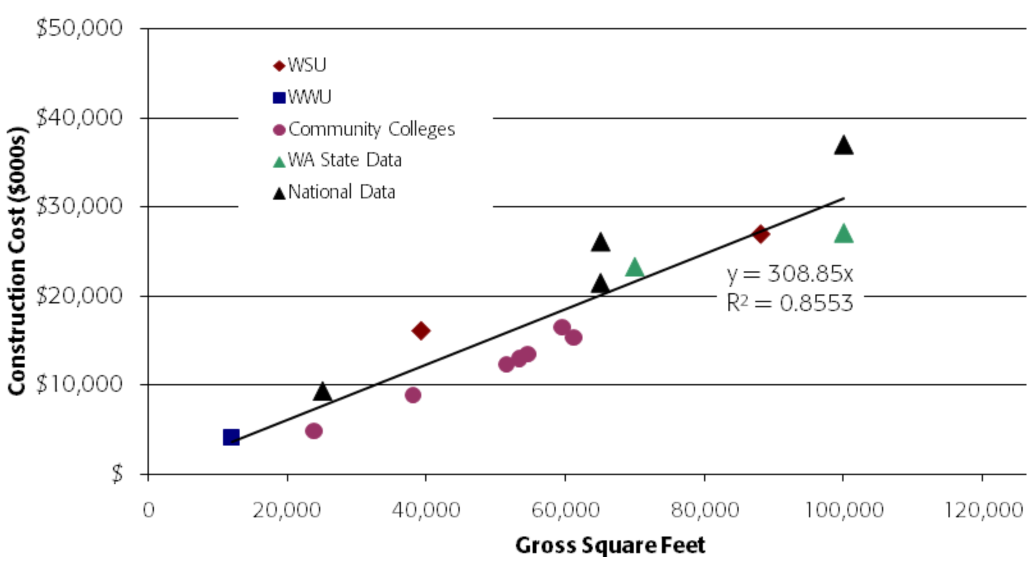
Exhibit 5 and **Exhibit 6** present costs for the construction of teaching science labs for 18 Washington higher education project examples, which include nine projects from community and technical colleges, three projects from four-year baccalaureate institutions, and six state and national benchmark sources.

Exhibit 5
Science Lab (Teaching) Facilities – Project Experience and Existing Cost Ranges

Institution	Facility Name	Gross SQFT	Construction Mid Point Year	Construction Cost ($000)	2008 Adjusted Construction Cost ($000)	Construction Cost/ SQFT 2008
WSU	Multimedia Classroom Building	39,161	2002	$12,266	$16,101	$411
WWU	Shannon Point Marine Center	11,978	2005	$3,672	$4,130	$345
WSU	Nursing Building	88,000	2007	$25,271	$26,967	$306
South Seattle Community College	Instructional Technology Center	59,500	2004	$14,154	$16,518	$278
Olympic College	Science and Technology Building	61,194	2006	$14,021	$15,432	$252
Tacoma Community College	IT Classroom	54,550	2004	$11,566	$13,498	$247
Whatcom Community College	New Science Building	53,300	2004	$11,154	$13,017	$244
Renton Technical College	Technology Resource Center	51,500	2002	$9,382	$12,316	$239
Green River Community College	Technology Center	38,100	2004	$7,579	$8,845	$232
Bellingham Technical College	Technology Center	23,790	2003	$3,846	$4,856	$204
Walla Walla Community College	Institute for Enology and Viticulture	15,750	2002	$2,403	$3,155	$200
Spokane Community College	Science and Math Building	65,268	2005	$9,691	$10,899	$167
JLARC - Comparable Framework	CRV Benchmark (Teaching Lab)	100,000	2002	$20,700	$27,172	$272
SBCTC	Science Building Reasonable Cost	70,000	2008	$23,345	$23,345	$334
Rider Levett Bucknall	University Building (Median)	100,000	2007	$34,750	$37,082	$371
Connecticut Dept of Public Works	Academic Buildings w/ Labs	65,000	2008	$21,540	$21,540	$331
Texas THECB	Laboratory, General	65,000	2007	$24,513	$26,158	$402
Wisconsin DSF	Academic Wet Lab (Average)	25,000	2005	$8,342	$9,382	$375

Source: WSU, WWU, GA, SBCTC, JLARC, RLB, THECB, DSF, and Berk & Associates, 2008

Exhibit 6
Science Lab (Teaching) Facilities — Best Fit



Source: Berk & Associates, 2008

The line of best fit here is equal to $309 per square foot for science teaching labs, which is, not surprisingly, greater than the line of best fit identified for basic classroom facilities. Community college projects again fall consistently below this line. Two four-year institution projects (one from WSU and one from WWU) fall directly on the best fit line, while the third is significantly above the $309 per square foot line.

Exhibit 7 shows the median construction cost per square foot equals $292, and the average weighted cost equals $305. The recommended $131 per square foot cost range for science teaching labs is slightly wider than the $115 per square foot range proposed for classrooms because the data on construction costs of instructional science labs is more dispersed.

Exhibit 7
Expected Cost Range—Science Labs (Teaching)

	Construction Costs / SQFT	Total Costs / SQFT
Science Labs (Teaching)		
Median	$292	
Weighted Average (GSF)	$305	
Best Fit	$309	
Recommended Range	$243 - $374	$344 - $530

Source: Berk & Associates, 2008

3.3 Research Facilities

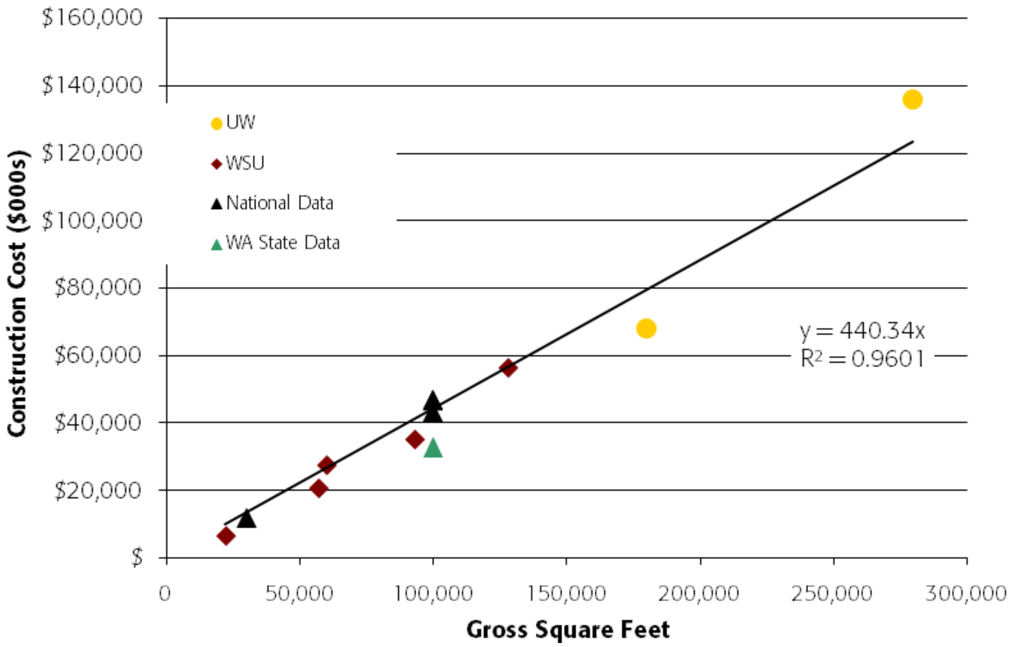
Seven capital projects for research facilities conducted by the State's two research institutions, UW and WSU, are shown in **Exhibit 8** and **Exhibit 9**. In addition, one state and four national cost ranges are presented for comparison and analysis.

Exhibit 8
Research Facilities – Project Experience and Existing Cost Ranges

Institution	Facility Name	Gross SQFT	Construction Mid Point Year	Construction Cost ($000)	2008 Adjusted Construction Cost ($000)	Construction Cost/ SQFT 2008
UW	William H. Foege Building	280,000	2004	$116,658	$136,141	$486
WSU	Engineering/Life Sciences Building	60,000	2000	$20,511	$27,390	$457
WSU	Biotechnology Life Sciences - Rec 2	128,000	2008	$56,185	$56,185	$439
UW	Paul Allen Center for Computer Science and Engineering	180000	2002	$51,689	$67,849	$377
WSU	Plant Bio Sciences - Rec 1	93,000	2004	$30,000	$35,010	$376
WSU	Bioproducts, Sciences and Engineering Lab	57,000	2007	$19,265	$20,558	$361
WSU	Mt. Vernon Ag Research and Tech Building	22,200	2007	$6,082	$6,490	$292
JLARC - Comparable Framework	CRV Benchmark (Research)	100,000	2002	$25,000	$32,816	$328
Dept. Veterans Affairs	Benchmark (Mix Heavy & Offices)	100,000	2008	$46,700	$46,700	$467
Rider Levett Bucknall	University Building (High)	100,000	2007	$40,500	$43,218	$432
Texas THECB	Laboratory, Medical/Healthcare	100,000	2007	$43,942	$46,891	$469
Winconsin DSF	Research Lab (Average)	30,000	2005	$10,491	$11,799	$393

Source: UW, WSU, JLARC, VA, RLB, THECB, DSF, and Berk & Associates, 2008

Exhibit 9
Research Facilities – Best Fit



Source: Berk & Associates, 2008

Most projects examined fall near or below the line of best fit, which equals $440 with a high R^2 of 96%. The five WSU projects sampled all fall at or below the line of best fit and are smaller in gross square footage than the two UW projects. All expected cost ranges examined also fall on or below the best fit line.

The median construction cost per square foot equals $405, as seen in **Exhibit 10**. The weighted average is considerably higher at $424, given the large range of gross square footage among the examined projects. The recommended range between $377 and $504 includes all of the five benchmark sources presented.

Exhibit 10
Expected Cost Range—Research Facilities

	Construction Costs / SQFT	Total Costs / SQFT
Research Facilities		
Median	$405	
Weighted Average (GSF)	$424	
Best Fit	$440	
Recommended Range	$377 - $504	$533 - $713

Source: Berk & Associates, 2008

3.4 Libraries

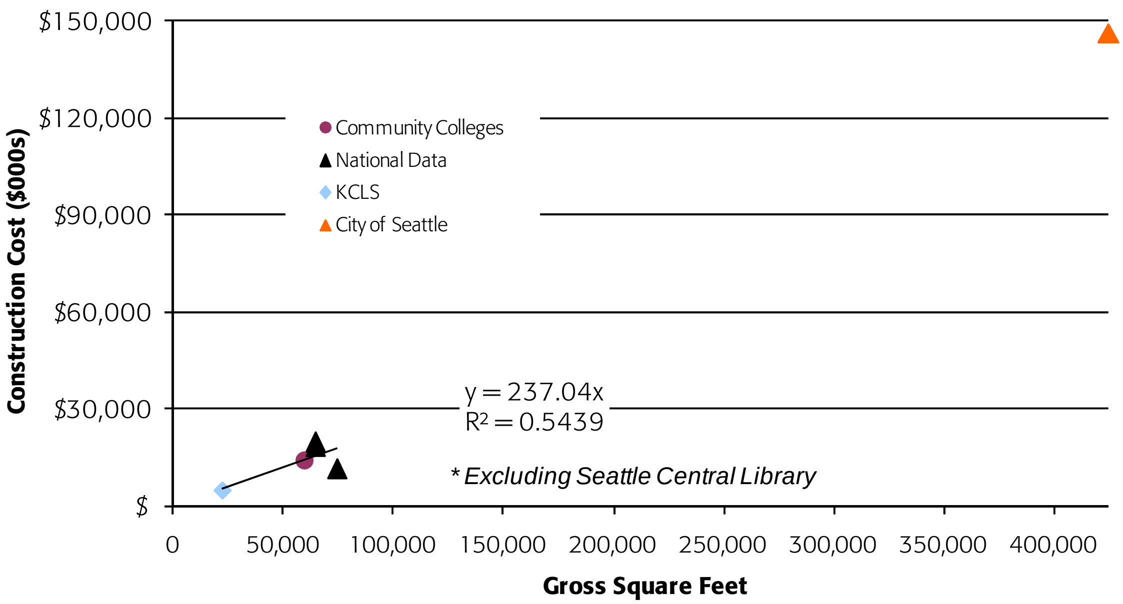
Only one higher education capital project for a new stand alone library facility with construction completed in 2000 or later was available for data analysis (the Library/Advanced Tech Education Center at Big Bend Community College). To increase the number of data points, a library facility project from King County, one from the City of Seattle, and three national cost ranges were also analyzed to determine a recommended cost range, as seen in **Exhibit 11** and **Exhibit 12**.

Exhibit 11
Library Facilities – Project Experience and Existing Cost Ranges

Institution	Facility Name	Gross SQFT	Construction Mid Point Year	Construction Cost ($000)	2008 Adjusted Construction Cost ($000)	Construction Cost/ SQFT 2008
Big Bend Community College	Library/ Advanced Tech Education Center	60,230	2003	$11,207	$14,149	$235
City of Seattle	Seattle Central Library	425,000	2003	$115,757	$146,139	$344
King County Library System	Covington Library	23,000	2007	$4,448	$4,746	$206
Connecticut Dept of Public Works	Libraries	65,000	2008	$18,436	$18,436	$284
Texas THECB	Library/Study Facilities	65,000	2007	$18,509	$19,751	$304
Wisconsin DSF	Library (Average GSF Building Costs)	75,000	2005	$10,411	$11,709	$156

Source: SBCTC, JLARC, King County Library System, DPW, THECB, DSF, and Berk & Associates, 2008

Exhibit 12
Library Facilities — Best Fit



Source: Berk & Associates, 2008

Data points from King County Library System (KCLS) and Big Bend Community College both touch upon the best fit line of $237. The City of Seattle's Central Public Library was excluded in analysis to determine best fit, given its outlier position both in terms of gross square footage and construction cost.

Exhibit 13 shows a median ($235) and weighted average ($239) that are very close to the best fit. The recommended cost range for library facilities is still relatively wide given that there are only five data points which are fairly dispersed, ranging from $178 to $296 per square foot.

Exhibit 13
Expected Cost Range—Library Facilities

	Construction Costs / SQFT	Total Costs / SQFT
Libraries		
Median	$235	
Weighted Average (GSF)	$239	
Best Fit	$237	
Recommended Range	$178 - $296	$251 - $420

Source: Berk & Associates, 2008

3.5 Administrative Buildings

Exhibit 14 and **Exhibit 15** present construction cost data for three administrative building capital projects and six state and national benchmarks.

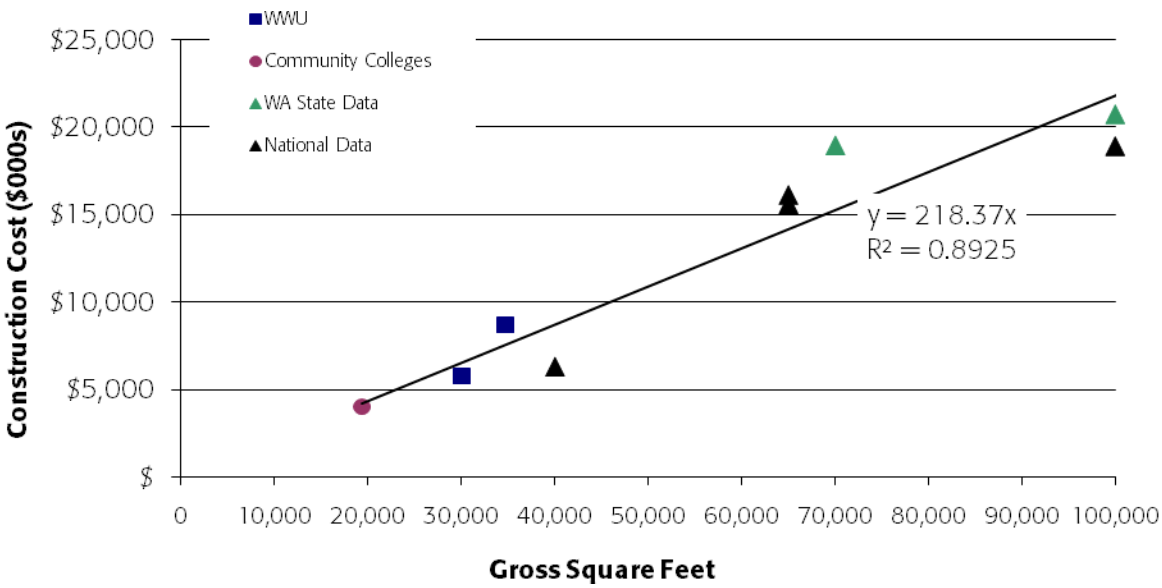
Exhibit 14
Administrative Buildings – Project Experience and Existing Cost Ranges

Institution	Facility Name	Gross SQFT	Construction Mid Point Year	Construction Cost ($000)	2008 Adjusted Construction Cost ($000)	Construction Cost/ SQFT 2008
WWU	Campus Services Facility	34,698	2001	$6,602	$8,741	$252
Peninsula College	New Student Services Bldg. "D" - Zone "A"	19,350	2003	$3,222	$4,068	$210
WWU	Administrative Services Building	30,035	1999	$4,239	$5,796	$193
JLARC - Comparable Framework	CRV Benchmark (Office)	100,000	2002	$15,800	$20,740	$207
SBCTC	Classroom/Office (Low)	70,000	2008	$18,970	$18,970	$271
Rider Levett Bucknall	Prime Office (Median)	100,000	2007	$17,750	$18,941	$189
Connecticut Dept of Public Works	Office/Admin.	65,000	2008	$15,637	$15,637	$241
Texas THECB	Office, General	65,000	2007	$15,145	$16,161	$249
Wisconsin DSF	Office Building 2-4 Story (Average)	40,000	2008	$5,659	$6,365	$159

Source: WWU, SBCTC, JLARC, RLB, DPW, THECB, DSF, and Berk & Associates, 2008

Exhibit 15

Administrative Buildings – Best Fit



Source: Berk & Associates, 2008

The line of best fit equals approximately $218. The higher education projects (from Peninsula College and WWU) have a smaller gross square footage than all cost ranges analyzed. These three projects fall close to the best fit line, with one slightly below, one slightly above, and one directly on the line. Three of the six benchmark cost estimates fall below the line.

The median ($210) and weighted average ($220) are close to the best fit estimate of $218, as **Exhibit 16** shows. Given that there is less complexity in design of administrative buildings and therefore more predictability in construction costs, the recommended range of $182 to $255 per square foot is relatively narrow ($73 difference per square foot) compared to other facility types.

Exhibit 16
Expected Cost Range – Administrative Buildings

	Construction Costs / SQFT	Total Costs / SQFT
Administrative Facilities		
Median	$210	
Weighted Average (GSF)	$220	
Best Fit	$218	
Recommended Range	$182 - $255	$258 - $360

Source: Berk & Associates, 2008

3.6 Communications Buildings

Projects from WWU, WSU and three national cost benchmarks were analyzed to determine recommended cost ranges for communication buildings, as presented in **Exhibit 17** and **Exhibit 18**. Given the specialized function of this category, data collection was more difficult.

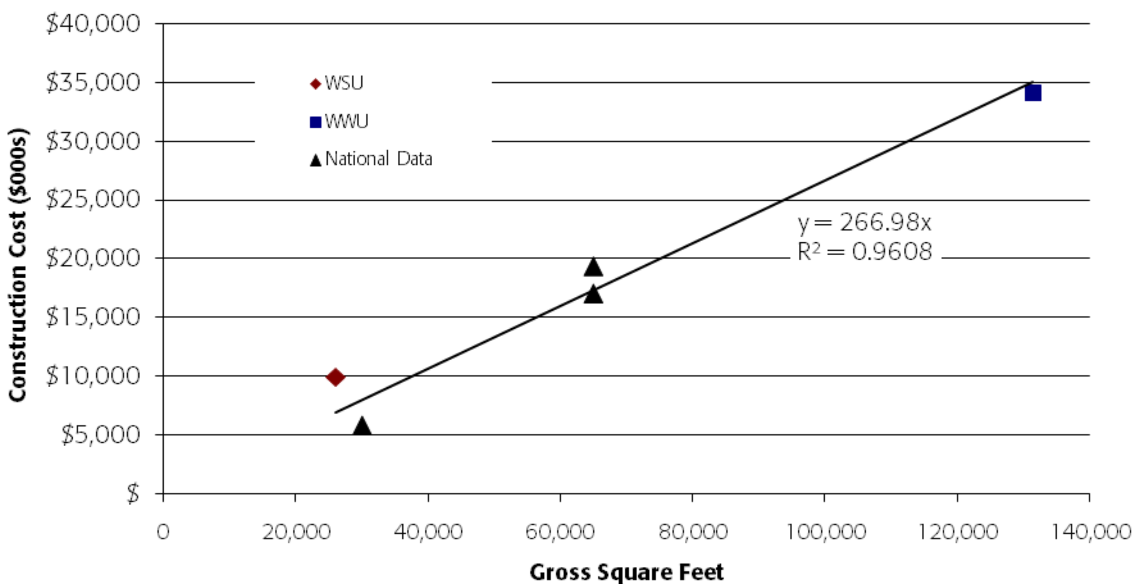
Exhibit 17

Communications Buildings – Project Experience and Existing Cost Ranges

Institution	Facility Name	Gross SQFT	Construction Mid Point Year	Construction Cost ($000)	2008 Adjusted Construction Cost ($000)	Construction Cost/ SQFT 2008
WWU	Communications Facility	131,365	2003	$27,041	$34,138	$260
WSU	School of Communication Addition	26,000	2003	$7,868	$9,933	$382
Connecticut Dept of Public Works	Media/Computer Labs	65,000	2008	$19,349	$19,349	$298
Texas THECB	Office, Technology	65,000	2007	$15,973	$17,045	$262
Wisconsin DSF	Computer Lab (Average)	30,000	2005	$5,205	$5,854	$195

Source: WWU, WSU, DPW, THECB, DSF, and Berk & Associates, 2008

Exhibit 18
Communications Buildings — Best Fit



Source: Berk & Associates, 2008

Best fit was calculated at $267, with an R^2 value of 96%. The difference in construction cost between WWU and WSU was considerable. The WWU project's construction cost per square foot was less than the line of best fit, median, and weighted average, as seen in **Exhibit 18** and **Exhibit 19**. WSU's project cost, however, exceeded all three measures. This can largely be explained by the difference in size of the two projects. As the WSU project was a 26,000 square foot addition, it was less able to take advantage of the economies of scale that a project over five times its size could leverage. This example illustrates the impact facility size can have on construction costs per square foot.

The recommended cost range, also seen in **Exhibit 19**, has a high upper end to capture smaller projects, although the WSU data point is still above the upper bound. With more data the best fit and range could likely be adjusted.

Exhibit 19
Expected Cost Range — Communications Buildings

	Construction Costs / SQFT	Total Costs / SQFT
Communications Facilities		
Median	$262	
Weighted Average (GSF)	$272	
Best Fit	$267	
Recommended Range	$199 - $335	$281 - $474

Source: Berk & Associates, 2008

3.7 Day Care Facilities

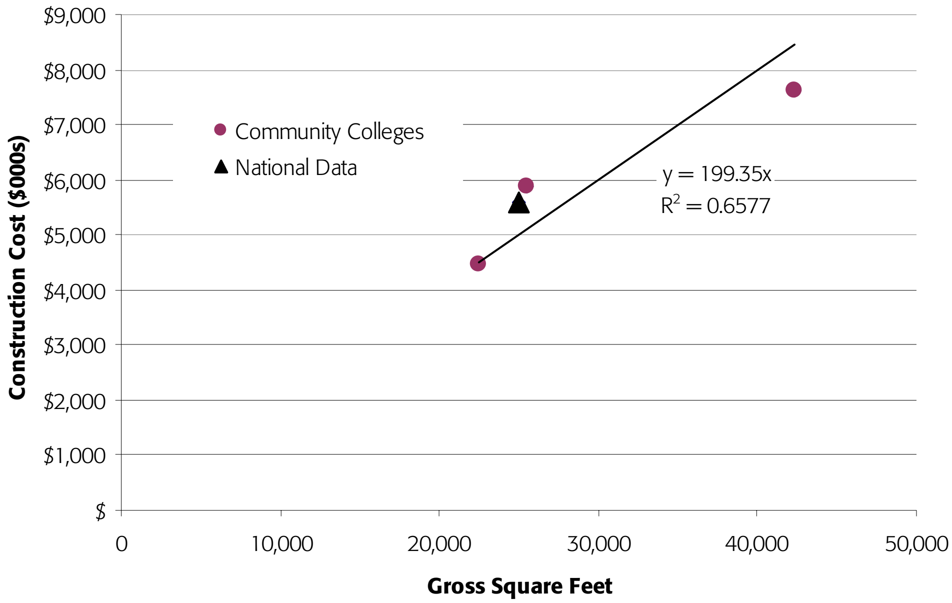
Four data points, which include three day care capital projects at community colleges and one national benchmark, are presented in **Exhibit 20** and **Exhibit 21**.

Exhibit 20
Day Care Facilities – Project Experience and Existing Cost Ranges

Institution	Facility Name	Gross SQFT	Construction Mid Point Year	Construction Cost ($000)	2008 Adjusted Construction Cost ($000)	Construction Cost/ SQFT 2008
South Puget Sound Comm College	Family Education Center	42,380	2003	$6,027	$7,609	$180
Edmonds Community College	Center for Families	22,490	2002	$3,400	$4,463	$198
Highline Community College	Early Childhood Development Ctr	25,500	2003	$4,670	$5,895	$231
Texas THECB	Childcare	25,000	2007	$5,244	$5,596	$224

Source: SBCTC, THECB, and Berk & Associates, 2008

Exhibit 21
Day Care Facilities – Best Fit



Source: Berk & Associates, 2008

Although there are only four projects, they fall relatively close to one another in terms of construction costs per square foot. The line of best fit equals $199, but has an R^2 value of only 66%, indicating that additional data is needed to arrive at a more robust construction cost per square foot figure.

Exhibit 22 below shows median and average costs that are higher than the best fit line. The narrow range reflects that the four data points are close to one another.

Exhibit 22
Expected Cost Range – Day Care Facilities

	Construction Costs / SQFT	Total Costs / SQFT
Day Care Facilities		
Median	$211	
Weighted Average (GSF)	$204	
Best Fit	$199	
Recommended Range	$176 - $223	$249 - $316

Source: Berk & Associates, 2008

4.0 COST BENCHMARK SUMMARY

4.1 Summary of Recommendations

Based on analysis of existing cost data at the national level and for specific projects, **Exhibit 23** summarizes the proposed expected cost ranges for seven facility types. The Exhibit shows the number of data points, the R^2, best fit, and cost per square foot range for construction costs and the range for total costs.

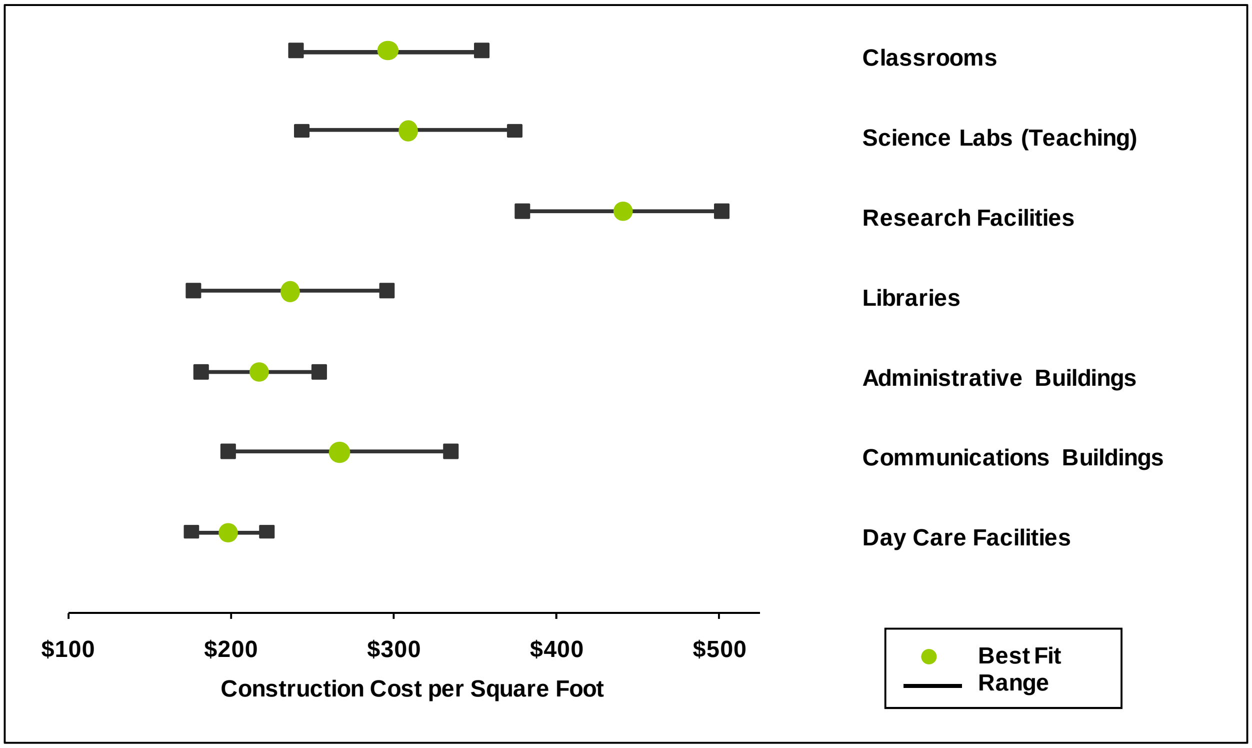
As described above, the ranges were determined such that data points more than one standard deviation away from the best fit value would not be included. There are many reasons why project costs might be projected outside of these ranges, some of which are detailed below. These ranges are based on the methodology described above using the available data points. There are a number of different ways the range could be determined, and the figures below are intended to represent a starting point for a cost benchmarking system based on more robust data.

Exhibit 23
Summary of Expected Cost Ranges by Facility Type

Facility Type	Number of Data Points	Construction Costs / SQFT			Total Costs / SQFT
		Std. Deviation	Best Fit	Range	Range
Classrooms	19	57.36	$297	$239 - $354	$339 - $501
Science Labs (Teaching)	16	65.59	$309	$243 - $374	$344 - $530
Research Facilities	12	61.31	$440	$379 - $502	$536 - $710
Libraries	6	59.44	$237	$178 - $296	$251 - $420
Administrative Buildings	9	36.20	$218	$182 - $255	$258 - $360
Communications Buildings	5	68.28	$267	$199 - $335	$281 - $474
Day Care Facilities	4	23.72	$199	$176 - $223	$249 - $316

Berk & Associates 2008

Exhibit 24
Expected Construction Cost per Square Foot Ranges and Best Fit Points by Facility Type



Berk & Associates 2008

Exhibit 24 above illustrates the construction cost per square foot ranges and the best fit for each facility type. The size of the range is a factor of the number of data points in each category, and the complexity of design for the given facility type. Categories representing more complex and varied facilities and categories with less data points will have wider ranges, and for this reason, administrative buildings had the second smallest and libraries the second largest range of construction costs.

The recommendations below address methods to increase the robustness of the data and facilitate a more accurate comparison of cost information across institutions.

Estimating Consistency and Adjustments Going Forward

In order to accurately compare cost data across institutions, all of the components of the construction and total costs must be known and clearly defined. The following recommendations would facilitate consistent reporting and increase reliability of cost data:

- Leverage the C100 to collect comparable cost information at project submittal. Provide space for institutions to comment on any factors contributing to costs outside the expected ranges.

- Create a template similar to the C100 for institutions to report final costs for completed projects. This would allow for consistent, ongoing collection of data for use in the cost ranges. The expected cost ranges will benefit from more recent cost data from all the institutions that is truly comparable. A template will ensure that all items of interest are called out and accounted for.

- Provide guidelines to accompany the template with clear directions for how to report cost information and definitions of key terms. For example, clear direction on what is included under A/E fees.

Information collected in this manner could then be incorporated into this analysis. Several years of consistent data reporting would greatly increase the accuracy and usefulness of the expected cost ranges.

4.2 Factors Contributing To Costs in Excess of the Expected Ranges

The cost ranges presented above should not be interpreted as a firm ceiling to construction costs. There are a variety of reasons why a project might be budgeting for costs above those of the expected cost ranges, and further analysis to understand the project-specific circumstances would be required. The following list represents reasons typically cited by industry professionals for higher than expected construction costs.

Availability of Materials. There are few volume steel fabrication or other manufacturing and fabrication facilities in the region. Steel is often imported and delivered to Washington ports, and then transported to the eastern side of the state. At the same time, there is often little or no competition for the materials that can be provided locally, such as premixed concrete or asphalt.

Community Involvement and Review Requirements. Institutions may be subject to community design review or input processes that can extend the project timeline, thereby substantially increasing costs. Additionally, if lower density construction, higher finish levels, or other public benefits such as public open space are required to accommodate the community's desires about building design and character, there could be a significant impact on project costs.

Dense Development, Topography, and Soil Conditions. Campuses that are densely developed or have sloping sites with restricted access and minimal staging areas can require remote material storage, layout, and mobilization yards. Bedrock and expansive clay soils at or near ground level make development more challenging.

Cost Escalation. Cost escalation is difficult to predict. For cost estimating purposes, historical data and forecasts are used; however, unpredicted shifts in inflation can have significant impacts on future costs. For example, the average annual inflation rate from RSMeans historical cost index was 4.6% from 2000 through 2008, while the inflation rate from 2004 through 2008 was 6.7%. This difference of over 2% can have a significant impact on large projects.

Fuel Cost. The cost of fuel has affected materials with respect to transportation costs – freight surcharges have been added in some cases – and product costs of petroleum based materials, such as PVC pipe and other plastics, are more expensive. Recent price shifts have caused increases not captured by escalation.

Leadership in Energy and Environmental Design (LEED). Obtaining LEED certification requires compliance with a minimum number of project criteria. Many LEED requirements go beyond standard building practices, but increase building efficiency in the long run. Research is mixed on the impact of LEED certification on project costs. One 2003 study estimated that LEED certification added 4% to 11% to construction costs, while more recent studies put the cost premium at less than 2%[2].

Lifecycle Cost Considerations. University buildings are expected to have a longer useful life (50 years) than most commercial and industrial buildings. University buildings are frequently designed to minimize operations and maintenance costs over the long time horizon, which can add to front end costs.

Location. Remote sites can be more costly to develop due to lack of available work force nearby, thus adding to relocation or commuting costs, while materials transportation costs may also be higher. Some urban sites can be more costly to develop due to extra security precautions that are necessary to prevent loss of materials.

State Environmental Policy Act (SEPA) Reviews. SEPA requires a study of the likely environmental impacts of a project. The public comment component, and especially the opportunity for the public to appeal a SEPA determination at little cost, can add to the project timeline if there is disagreement or concern about a project's impacts.

Weather. Institutions on the east side of the State design and construct buildings to withstand extreme winter and summer conditions. Weather can also impact the available time horizon for construction, which can increase the chance of delays, thereby increasing costs.

Workforce Availability and Per Diem Costs. When local workers are unavailable, per diem costs must be added to prevailing wage rates.

[2] Northbridge Environmental Management Consultants, Analyzing the Cost of Obtaining LEED Certification (Arlington, VA: American Chemistry Council, 2003); Gregory Kats, Greening America's Schools: Cost and Benefits (Washington DC: Capital E, 2006) and David Langdon, Cost of Green Revisited (Los Angeles: Davis Langdon, 2007)