THE COMPLEX AND MULTI-FACETED NATURE OF SCHOOL CONSTRUCTION COSTS:

Factors Affecting California

RESEARCH FINDINGS

JUNE 2008

Prepared by
Jeffrey M. Vincent and Deborah McKoy
Center for Cities and Schools
University of California-Berkeley

AIA California Council

Sponsored by
CAPITOL FORUM

Back Cover + Above
Project: Camino Nuevo Charter Academic Elementary. Architect: Daly Grenik. Photo: Tim Griffith

ACKNOWLEDGEMENTS
The authors would like to thank the following individuals for their invaluable suggestions in preparing this report: members of the American Institute of Architects California Council, Duwayne Brooks, David Dowall, Mary Filardo, Paavo Monkkonen, and Kathleen Moore, the many focus group participants throughout California, and the state policy contacts in the comparison states. Kristin Perkins, Greta Kirschenbaum, and Andre Chan provided excellent research assistance for this report.

This research effort was made possible by the Capitol Forum – a collaborative of California architectural firms dedicated to research and advocacy on issues advancing the value of design and addressing the health of our communities.

Prepared by:
Jeffrey M. Vincent, PhD and Deborah McKoy, PhD, Center for Cities & Schools. University of California – Berkeley. http://citiesandschools.berkeley.edu

McGraw-Hill school construction data was available to the Center for Cities and Schools through its participation in the Building Educational Success Together (BEST) community of practice, which works to ensure high quality school facilities for all children.

BEST
Building Educational Success Together

Center for Cities & Schools

The material contained herein is © 2008 copyright of The American Institute of Architects, California Council. No part of this report may be reproduced, in whole or in part, without the specific written permission of AIACC. To obtain permission to reprint text or images, please contact us at the following address:

AIACC
1303 J Street, Suite 200
Sacramento, CA 95814
(916) 448-9082
www.aiacc.org

PREFACE

Public schools are essential public infrastructure assets. Their condition, utilization, and design impact educational performance and local neighborhoods. So many states, including California, face tremendous needs in modernizing their older schools and building new, high quality schools for a rapidly growing population. Recognizing this great need, the Capitol Forum sought to investigate the factors affecting school construction costs in California. The Center for Cities and Schools conducted this study because we have a keen interest in school and community planning for the built environment and because school construction costs are so central to decisions about public education infrastructure.

Policymakers need a more informed understanding of public school construction to build effective policy. In addition, a public that grasps the challenges and constraints of public school construction and renovation is more likely to sustain their support for this important public investment. Amidst a climate of increasing construction costs and increasing demands on the public purse, this study analyzes school construction processes and costs for policymakers and the public.

Public school construction is immensely complex. The amount of coordination, planning, timing, skilled professionals, and capital required to build schools is tremendous. It was no simple task to sort through public planning, design, and construction processes. This is, in part, due to the lack of quality data and information on school construction cost, schedule, and scope, but it is also because little research on these processes exists.

In this report, we translate and provide clarity on the practices and policies affecting school construction. Through the interviews, focus groups, and analysis of project level data, we did the due diligence to educate ourselves and translate the construction world to others. This report is our attempt to bring order to what is a fast-moving, high dollar value, and very important public activity. Still, continued empirical research and analysis is needed to create a deeper understanding – with clear definitions and ample information – to fully unveil the policy and practice behind public school construction

Jeffrey M. Vincent
Deborah McKoy
Center for Cities and Schools

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Over the past ten years, public education construction has seen unprecedented growth and California is among the front runners driving this trend. Rising costs, however, are increasing rapidly in a wide range of areas thereby impacting school districts' ability to deliver the schools they are promising their constituents. Despite massive public investment, estimated nationally at more than $500 billion, very little research has tried to understand the actual factors driving these costs.

This research report addresses the void in understanding school construction costs by addressing two key questions:

a. What are the factors affecting school construction costs in California?
b. In what ways do these factors compare nationally and in other states?

Understanding and measuring California school construction costs is complex. A variety of unique factors affect school construction costs and these factors are likely not very discrete from one another. Rather, school construction costs are determined by a complex interplay of factors. This report describes three key areas and specific factors that appear to be driving school construction costs in California and seven comparison states: (1) regulatory structures, (2) school politics, practices, and design, and (3) market conditions.

Using a variety of methods, including focus groups, interviews, policy comparison, and statistical analysis, we sought to better understand the factors that affect school construction costs. This analysis took place over 14 months and involved three phases:

Phase 1 *Literature and Data Review on Public School Construction Costs* The study began by collecting and assessing existing literature and available public data on public school construction costs and trends.

Phase 2 *California Focus Groups and Interviews on School Construction Policy, Practice, and Costs* Focus groups and interviews with over sixty school construction professionals and policy makers were conducted to gather insight on factors affecting school construction costs from school district, industry, and state agency leaders.

Phase 3 *Statistical Analysis of National School Construction Database* A project-level school construction cost database incorporating data from McGraw-Hill Construction, Building Educational Success Together (BEST), National Center for Education Statistics, Census, and other sources was utilized to analyze national school construction trends.

KEY FINDINGS AND RECOMMENDATIONS

Finding 1: School construction costs are complex, multi-faceted, and inconsistently reported.

There are a variety of state regulatory factors, local school district and project factors, and construction market conditions that together have cumulative effects on school construction costs. These factors interact in unique ways depending on the local context, particularly school district and local and regional community characteristics.

Of particular importance to understanding and comparing school construction costs is the fact that school planning, design, and construction are highly local activities, and a large amount of variation exists in this work. This finding is supported by focus groups, the state policy interviews, and suggested by the statistical analysis. The regression results further suggest that the factors affecting school construction costs vary from state to state.

Recommendation 1: The State of California and/or local governing entities should develop more systematic school construction cost data collection systems, guided by professional oversight, to enable appropriate cost analysis.

To fully and empirically understand how school construction costs differ between states and the factors that affect these costs states need a standard format for consistently measuring, categorizing, and reporting school construction costs. A statewide database is not useful unless data elements, collection methodology, accuracy, and timeliness of the information are maintained. In order for the information to be consistent and accurate, it needs some level of centralized direction, training for quality data entry, and funding to maintain the system.

Making information about school construction costs public has a two-fold purpose. First, it informs parents and children about the taxpayer supported investments being made into structures in their community. Secondly, it holds public officials accountable for their planning and expenditures on new public school facilities.

Finding 2: Three central areas of factors affecting school construction costs are: a) state regulatory structures, b) local school politics, practices, and design, and c) regional market conditions.

Interview and focus group data reveal key elements of state regulatory structures that affect school construction costs: design and construction specifications, school facilities finance structure, public approvals process, and project management regulations. Our statistical analysis indicates that the states with greater numbers of state regulations (as measured by our School Construction Regulation Index) had higher school construction costs: the presence of school siting laws and prevailing wage laws had the most significant cost impacts, increasing cost per square foot by 12 percent and 9.6 percent, respectively.

The local political context and the choices school districts make regarding practices and design ultimately affect school construction costs. According to interviews and focus groups, there are several key elements of local school politics, practices, and design that affect school construction costs: school characteristics and design choices, school capital financing practices, public approvals process, project management, and local weather/ climate.

Regional market conditions impact all construction, and school construction is no exception. Changes in land and construction prices are a major driver of public school

construction costs. California's rapid growth and high cost of living have important consequences for public school construction costs. School construction is driven largely by enrollment growth and needs for upgrading existing schools. School districts must build schools whether market conditions are favorable or unfavorable.

Recommendation 2: The State of California and the school construction and architecture professional community should work together to develop greater policy directives and oversight systems to guide future school construction policies and practices.

Specific areas for collaborative work include: collectively defining "good" or "complete" school construction projects that are driven by curricular goals and outcomes and establishing tools to measure school facility quality; state offices involved in school construction should work with other comparable state-level leaders and authorities to better determine what patterns are developing across the nation and how they might differ from region to region; and policy and professional leaders should establish and publish recommendations or guidelines for effective school facilities planning, both at a district wide level and at an individual project level.

Finding 3: School construction has not yet been studied in a rigorous or systematic way, partly due to the lack of process and data standardization in the field.

There is very little empirical literature on school construction, its costs, or the factors that affect these costs. Available data sources currently appear to report state or regional cost trends inconsistently in terms of understanding the cost differences between states. The one national data set of school construction costs available, developed by McGraw Hill, can only be used as an estimated measure of actual final projection costs; thus are useful for assessing trends and construction spending, as done in this report, but not actual costs (see Appendix 4).

Recommendation 3: Conduct further research on school construction that appropriately analyzes costs at the project level to provide more comprehensive analysis of all school construction cost components, drivers and results.

Future research should focus on three key areas: first, examining school construction costs based on newly developed data sets that gather project level data, second compare school construction to other construction industry sectors, and third, analyze and compare the cost impacts of state and local policies and practices.

Project: Cragmont Elementary School. Architect: ELS Architecture. Photo: Timothy Hursley

ABBREVIATIONS

ADA	Americans with Disability Act
ADA	Average Daily Attendance
AIA	American Institute of Architects
BEST	Building Educational Success Together
CASH	California's Coalition for Adequate School Housing
CCD	Common Core of Data
CDE	California Department of Education
CM	Construction Management
DSA	Division of the State Architect
DTSC	Department of Toxic Substance Control
DVBE	Disabled Veteran's Business Enterprise
GC	General Contractor
HVAC	Heating, Ventilation, Air Conditioning
IOR	Inspector of Record
LAUSD	Los Angeles Unified School District
LULU	Locally Unwanted Land Use
NCES	National Center for Education Statistics
NJSCC	New Jersey School Construction Corporation
OPSC	Office of Public School Construction
PLA	Project Labor Agreement
PPI	Producer Price Index
PWL	Prevailing Wage Law
SAB	State Allocation Board
SFP	School Facility Program
SFPD	School Facility Planning Department
SLC	Small Learning Community
SPM	School Planning and Management Magazine

1 BACKGROUND

The public education construction sector has seen significant and unprecedented growth over the last few years (BEST 2006; Abramson 2007; Agron 2007). A recent analysis reports that the nation's public school districts spent more than $500 billion dollars on capital expenses between 1995 and 2004, building more than 12,000 new schools and managing more than 130,000 renovation and other improvement projects to existing schools (Filardo et al. 2006). Between 2000 and 2007, school construction expenditures across the country have consistently hit record levels[1], topping more than $20 billion annually (Abrahamson 2007). Despite this enormous investment, little tracking and analysis of costs and spending have been conducted.

Leading these national trends, California is in its own unprecedented era of new public school construction. The state's voters have passed more than $30 billion in state public school construction bonds since 2000. According to U.S. Census of Governments data, public school districts in California spent more than $65 billion in capital outlay between 1995 and 2004, about two-thirds ($45 billion) of which went towards "hard" construction costs (Filardo et al. 2006). About 40 percent of these expenditures funded new construction while the remainder paid for modernization and additions to existing schools. California's Office of Public School Construction (OPSC 2007) reports more than $12 billion in new school construction state apportionments between 2002 and 2004 alone, funding more than 2,700 new school projects throughout the state.

Given the extent of public dollars being invested in new public schools in California, it is no surprise that the cost of school construction is a pressing priority at state and local levels. In fact, as part of Assembly Bill 127 in 2007, OPSC is charged with revising its estimates on how much it costs to build a new school in California to better meet its grant adequacy obligations to school districts. The state's School Facility Program (SFP) is designed to contribute 50 percent of construction costs to each new school built. However, as a result of public outcry that state grants were not adequate due to recent construction cost escalations, state agencies are currently working to determine what elements constitute a "complete school" and what it costs to design and construct such schools – a topic that has been on the State Allocation Board (SAB) monthly agenda repeatedly throughout 2007.

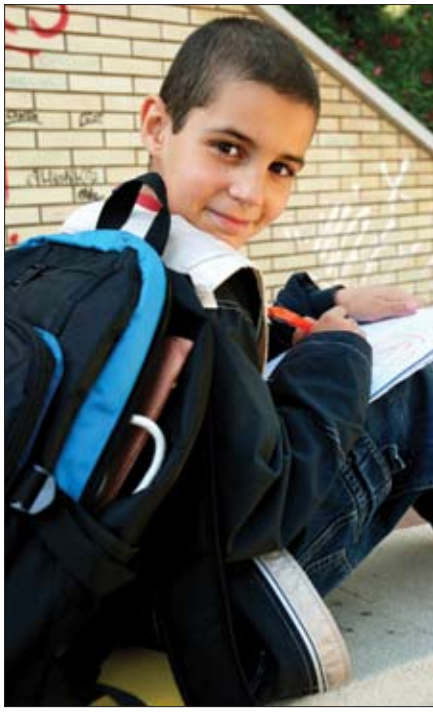
Overall, the general perception throughout the state is that new school construction costs are "too high," a fact noted by the OPSC's 2000 report, *Public School Construction Cost Reduction Guidelines*. The report goes on to state, "This, of course, is a relative evaluation, and requires a 'base' from which to make the comparison. In fact, no such base exists, and the assertion is very difficult to quantify. None-the-less, the perception is generally accepted" (OPSC 2000, 1).

[1] With the exception of 2003

Rising costs are impacting districts' ability to deliver the schools they are promising their constituents. Looking at 19 local school district construction bonds (totaling $1.7 billion) passed since 1990, the *Orange County Register* (June 18, 2006) found that due to cost increases, only six of those districts were inline to deliver every project promised in their original bond. Two-thirds of these districts were being forced to scale back. A superintendent from one of these districts stated, "You tell me how we can do all the work we needed when construction costs go up by 30 percent across the board?"

Despite the dramatic effects cost escalation is having on local school districts, little research has been done on school construction and the factors that affect these costs. Almost none has attempted to compare across states or understand the school construction-related policy differences found among states. And almost no research has looked at how school construction policies and practices translate into construction costs. Thus, school construction costs remain a "black box" for two main reasons: construction costs are difficult and complex to define and measure, and data on school construction expenditures is extremely limited. There are many reasons why this is the case. Few states collect and report detailed school construction data. More robust data are collected by construction industry firms such as McGraw-Hill Construction, but this information is largely proprietary and/or presented in aggregate, or it simply does not contain the data fields necessary for detailed and comparative analysis. While construction and architectural practitioners can typically provide a host of reasons to explain cost escalations on their projects, there is little empirical research to identify and understand these factors.

Understanding and measuring California school construction costs is complex. Several groups and organizations have collected, or are in the process of trying to collect such California data in more systematic ways, including the state's Office of Public School Construction (OPSC) and California's Coalition for Adequate School Housing (CASH). The American Institute of Architects California Council (AIACC), however, is the only group identified who is interested in comparing school construction costs across states. As this study will reveal, this is particularly complicated for California, which has a high cost of living, high labor costs, and some of the most expensive land in the country. The combination of these factors may make any construction in California more expensive than many other parts of the country, let alone school construction.



This research report addresses the void in understanding school construction costs by addressing two key questions:

a. What are the factors affecting school construction costs in California?
b. In what ways do these factors compare nationally and in other states?

A variety of unique factors affect school construction costs and these factors are likely not very discrete from one another. Rather, school construction costs are determined by a complex interplay of a wide variety of factors that total the "black box" of school construction costs. This report describes the three key areas and factors driving school construction costs in California and seven comparison states: (1) extensive state regulatory structures, (2) local school politics, practices, and design, and (3) regional market conditions.

2 SCOPE & METHODOLOGY

The purpose of this report is to shed light on the complex set of factors influencing and driving school construction costs in California and the rest of the nation. In particular, the study seeks to better understanding the nexus of new school construction policy, practice, and costs and identify key factors leading to the perceived cost differences found between California and six other states. To do so, and thereby address the two main research questions described above, the study's specific objectives are:

1 To identify and assess existing evidence for the perceived cost differences between California school construction and other states.
2 To identify key factors affecting school construction costs in California and other states.
3 To measure the relative influence of these key factors on school construction projects.
4 To provide recommendations for future policy making and further research aimed at lessening these disparities.

The fundamental focus of this report is on identifying the factors believed to affect school construction costs. This report does not attempt to determine the elements that should be included in a school nor what it costs to build a school. The cost comparison data that we do present are meant strictly for trend comparison purposes across states and not as evidence of precisely what it costs to build schools within a given state; they are proxy measures based on the McGraw-Hill "construction start" data.

Seven case states were chosen to analyze in comparison to California: Arizona, Florida, Michigan, New Jersey, Ohio, Texas, and Virginia. These states were selected because: a) they are among the states building the most new schools in recent years; b) they are spread out among the different regions of the country; and c) they represent average construction contract bid project costs comparable, below, and above those of California according to a recent analysis by Building Educational Success Together (BEST) (Filardo et al. 2006). (See Appendix 1 for "Rank of States by Number of New Public Schools Built 1994-2005."). Upon finding the importance of recent school facilities-related lawsuits in numerous states including California, New Jersey was included because it has had court action similar to California.

The research consisted of three phases utilizing different research methodologies:

Phase 1: *Literature and Data Review on Public School Construction Costs* The study began by collecting and assessing existing literature and available public data on public school construction costs and trends. These included academic research studies, state and local government statistics, construction industry publications, and data from the National Center for Education Statistics.

Phase 2: *California Focus Groups and Interviews on School Construction Policy, Practice, and Costs* Focus groups and interviews with over sixty school construction professionals and policy makers were conducted to gather insight on factors affecting school construction costs from school district, industry, and state agency leaders. In general, there was wide agreement on these factors in the focus groups and interviewees further supported the focus group findings. What emerged from the focus groups was discussion on what factors impose different cost implications in different locales. These findings are not meant to encompass the absolute full range of factors that affect school construction costs in California. Instead, they represent the most salient factors that local and state school facility practitioners and policymakers believe contribute to the ultimate cost to build new schools in the state. For more detailed methodology on the focus group and interviews, see Appendix 3.

Phase 3: *Statistical Analysis of National School Construction Database* This study utilized the Building Educational Success Together (BEST) Collaborative national project-level dataset on school construction costs and characteristics. This dataset is built on raw construction and renovation contract data from McGraw-Hill Construction (see Filardo et al. 2006)[2]. In combination with several other national databases, McGraw-Hill data provides detailed hard cost and characteristic data for public schools with construction contract bid dates between 1995 and 2004. For this study, the new school projects were identified within the data set and linked to school-level data in the National Center for Educational Statistics Common Core of Data (NCES CCD).

First, summary data on school types, sizes, and costs were prepared. To test the significance of the various factors believed to affect school construction costs, as identified by the literature, focus groups, and interviewees, an econometric model to explain school construction costs was created, building off the methodology of previous research (e.g., Azari-Kad et al. 2003). Secondary data – including Census demographic and locality data and state regulatory data – to represent this additional information was gathered and entered into the model. A series of analyses were run, including summary statistics and national and state regression analyses. For more detailed methodology on the data and regression analysis, see Appendix 4.

---

[2] Initial analysis of this dataset, which included McGraw-Hill Construction data, can be found in "Growth & Disparity: A Decade of U.S. Public School Construction," released by the national Building Educational Success Together collaborative in 2006. McGraw Hill Construction, a segment of McGraw Hill Companies collects detailed project-level data on every building project valued at more than $100,000 undertaken by the nation's school districts. These proprietary McGraw Hill data are collected in real time for the purpose of informing construction industry manufacturers, contractors, and subcontractors of projects that will be under construction, so they can market their goods or services to the project owner and contractor. These "construction start" data reflect the contract value of each project and represent the construction "hard costs": the basic labor and material expenses of the project. Because they do not represent the full costs and because construction costs can rise during the course of a project, the "construction start" McGraw-Hill data can be used only as an *estimated* measure of actual final project costs, and are highly applicable to assessing local, regional, state, and national *relationships and trends* in construction spending, as we have done in this report. These data do not lend themselves to measuring what it actually costs to build a school. For more detailed description of the McGraw-Hill data and its usefulness, see Appendix 4.

3 PUBLIC SCHOOL CONSTRUCTION TRENDS & COSTS:

A Literature & Data Review

SCHOOL CONSTRUCTION TRENDS:
Comparing California and the Seven Comparison States to National Trends

With school construction expenditures on the rise, California is one of the states leading the way; the state's school districts reported spending $65 billion (in 2005 dollars) in capital expenditures from 1995 to 2004 (second only to Texas), accounting for nearly 13 percent of the national total spent during this decade (Filardo et al. 2006).

California is not alone in increased investment in new schools, particularly within the last decade. About one-fifth of all schools in the country today were opened since 1995, according to our analysis of NCES data[3]. Between 1995 and 2004, the seven comparison states (AZ, FL, MI, NJ, OH, TX, VA) together opened about 36 percent (7388) of the number of new schools opened, while California accounted for about 11 percent (2197), as shown in Exhibit 1.

California and the comparison states as a whole opened a slightly greater share of new schools than the national average, as shown in Exhibit 2.

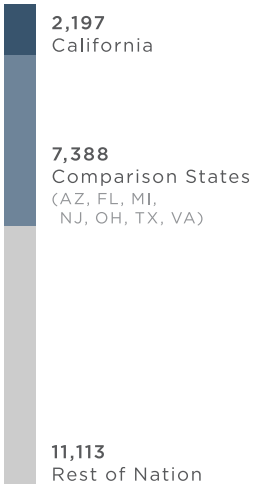


Exhibit 1:
New Schools Opened, 1995-2004
Source: NCES

SCHOOL CONSTRUCTION COSTS:
What the Literature Says

The literature on school construction costs is minimal as few researchers have investigated the subject. Most analysis comes from the construction industry itself and as such, availability of data poses a major challenge to research at national and local levels. As noted, part of the difficulty lies in the fact that school construction costs are often not systematically tracked and/or reported. In states where they are, these procedures are typically too new to allow for any longitudinal analysis of cost trends. The second issue is making sure that costs are being compared adequately. Because construction costs can be defined in numerous ways, comparison must ensure an "apples to apples" analysis. Often across sources, this can be difficult to assess, especially in separating the differences between "hard" and "soft" costs and in the case of "hard" costs, whether or not the amount reflects the construction bid or whether it is the final construction expense change orders.

IS CALIFORNIA MORE EXPENSIVE?

A variety of sources report school construction costs nationally. These sources do not all support the assertion that California school construction costs are more expensive relative to other states. One of the most widely cited source is the "Annual School Construction Report" published by *School Planning & Management (SPM)* magazine. However, this report presents construction costs aggregated for twelve regions of the country, which masks individual state differences within the regions. California joins Hawaii, Nevada, and Arizona to make up Region 11, which, in 2005, was the highest spending region in the nation by a wide margin (nearly half a billion dollars more than the second highest region). Considering Arizona and Nevada are two of the nation's fastest growing states, and California is the largest, this fact is not surprising.

School Planning & Management's data reveal that Region 11 has high school construction costs compared to national trends. However, it is not the region with the highest cost. *SPM* also reports that Region 11 tends to provide fewer square feet per student than the rest of the country – a fact it attributes to the common practice of building exterior corridors in these warm weather states that often are not counted in square foot totals. Exhibit 3 shows *SPM's* regional school construction cost data for selected recent years, which illustrates that in 2000, 2002, 2004, and 2006, Region 11 was only the highest in cost per square foot in one year – high schools in 2006 (the darkened squares mark the high costs for the year). However, Region 11 was not the sole highest in this year; it tied with Region 2. Based on these data, Regions 1 (CT, ME, MA, NH, RI, VT) and 2 (NJ, NY, PA) have the highest cost per square foot for both elementary schools and high schools in these recent years, substantially higher than California's Region 11.

However, *SPM's* regional analysis may mask the higher costs in California when averaged with its regional counterparts. For example, summary data provided by Los Angeles Unified School District (LAUSD) has construction cost bids (materials and labor only) for recent new schools averaging about $250 per square foot. Another industry source reports similar numbers in 2006: $185-$265 per square foot in Los Angeles and $195-$275 per square foot in San Francisco (Rider Hunt Levett & Bailey 2006). However, a recent report claims 2007 California K-12 and community college educational facilities construction costs are even higher – at an average of $450 per square foot and up to about $600 per square foot in urban locales – although the report does not state whether these are hard costs only (Parsons 2007).

Other sources support the notion that California school construction costs may not be the highest in the nation. For example, Building Team Forecast's analysis of RS Means data finds that of the 25 major U.S. cities analyzed, Los Angeles, San Diego, and San Francisco were ranked 2, 7, and 8, respectively in terms of cost per square foot for both elementary and junior high schools in August 2007 (Carrick 2007). In terms of percent change in cost from the previous year, these three California cities saw 6.0 percent, 6.2 percent, and 5.5 percent increases, respectively. However, these rank among the median ranges of cost per square foot changes for these 25 cities, not at the top.

Exhibit 2: New Schools Opened, 1995-2004 as a portion of Total Schools, 2005 (Source: NCES)

		Cost Per Square Foot (in dollars)			
		2000	**2002**	**2004**	**2006**
Region 1	ES	125	146	186	205
(CT, ME, MA, NH, RI, VT)	HS	160	173	148	192
Region 2	ES	161	146	167	221
(NJ, NY, PA)	HS	145	147	177	218
Region 3	ES	107	137	131	173
(DC, DE, MD, VA, WV)	HS	117	144	136	158
Region 4	ES	106	106	109	140
(NJ, NY, PA)	HS	107	91	115	143
Region 5	ES	86	90	93	98
(AL, FL, GA, MS)	HS	86	100	114	124
Region 6	ES	109	135	137	171
(IN, OH, MI)	HS	127	149	164	173
Region 7	ES	103	141	164	130
(IL, MN, WI)	HS	103	111	152	188
Region 8	ES	96	103	100	131
(IA, KS, MO, NE)	HS	91	92	97	124
Region 9	ES	96	100	107	152
(AR, LA, OK, TX)	HS	93	98	113	143
Region 10	ES	90	103	105	126
(CO, MT, ND, NM, SD, UT, WY)	HS	98	98	125	153
Region 11	ES	146	127	141	203
(AZ, CA, HI, NV)	HS	121	124	134	218
Region 12	ES	127	142	155	146
(AK, ID, OR, WA)	HS	162	168	120	194

Exhibit 3: *School Planning & Management* School Construction Cost Data for Selected Years

Still, what none of these sources do is compare the quality and characteristics of what was actually built. Rather, they compare costs irrespective of what was built – other than calculating cost per square foot. The assumption is that the quality of each of these square feet would be the same across schools, districts, and states. Yet evidence suggests that school districts build schools of widely varying quality. California schools could cost more because they are of higher quality. While this is entirely possible, whether this is the case is unknown.

FACTORS AFFECTING SCHOOL CONSTRUCTION COSTS

While research is limited, a number of factors affect construction costs, and specifically school construction costs. Most often, analysis points to general construction industry growth or decline and the related effects on materials and labor costs. For example, cycles of industry productivity greatly affect construction costs. Like school construction, the overall construction industry nationally has also been in a boom cycle for nearly a decade. Projections from the industry have expected this trend to continue into 2010, although residential construction has slowed considerably within the past year. The result of this massive construction activity has been that both labor and materials have been in high demand, especially in rapidly growing regions, which ultimately leads to labor and materials price increases. For example, Producer Price Index (PPI) data reveal about a

40 percent increase nationally in construction materials costs alone between 2000 and 2006, and construction materials have continued to increase in cost more than the overall rate of inflation since 2004 (Simonson 2006). Construction wages are also on the rise across the country, and California led the nation in wage increases in 2006 alone; San Francisco had a common labor wage increase of 8.9 percent while Los Angeles had a skilled labor wage increase of 9.9 percent (Saylor 2007).

Yet, many California construction industry insiders argue that these and other related cost increases still do not adequately explain recent school construction cost escalations seen throughout the state. A widely held perception is not only that school construction costs are higher in California, but that they are escalating faster than in other states. Data reported by Rider Hunt Levett & Bailey (2006) support this assertion; school construction costs in Los Angeles and San Francisco (good barometers for overall California cost changes) have escalated more than other selected major U.S. cities between the first quarter of 2005 and the third quarter of 2007. However, while Carrick (2007) does find cost per square foot to be among the highest in Los Angeles and San Francisco according to recent RS Means data, he does not find that these two cities have the fastest cost escalation rates. Comparing the changes in different construction sectors of the RHL&B data reveals that elementary and high school construction costs have risen more than the construction costs for prime office buildings, standard office buildings, and warehouses during the same time. It is unclear why this apparent difference between schools and other private construction types exists.

CALIFORNIA POLICY CONTEXT AND CONSTRUCTION COSTS

What many point to in analyzing public school construction costs is that public construction work (e.g., schools) is fundamentally different from private construction work in that the two play by different rules, particularly in California. Being public projects, California public school construction projects are bound to different state regulations. Standards and regulations on school facility planning, design, construction, and finance differ by state. Many architects, builders, and others who participated in focus groups point to the state's unique set of policies on school construction as a key factor that has increased costs.

Arguably, California has one of the most elaborate state systems for financing and regulating public school construction and modernization projects in the entire country. Multiple levels of government are involved. While the state shares responsibility for capital costs, responsibility for the construction, operation, and maintenance of schools belongs to the local districts. The state does, however, enforce a set of minimum design, construction, and planning process standards that must be met. Local school districts are responsible for adhering to state and local building codes, other local ordinances, state and federal environmental regulations, and for keeping facilities code compliant over time.

Structured with the intent to increase public accountability for public dollars spent on school facilities and to maintain specific standards across schools, the state's School Facilities Program (SFP), begun in 1998, has had its share of criticism. It has been described as one of the most "complex and lengthy processes in the California government" (Izumi and Cox 2003, 91) that is cumbersome, duplicative, and time-consuming (California Performance Review 2004; Carroll et al. 2005; Little Hoover Commission 2000; Ortiz 2004; Billingsley 2005). The multi-agency facility approval process involves four main agencies, as many as 40 additional state agencies and can

often take 18 months or longer (California Performance Review 2004)[4]. The Little Hoover Commission (2000) argued that the state "micromanages school construction projects, delaying the completion of and driving up the costs of school facilities."

One of the biggest perceived problems with school facility planning and siting in California is that school districts must navigate through a process of multiple and little-coordinated agency review and approval. Critics argue that while the state needs a system that is rigorous and involves multiple agency expertise to ensure adequate school facilities, it also needs a streamlined, clear-cut process that is more manageable for school districts. Three main problems are created by the multiple-agency structure (Little Hoover Commission 2000):

- First, most of the agency reviews occur in sequential fashion, as opposed to a collaborative and simultaneous process. This decouples each review from the next, and typically adds significant time to the process because one slow agency can stall the entire process. Thus, sequential processing is inefficient.
- Second, the separate agency reviews increase the chance of gaps in oversight. School districts must navigate through a process of multiple and little-coordinated agency review and approval.
- Third, there is an innate complexity in the system seen from the school district's point of view. As a result, most school districts hire private consultants to navigate this bureaucracy for them, adding to the overall construction budget. School districts tend to lack the internal expertise to manage the state's facility planning process requirements.

The Little Hoover Commission (2000) has recommended that the state unify its oversight structure by creating the "functional equivalent of a single state agency." Arguably, state agencies have made incremental changes to address these concerns, although a comprehensive solution appears to be absent.

An additional California school construction policy directly related to school construction costs is the state law mandating that prevailing wages be paid on all public school construction projects. Prevailing wage laws (PWL) set minimum pay and benefits for all workers on any public construction project. While all states must adhere to the federal Davis-Bacon Act, only 25 states have PWLs specific to school construction while the rest do not, a circumstance that has led to debate over the effect of PWL on school construction costs (Associated Builders and Contractors 2007). Critics of PWLs contend that they inherently increase the cost of school construction because they set a minimum labor cost. For example, one survey of contractors found that respondents felt that school districts would save 12.7 percent on construction costs were the Washington state law repealed (Washington Research Council 1999). An early study found significant cost increases due to PWL (Fraundorf et al. 1984), but a more recent study replicating these findings finds little to no effect (Azari-Rad et al. 2003). Other studies have also found no significant increase in school construction costs associated with PWL laws among Mid-Atlantic states (Prus 1999) and Midwestern states (Philips 2001). The effects of PWL in California on school construction have not been tested.

[4] Four main state agencies are involved in school construction: the California Department of Education School Facilities Planning Division (CDE-SFPD), California Department of Toxic Substances Control (DTSC), Department of General Services, Division of the State Architect (DGS-DSA), and Department of General Services, Office of Public School Construction (DGS-OPSC). See Appendix 2 for a diagram of the California process.

California's detailed and somewhat unique regulatory structure stems from a long tradition of state support for school capital costs. For example, the powerful 6.3 Long Beach Earthquake of 1933 caused serious damage to many schools in the area and ushered in the Field Act – Sections 1 and 2 of Title 24 of the California Code of Regulations – which required that all K-12 public schools and community colleges be approved to meet heightened structural safety standards by the state. The California Seismic Safety Commission (2007, 12) reports that the "incremental design and construction costs are about 3 to 4 percent. These costs, however, are miniscule compared to lower building lifecycle costs, safer buildings, few fatalities and injuries, and vastly lower repair and reconstruction costs." In part due to this mandate, the state began assisting in school construction costs to ensure safe facilities for the state's students, given the natural earthquake threat throughout the state. Most, if not all, states do not have this history of state codes or funding levels.

SUMMING UP THE LITERATURE

The literature and data review show that school construction activity has increased at unprecedented levels in recent years, as have overall industry construction costs. Amidst this rapid growth, there is significant debate on school construction costs among practitioners/professionals and policy makers, yet little detailed analysis of them, or understanding of the full array of factors that affect or drive these costs. Research is hampered by the lack of systematically collected data on school construction projects and the costs associated with their various elements. The next section presents findings from our analysis of school construction in California and selected comparison states, shedding light into the black box.

Project:
Camino Neuvo Charter
Academic Elementary
Architect: Daly Genik.
Photo: Tim Griffith

4 FINDINGS:

THREE CENTRAL AREAS OF FACTORS AFFECTING SCHOOL CONSTRUCTION COSTS

Our analysis of school construction costs nationally and in California finds that three overarching areas of factors affect school construction costs:

1. State Regulatory Structures
2. School Politics, Practices, and Design
3. Market Conditions

There is a complex interplay between these three broad categories – "macro" (state) regulations and processes affect the "micro" (local) practices and design choices, all working within the ever-changing context of market trends, such as land, labor, and materials costs. Local communities are working to build the best schools they can with limited budgets and professional capacity, the state is trying to assist localities in doing so while maintaining a set of state standards that ensure equity, parity, and safety for all children, while the market is continually responding to supply and demand pressures.

STATE REGULATORY STRUCTURES

The state regulatory structure of planning, designing, and financing school facilities affects school construction cost in a variety of ways. In the focus groups and interviews, variations on this statement were often repeated, "regulation and policy requirements [in California] are driving school design – not educational goals – and this is having unintended consequences, especially in the area of costs."

CALIFORNIA FOCUS GROUP AND INTERVIEW FINDINGS

State design and construction specifications affect construction costs in a variety of ways, including:

COST FACTOR	EXPLANATION
Increased State Design and Construction Specifications	The state's specifications for schools have gotten more detailed, largely due to pending litigations. In response, architectural and engineering plans have in turn become more detailed. The result is that they are more complex to decipher for the contractors, who often increase their bids because they do not have the time to adequately digest all the details in the specification book.
Seismic Structural Requirements *"The way I help my community cope with that cost is that I tell them that we don't build schools, we build disaster centers."*	All California public schools (except charters) are required to adhere to Title 24 (Field Act) structural seismic requirements to withstand earthquake activity. These structural standards are above and beyond those set forth for all other buildings in state and local building codes. A recent DSA study showed that Field Act compliance added about 4 percent to the cost of a new school (2 percent soft costs, 2 percent hard costs). This addition can be significant on a project
Allowable Construction Techniques	Engineering for new schools is often limited because school projects do not use some new construction techniques used in the private sector, because the State does not have the knowledge, capability, or willingness required to accommodate newer approaches (e.g., tilt-up construction).
Energy Specifications *"We're doing a high school right now that will cost between $6.5 and $7 million, whereas if we lowered the AC specs a bit, we'd be around $4 million. That's $2.5 million you need to save through the usage….I think we need to be realistic on what is feasible and what we can afford."*	Energy efficient systems (e.g., HVAC) often are more expensive upfront, which affects the construction project cost. The savings are realized over the longer term, yet funding for these systems rarely is supplemented from operations and maintenance funding. Additionally, energy efficient systems have hidden costs – they are sophisticated and complex and require capable people to run and upkeep them.
ADA Compliance (Americans with Disabilities Act)	While ADA is a federal requirement, participants felt that it was dealt with differently in California. Participants who have worked on school projects in other states agreed that California schools went above and beyond federal ADA requirements, designing all areas of all schools fully assessable. At issue is the California interpretation of the federal ADA requirements. ADA compliance adds tremendous costs to any project, such as installing ramped walkways and/or wheelchair lifts. Participants acknowledged that ADA requirements were extremely worthwhile, yet at the same time difficult to have any public conversation about their impacts via a cost-benefit analysis.
Telephone/Communications Systems *"These are policies with unintended costs that nobody accounted for."*	Since the tragic events at Columbine High School, every teacher has to have a phone in their room. Each additional room to be hardwired adds cost to the project cost.
Over-design to Ensure Specifications Met	Unpredictable regulatory enforcement often leads to the over-design of school facilities, and there is little financial accountability associated with state regulatory requirements. That is, changes in the design and construction specifications are often not assessed from a cost impact assessment perspective.

COST FACTOR	EXPLANATION
Classroom Size	The size and shape of classrooms affect cost. Typically, California classrooms are built as 960 square foot rectangles. This is not a mandated size but rather based on a formula many architects use to design schools. One reason for this is a state design regulation mandating that classrooms exceeding a certain size must have two exits. Such changes bring up security issues and affect construction costs. Many participants also felt that 960 square feet was high considering the number of students many schools assign per classroom. And they asked if 960 square feet is needed for 20 students with the increasingly common use of class size reduction practices (CSR). Others suggested that districts were hesitant to build classrooms smaller than 20 square feet per student because CSR funding may not always be available and as demographics change, they may need to use those rooms for different purposes and need to build extra square feet for those purposes. Classroom size has more of an influence on cost than the number of students assigned per teacher. Classrooms are also not mandated to be rectangles, but they tend to be – a result of a design efficiency that may be outdated to current teaching and learning styles. Other classroom shapes may offer new design and cost efficiencies.

The state structure of **school facilities finance** affects school construction costs:

COST FACTOR	EXPLANATION
State Grant Adequacy	Numerous participants noted that the calculations that the state used to determine its share of new school construction have not typically been adequate to cover the mandated 50 percent of the cost of the new school. To address this issue, school districts often cover the differential entirely out of pocket.
Inconsistency of State Facilities Funding	California's state bond-driven method of funding public school construction means that future funding is unknown, disincentivizing long range facilities planning by local school districts. Effective long range planning is believed to play a role in reducing planning and construction costs.

State policy mandates the **public approvals process** that school districts must adhere to when building new schools. Aspects of this process that affect construction costs include the following:

Project: Cragmont Elementary School. Architect: ELS Architecture. Photo: Timothy Hursley

COST FACTOR	EXPLANATION
Time *"…the layering of all the things – not just is it longer than other states, but it's longer in California than it used to be."*	Time added to a project as a result of meeting the requirements of a public school capital project in California (e.g., Public Contract Code, DSA approval, DTSC approval, etc.) was mentioned as one of the most significant factors affecting the cost to build public schools in the state. Participants noted it generally takes close to six years to build a school, and much less to build a similar type project in the private sector.
School Siting Approval: DTSC and CEQA (California Environmental Quality Act) *"DTSC is truly driving the train right now."*	The process to obtain DTSC approval for a school site was identified as a major factor, although participants generally agreed that it has been made simpler since it began in 1999. While DSA used to be the biggest hurdle for getting new school designs approved, participants stated that now it has become obtaining DTSC approval for new school sites. "The mandatory process of studying a parcel of land and mitigating any environmental conditions found on it is a tremendous undertaking on any project." Soil contamination, for example, is a major factor adding time and expense to new school projects, especially in urban and rural sites. One participant noted they were cleaning up "naturally occurring asbestos." In this post-Belmont High School climate, process and regulation around site contamination has increased. Part of DTSC approval is meeting CEQA requirements to mitigate any environmental impacts that will be generated by the project. Increasingly, school districts are going through a 'mitigated negative declaration' rather than an EIR process because "getting a Negative Effects Declaration from the CEQA process is a lot quicker." But due to recent legal decisions, CEQA investigates more off-site effects and requires more off-site mitigations. For example, one participant noted that the "city and county [are] able to force us to put in traffic signals a mile away. We'll see more of this." Adding these types of expenses increases the cost of projects. Overall, the difficulties in new school siting have a tremendous effect on school construction costs. One participant described how, for various reasons, they had changed sites four times on a current project: "So you can imagine where that goes – cost goes up, cost of management, cost of design; it adds all kinds of problems and costs increase."

COST FACTOR	EXPLANATION
DSA Approval *"We all agree that the school should be the strongest thing standing in the neighborhood, but we need a smoother process to attain this."*	Participants generally agreed that DSA specifications were in effect adding cost by getting more detailed, partly due to liability issues and partly due to more sophisticated building requirements. However, many participants pointed to DSA practices as adding significant hurdles. DSA hires consultants to do some of their plan-checking, which participants argued, often adds time to the approval process, thereby increasing costs. There is also a feeling that there can often be different interpretations from one DSA plan-checker to another. One participant described how they have had items approved by one plan-checker, then "called out" by another further along in the process. This subjectivity in interpretation of DSA specifications adds significant complications to many projects. DSA also ensures the design standards set forth in Title 24 (Field Act). However, there was some differing of opinions in regards to DSA's role in the process. One private architect noted that, "DSA requirements are not a culprit in the increase of costs for school construction in California. DSA is actually a shining star….[and] a very efficient organization." Lack of State Knowledge of Unique Projects Participants felt that the state lacked knowledge and information on the host of issues that come up with trying to build schools on unique sites, such as small urban sites that require multiple-story buildings with parking garages. As more and more of these types of projects are being proposed, the state takes more time to approve them, slowing down the planning process. This is especially prevalent siting in urban districts. One participant described a tour of other states that a committee of California urban districts went on to see examples of high-density new schools on the East Coast. They found that there was "not too much to learn about because they don't have the density we have – nothing comparable to California."
Lack of State Knowledge of Unique Projects	Participants felt that the state lacked knowledge and information on the host of issues that come up with trying to build schools on unique sites, such as small urban sites that require multiple-story buildings with parking garages. As more and more of these types of projects are being proposed, the state takes more time to approve them, slowing down the planning process. This is especially prevalent siting in urban districts. One participant described a tour of other states that a committee of California urban districts went on to see examples of high-density new schools on the East Coast. They found that there was "not too much to learn about because they don't have the density we have – nothing comparable to California."
Prevailing Wage Laws	Participants were largely mixed on the cost effects of prevailing wage laws mandated by the Public Contract Code. While paying the prevailing wage likely increases labor costs, participants felt it also increased the quality of the work, thereby making the cost worth it

COST FACTOR	EXPLANATION
Public Contract Code *"So as a contractor, why would I want to bid on a public project when I can bid on all these other jobs, when the requirements for the public job are so cumbersome?"*	The Public Contract Code establishes a host of regulations that must be followed when working on a public construction project, which invariably result in higher bids and cost overruns. Items addressed in the Public Contract Code include labor compliance and prevailing wage. Labor compliance was repeatedly noted as a tremendous cost to new school construction projects. In particular, participants noted the enormous time and money required to monitor labor compliance – money that ultimately is taken away from the building project itself. As one participant described it, "we're paying more money to make sure we're spending enough money." Numerous participants noted that the current regulations require that every aspect of every construction project be monitored, rather than only investigating suspicious practice and/or contractors with checkered track records. In particular, numerous participants expressed what they saw as very mixed results on the regulations surrounding the use of Disabled Veterans Business Enterprise (DVBE) workers. In general, participants felt that DVBE money could be spent in more appropriate ways to better benefit the DVBE. Overall, participants noted that labor compliance monitoring is hugely labor intensive and discourages contractors from taking public construction jobs. Overall, participants largely agreed with the statement made by one participant, "The Public Contract Code is problematic in that it results in higher bids and cost overruns." In part, because the way it is set up creates an "adversarial" atmosphere among the involved parties.
IOR (Inspector of Record)	Participants generally agreed that the presence and continuous inspection of the IOR was a benefit to any project. The IOR has a unique contractual position; the district pays for them and they work closely with the construction contractor but under the supervision of the architect. Essentially, the IOR assures that the plans get built to the architect's specifications as approved by DSA. Additionally, the IOR assures prevailing wages are being paid. The IOR also arranges timely inspections of the project to avoid costly delays. Participants noted a good IOR will save the project a "fortune," while a poor IOR can cost the project a "fortune." This is in part due to a feeling that there is subjectivity on the part of some IORs in interpreting the specifications. IORs have been known to "call out" items in the design that they think are problematic, even though the designs have been approved by DSA. A few participants noted that they spend a fair amount of time arguing with their IOR over these and other issues, which is costing project time and money. Also, participants noted that there were not as many good IORs available as is necessary in many locales.
Processing Change Orders *"Change orders cost a fortune – not the actual change, but the paperwork; the administrative costs are huge."*	Change orders – alterations to the design during the construction process – are a fact of life in nearly any construction project for a host of reasons. Participants noted that the state's requirement that all change orders be reported regardless of how minor places a tremendous bureaucratic paperwork burden on the project. At times reporting change orders is justified, such as with plumbing changes, but not with minor things such as moving a door from one end of a wall to another. Participants noted that the documentation on change orders has become more complex because no party wants to be responsible for making a change that could hold them liable at anytime during the use of the school by students and teachers.
State and Local Code Conflict	Participants noted that in many locales, state and local codes, particularly building codes and parking requirements, are often in conflict. The result is that obtaining both state and local design approvals add complexity and time to the project.

State regulations on project management affect schools, namely:

COST FACTOR	EXPLANATION
Allowable Project Delivery Method	Participants generally agreed that the project delivery method used affects costs – different methods are best for different projects. While the private sector has been expanding the use of different project delivery methods, state regulations on school construction limit the choice in delivery methods school districts can utilize. For example, the design-build method can only be used on projects costing more than $10 million. These policy regulations limit choices for school districts and limit project efficiency.

STATE POLICY COMPARISON

To better understand the state policy differences between states, we collected more detailed state policy for California and the seven comparison states, as shown in Exhibit 4. Our more in-depth analysis revealed that:

- Regulations vary widely by state.
- California and New Jersey exert the greatest level of regulatory control over school construction.
- In California *(Godinez and Williams)* and New Jersey *(Abbott)*, equity-related litigation has significantly impacted state school facilities regulations.
- Most comparison states' informants claimed that their state has increased or is likely to increase state regulations to guide new school construction funding, programs, and/or policy.

In particular, we found that:

Overall State Regulation

- School districts in California and New Jersey are subject to a greater level of regulation across the board than are districts in the other states. Of all the states studied, New Jersey has the greatest number (six) of main agencies claiming regulatory jurisdiction over school improvement and construction (compared to California's four).
- Florida and New Jersey emerge as the most similar states to California, in terms of the regulatory requirements the state imposes on local school districts. Like California, these two states both have several agencies with control over the various phases of school design and construction. Aspects of the construction process that are not regulated in Florida include construction contracts and joint-use. Also, while both California and New Jersey review and approve all school projects at the design stage, Florida (which does have detailed design guidelines) only reviews school designs upon the request of individual districts.

Plan and Site Review

- New Jersey is the only state that requires state review of school district facility master plans (not just upon request or when districts are receiving state funding). California does not require that school districts have school facility master plans.
- Two states – Arizona and Ohio – only require plan-level review/approval if a project is funded by the state; neither Virginia nor Texas require state-level plan review

under any circumstances. California requires plan-level review for all public schools, regardless of funding sources.

- Only California and Arizona require state-level review/approval of site selection. Like California, New Jersey and Ohio also have environmental site review regulations for school sites.
- California appears to have the most robust environmental site selection criteria.

State Funding

- California, Arizona, Florida, and New Jersey have set or minimum funding contributions for school improvements and new school construction; Michigan, Texas, Ohio, and Virginia provide need-based funds for local school renovation and construction.
- California and Florida are the only two states of the eight that fund facilities for charter schools.

Exhibit 4: Case State Policy Comparison

	CA	AZ	FL	MI	NJ*	OH	TX	VA	NATIONALLY
Had successful school facilities litigation	Y	Y	Y	N	Y	Y	Y	N	29
Has state school building program	Y	Y	Y	N	Y	Y	N	N	28
Funds school construction	Y	Y	Y	N	Y	Y	Y	N	35
Requires District master plan approval	N	N	N	N	Y	N	N	N	n/a
Has site size recommendations (R) / standards (S)	Y(R)	N	Y(R)	Y(S)	N	Y(S)	Y(S)	N	n/a
Requires site selection approval	Y	Y	N	N	N	N	N	N	32
Has environmental site review regulations	Y	N	N	N	Y	Y	N	N	n/a
Has school design guidelines	Y	Y	Y	Y	Y	Y	N	N	n/a
Requires construction document approval	Y	Y	Y	Y	Y	Y	N	N	n/a
Requires construction contract approval	N	N	N	Y	Y	Y	N	N	n/a
Has prevailing wage law for school construction	Y	N	N	Y	Y	N	Y	N	26
Has higher structural requirements	Y	N	Y	N	Y	N	N	N	n/a
Has own ADA standards**	Y	N	Y	Y	Y	N	Y	N	n/a
Funds charter school facilities	Y	N	Y	N	N	N	N	N	n/a
TOTAL	**12**	**6**	**9**	**6**	**11**	**8**	**5**	**0**	

Sources: Interviews with national and state experts; Beaumont 2003; Rhode Island Legal Services 2005; ACCESS Network 2007; Associated Builders and Contractors 2007; Filardo 2007; New Jersey Education Law Center 2007.

*Note: Based on the Abbott v. Burke lawsuit, the so-called "Abbott districts" are funded 100 percent by the state of New Jersey and are subject to additional policy mandates. For the most part, the policies specified above apply to all public schools in New Jersey, however specific regulations and procedures may differ between Abbott districts and non-Abbott districts.

**Note: All states must follow federal ADA guidelines. In states marked with a "Y," state policy contacts indicated that their state had their own ADA standards that differed from, or were described as "above," the federal guidelines.

Joint Use Schools

- All of the states recommend, allow, or encourage some form of joint- or community-use of schools; California has a funded joint use program; Ohio has a new state program, which includes funding and specific requirements; and New Jersey has a pilot program for six “demonstration projects.”

Design and Construction Specifications

- California, Florida, New Jersey, and Ohio schools are held to structural requirements beyond standard building codes: California has the Field Act, Florida designates Enhanced Hurricane Protection Areas where schools are constructed to a higher standard, and New Jersey has the New Jersey School Construction Corporation (NJSCC) Design Manual. Ohio has the Ohio School Facilities Commission Design Guidelines.
- Aside from Arizona, Ohio, and Virginia, each state has either adopted its own ADA standards, or like Michigan, has at the very least amended the federal standards to suit its needs. New Jersey also uses the international code standards.

Project Management/Delivery Method

- While project delivery methods varied across states, Design-Bid-Build and Construction Management were cited as the most commonly used project delivery methods among the states polled.
- The majority of the state representatives interviewed were unable to say which project delivery method utilized within their state is most costly; some were able to speculate, but none track the cost differentials for similar projects.

New vs. Renovation Rule

- California, Ohio, and Virginia have recommendations pertaining to the point at which districts should renovate older schools versus building new ones; while none of the other states have specific recommendations, Florida does require that the replacement of a building be approved by the state Department of Education, and New Jersey states that its goal is to renovate unless the cost far exceeds the cost of building new.

Upcoming Trends Affecting Costs

- Representatives from each of four states – Arizona, California, Texas, and Virginia – all mentioned green building trends as being a significant factor likely to affect construction practices and costs over time.

External Cost Factors

- Interviewees from each of the states recognized the cost of materials as a major contributing factor to the cost of school construction; the limited availability of skilled labor was also mentioned by more than one state representative.

The higher levels of regulation in California appear to be directly tied to the state's increased involvement over time in funding public school facilities. As other states also increase their involvement in school facilities, regulations are likely to also increase to safeguard the state's investment. For example, nearly all comparison state policy informants claimed that their state has increased or is likely to increase one or more state regulations to guide new school construction funding, programs, and/or policy.

STATISTICAL ANALYSIS OF NATIONAL SCHOOL CONSTRUCTION DATABASE

Our statistical regression analysis of the national school construction database assessed factors affecting school construction costs and provides insights on the impacts state policies have on costs. (See Appendix 4 for the detailed regression model methodology and results.) Using four key policy measures[5] across the states, we established a School Construction Regulation Index (SCRI). Our national model found that more robust school construction regulatory structures, as measured by the SCRI, significantly increase costs. Our model found that for each additional point on the SCRI (0-4), school construction costs per square foot likely rose 6.2 percent. Looking at individual regulations separately, we found that school siting laws and prevailing wage laws for school construction have cost impacts, increasing cost per square foot by 12 percent and 9.6 percent, respectively. States with the highest SCRI scores were more likely to have higher school construction costs.

Our model only measured a select set of school regulatory variables, with the hope that these key regulations would serve as proxies for the robustness of each state's school construction regulatory environment. Thus, the model's findings concur with the findings from the focus groups and interviews: increased state regulation appears to increase school construction costs. As the state policy comparison shows, states vary widely on their school construction related regulations, which would need to be more adequately measured to assess the impacts of each and the ways in which they interact. But, it is difficult to assess just how much impact any one policy has on construction costs because policies in school construction tend to be interconnected and difficult to isolate.

LOCAL SCHOOL POLITICS, PRACTICES, AND DESIGN

While state policies and regulations dictate many "rules of the game" in building new schools, the local political context and the choices school districts make regarding practices and design significantly affect school construction costs. As we discovered, these factors can vary widely from district to district and even from project to project. There are many reasons for this as will be illustrated, but we found one unique, overarching fact that was repeated in one form or another by many of the people contacted for this research: schools are very "personal" elements of communities. As a result, local viewpoints about them are driven by a host of concerns and beliefs from personal pedagogical preferences and affinities, to concerns of taxes and public

[5] The four policy measures are whether the state: funds school construction, has school siting laws, has prevailing wage for school construction and had had successful school facility litigation.

spending. These various public concerns come together in a variety of ways because school construction mandates a significant amount of community input in the planning stages, from school board decisions to school design decisions. Additionally, we found that oftentimes, an idiosyncratic decision making structure drives the local planning process. And the desires for local flexibility in siting and design often conflict with regulations and/or cost efficiencies.

CALIFORNIA FOCUS GROUP AND INTERVIEW FINDINGS

A variety of individual school characteristics and school design choices made at the local level affect construction costs, including:

COST FACTOR	EXPLANATION
School Design	School design choices greatly affect cost. Different districts will make different design decisions based on a host of factors, including local preferences, budget, and site constraints. Cost changes occur for many reasons, from the availability of specific materials in the design to the fact that there is a cost premium for building multi-storied schools compared to building single story schools.
Grade Configuration	The type of educational facility (i.e., K-6 vs. K-8 or 9-12) to be built affects cost: high schools are generally more expensive to build, followed by intermediate schools, and then primary (elementary) schools. As districts experiment with different grade configurations, construction costs are affected. For example, building a K-8 school requires the labs and athletic facilities needed for 7-8 graders which means that the cost differential between a typical middle school and a typical elementary school is added. Therefore, cost per student for a K-8 is more than for a K-6 because the costs are spread over fewer students. However, cost savings may be achieved in comparison to building separate middle and elementary schools.
School Size/Building Size	Size of school affects costs. Typically, larger buildings cost more overall to build, but also benefit from economic efficiencies. The trend towards small schools and small learning communities (SLC) raise many issues relating to construction costs. While smaller school sizes are desired educationally, they are difficult to pencil out cost-wise from a facilities and operational standpoint. Each small school will likely need the ancillary spaces that support the programming, which are ultimately being built to serve fewer students. “One 900 student elementary school will likely be cheaper and more efficient than building three 300 student small elementary schools,” for example. In some instances, multiple SLCs are being built on one campus, and sharing ancillary space. Yet, it is more efficient to have one large school than three smaller ones. One reason is that a central HVAC system is cheaper than three separate ones. Also, with small schools, the administrative load is still present but there are fewer students – which means less average daily attendance (ADA) funding coming from the state. So the fewer students do not translate into necessary funding. Still participants tended to agree that small schools were cost effective from the initial construction standpoint, but much more difficult to sustain ongoing operating efficiency.

COST FACTOR	EXPLANATION
Classroom Size and Shape	As noted in the previous section, classroom size and shape affects cost. While some elements of size and shape are established in state policy, some are the result of local design decisions.
Classroom Type	Different types of classrooms cost different amounts. For example, science labs cost more then conventional classrooms. Grade levels served and school curriculum drives the need for specialty classrooms. Facilities and classrooms designed for special education classes also tend to be more expensive.
Educational Trends	Trends in education and technology continually change school design, thus affecting cost. School designers and builders are often "out of the loop" as to these policy changes at the school or district level. Educational program decisions can occur at many different levels and this flexibility can result in unclear expectations for the designer. Thus, school district personnel become responsible for making sure these new educational trends are translated into the built environment of new schools through adequate communication with their designers.
School Curriculum Focus	Because many educational programs require specialized spaces, a school's curriculum focus affects costs. Following the rationale for classroom type, as many schools increasingly move to specialized curriculums, schools with a focus in subjects that require more expensive classrooms (e.g., science) will likely be more expensive to build.
Joint Use, Shared Use, and Other Non-School Uses	Incorporating joint use into a school design affects cost. In theory, joint use opportunities save money by pooling resources among joint use partners. However, brokering, planning, and designing joint use school facilities typically adds time to a project, which ultimately increases cost, particularly given the rapid increase in construction cost California has experienced over the last decade. In essence, there are "hidden costs" found in joint use projects. Therefore, costs of joint use need to be analyzed over the long term; typical methods of measuring school construction cost may inflate short term cost data. Districts are often also expected to cover expenses associated with non-school functions such as health centers, Head Start, and other community functions. Joint use schools may increase the cost of the school, but they can decrease overall costs to the community. Still, this is difficult to account for.
School Location *"If suburban location costs are your base, you pay a premium to get contractors into urban areas and out to rural areas."*	School location affects cost – from the specific site choice to the location within a given region. Building in urban areas tends to cost more; the cost of land is higher and more difficult to attain, cost premiums that spread over to all other costs. In urban areas, existing structures are often demolished to make way for a new school, which adds costs to the overall project. Additionally, relocation expenses are also frequently incurred. In urban areas, new schools tend to be on smaller sites and have more stories. It costs more to build vertical than to build horizontal. There is also a premium to be paid for getting materials and contractors out to a rural construction location.
Types of Plans Used	Districts can build new schools with a unique architectural plan or re-use and modify existing plans. Although the scope of modification is determined by an individual project's needs, reusing plans can often save on project soft costs.

Local school capital financing practices affect school construction costs, including:

COST FACTOR	EXPLANATION
Capital and Program Dollars are Separate	As described previously, local financing largely follows state financing structures, whereby capital and program dollars are separate. This often works against having these funds work in complement to one another, such as using maintenance dollars to help fund the upfront costs of a more expensive higher-efficient HVAC system that would give the district cost savings over the long term.
Lifecycle Costing Not Done	Partly as a result of capital dollars being separate and partly due to school district capacity, lifecycle costing of new school projects is rarely done, which would work to maximize value over the life of a school, from design and construction, through operation, and to maintenance and renovation. When it is done, the focus is on determining if the programming funding will sustain the building. But rarely is lifecycle costing done in a way to significantly determine long term costs in a way that provides input into the design and construction specifications.
School Size/Building Size	Size of school affects costs. Typically, larger buildings cost more overall to build, but also benefit from economic efficiencies. The trend towards small schools and small learning communities (SLC) raise many issues relating to construction costs. While smaller school sizes are desired educationally, they are difficult to pencil out cost-wise from a facilities and operational standpoint. Each small school will likely need the ancillary spaces that support the programming, which are ultimately being built to serve fewer students. "One 900 student elementary school will likely be cheaper and more efficient than building three 300 student small elementary schools," for example. In some instances, multiple SLCs are being built on one campus, and sharing ancillary space. Yet, it is more efficient to have one large school than three smaller ones. One reason is that a central HVAC system is cheaper than three separate ones. Also, with small schools, the administrative load is still present but there are fewer students – which means less average daily attendance (ADA) funding coming from the state. So the fewer students do not translate into necessary funding. Still participants tended to agree that small schools were cost effective from the initial construction standpoint, but much more difficult to sustain ongoing operating efficiency.
Local Bond Language	Funding sources dictate how funds are allocated. Sometimes, particularly in urban areas, local bonds have language in them to help them gain local political support, such as establishing Project Labor Agreements or hiring local contractors to ensure local jobs. These rules affect cost and can partly drive the project scope.

The **local public approvals process** affects school construction costs:

COST FACTOR	EXPLANATION
State and Local Code Conflict	Participants noted that in many locales, state and local codes, particularly building codes and parking requirements, often conflicted. The result is that obtaining both state and local design approvals add complexity and time to the project.
Public Opposition	Public opposition to the location of schools has grown. Many residents see schools, especially high schools, as a locally unwanted land use (LULU). Participants noted less opposition to elementary schools. But for all schools, the overarching complaint from local residents is the negative traffic impacts.
School District Relationship with Local Municipalities and Local Planning Processes	The school district's relationship to their local municipalities and the local and regional land use planning process have significant indirect affects on school construction costs, particularly on site costs. As noted above, local municipalities can have the foresight to zone in such a way to save the school district money. However, joint planning for new school sites is rarely done and this zoning tool is rarely used in this way. Both cities and school districts have to see this kind of collaboration as in their best interest, which goes against decades of institutional separation. For one, in the post-Prop 13 climate, schools are often seen by cities as providing zero tax returns as they struggle to increase revenues. Participants generally agreed that schools were not part of these local land use planning processes and were seen as both a developer and as a service provider; they both serve as community infrastructure and use a lot of community infrastructure. As a result, school districts are "typically left with what's left of land in a master planned community." Local pressures and politics play into what choices districts needs to make and often add to cost.
Landscaping	More detailed landscaping also affects costs. Sometimes landscaping requirements are a local municipal demand; they are also school and school board choices for physical activity, outdoor learning environments, and/or aesthetics.
Infrastructure Improvements	Depending on the new school's location, and the existing quality of infrastructure, new school projects often need to make tremendous investments to connect to utilities (e.g., water, wastewater, utility connections, or transportation improvements).
Districts Have to Build Schools	Once a district passes a local bond to build a new school, it is largely tied to building the school as soon as possible. Thus, they cannot wait until market or other conditions are more favorable, as a private developer can to optimize the project's finances. As unique public development entities, their project needs are driven by demographics and educational programming, not by construction market conditions.

The decisions the school district as owner and **project manager** make affect school construction cost:

COST FACTOR	EXPLANATION
School District Capacity Regarding Construction *"Districts don't negotiate effectively in the process of designing and building new schools."*	School districts vary in their experience and capacity in school construction. Some districts build schools frequently and have large facility planning staffs, others have small facility staffs and build new schools infrequently, while others have no facility staff and maybe build a new school every 10 years or less. Much of this is dictated by the school districts enrollment growth rate. Thus, school district construction "culture" affects cost. In many districts, personnel working on facilities planning have educational backgrounds and often do not have construction project management capacity. As a result, many districts hire every aspect of the construction process out to consultants and contractors. Participants repeatedly noted that the more school district personnel were "savvy" enough to negotiate with consultants and contractors in the project management phases, the more likely this would translate into cost savings.
Lack of School District Master Planning	Public opposition to the location of schools has grown. Many residents see schools, especially high schools, as a locally unwanted land use (LULU). Participants noted less opposition to elementary schools. But for all schools, the overarching complaint from local residents is the negative traffic impacts.
Speed of District Payment for Construction Services	School districts have had poor track records of providing prompt payment for construction services. As a result, contractors are reluctant to bid or, because they know they will be financing the project until payment, overbid in order to compensate. Many districts, including LAUSD, have made great strides to speed time of payment down to a month or less.
Choosing Project Delivery Method	Many participants pointed to project delivery method choices as affecting costs as noted previously. Traditionally, school districts have utilized the Design, Bid, Build method. However, districts are increasingly going with other methods, including, Multi-Prime, Lease Lease-Back, Construction Management (CM), CM at Risk, and Design-Build. The choice of project delivery method requires different levels of capacity by the school district, thus any one method may not be appropriate for all districts. Numerous participants touted the benefits to project quality and cost that were realized by the Design-Build method. One participant stated, "Design-build method is faster, better, cheaper and less adversarial." In the Design-Build method, the school district establishes the criteria that must be met by the design, and the general contractor/architect have a fair amount of design freedom to meet the criteria and the agreed upon cost. The result is a "much more collaborative" construction phase because they are incentivized to solve problems that arise quickly.

Project: Horace Mann Elementary School.
Architect: BFGC Architects Planners in association with Moore Rubel Yudell. Photo: John Edward Linden

COST FACTOR	EXPLANATION
Growth of Construction Management Firms *"[School districts] will always prefer to avert and distribute risk to others. All of this results in higher costs for construction."*	Some school districts are increasingly hiring Construction Management firms. As one participant argued, these firms often "provide services which are redundant to those services provided by the architects." One reason posed for this practice is that districts follow their attorney's advice and look to distribute risk to various parties. Having more consultants on board enables the district to access liability insurance carried by those entities. A participant also noted that scenarios in which Construction Managers are hired to manage multiple prime projects essentially allows for the "hiring of a General Contractor without bidding, and further transfers liability for cost overruns to the districts as they act as 'owner-builders.'" An architect noted that "Our consultants all typically raise the rates of their proposals to us when they discover that the project will have the involvement of a Construction Management firm."
No Damage for Delay Clause	As dictated by the Public Contract Code, public works projects have nodamage for delay clause in them. In the private sector, contracts are negotiated such that no matter what happens projects must be built by a certain date. In the public sector, school districts must choose the lowest responsible bidder, but unfortunately intent often means nothing and, coupled with the increased specifications and process requirements, the entire project becomes more vulnerable to time delays, which ultimately increase the project cost.

The **weather / climate** where the school is located affects design and construction, thus affecting cost:

COST FACTOR	EXPLANATION
Weather/Climate Conditions	Schools must be built differently depending on local climate and weather patterns. Schools in temperate locales often need less insulation. Buildings are designed differently if they must withstand freeze/thaw conditions. The temperate climate of many California locales has enabled many schools to have exterior corridors between buildings, rather than encloses hallways (double loaded corridors).

STATISTICAL ANALYSIS OF NATIONAL SCHOOL CONSTRUCTION DATABASE

Our analysis of nearly 3,000 school construction projects nationwide found that between 1995 and 2004 for both elementary and high schools, on average:

- California built smaller schools than the nation and the seven comparison states
- California built fewer square feet per student than the nation and the seven comparison states
- California spent more per square foot than the nation and the seven comparison states[6]

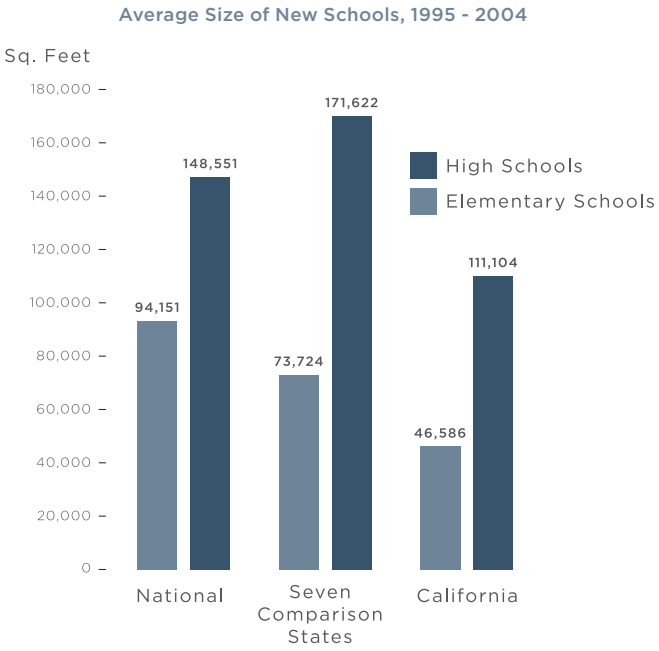


Exhibit 5: California built smaller schools than the nation and the seven comparison states from 1995 - 2004

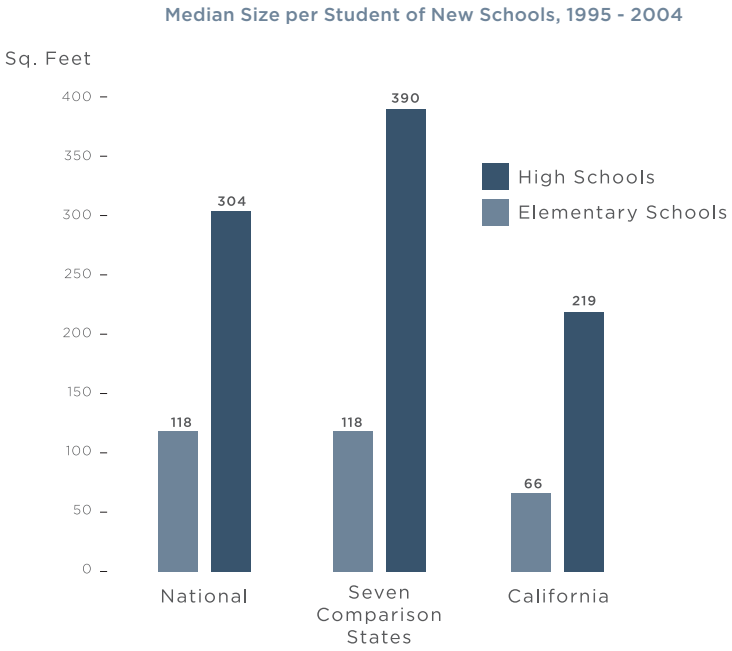


Exhibit 6: California built less square footage per student than the nation and the seven comparison states, 1995 - 2004

While the statistics above point to national and state comparisons, these data are not without important limitations. First, the construction projects used in this analysis are not a random sample from the raw McGraw-Hill data. Rather they are the nearly 3,000 (out of more than 9,000) projects that we were able to positively match to a specific school in the NCES Common Core of Data in order to get the school's address and student enrollment numbers for each project. While one-third (2,737 schools) is a sizable figure, the projects analyzed may not be representative of the entire population, thereby limiting

[6] The cost comparisons in the charts presented in this section are proxy measures based on the McGraw-Hill "construction start" data. They are intended only for trend comparison purposes across states and not as evidence of precisely what it costs to build schools within a given state.

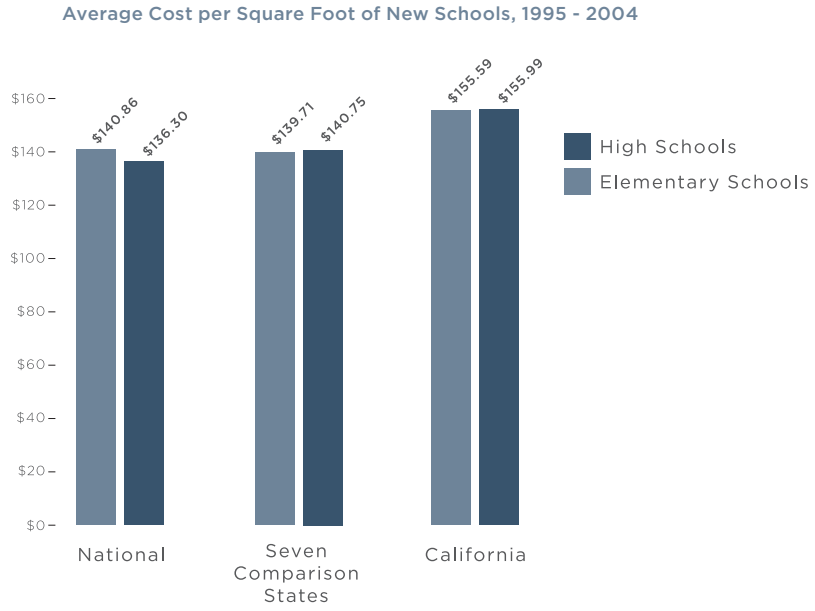


Exhibit 7: California spent more per square foot than the nation and the seven comparison states, 1995 - 2004

the generalizability of these findings. Second, the data do not contain costs associated with change orders during the course of a construction project, rather they are the hard construction contract bid price at the beginning of the project. Third, many schools built in mild climate states (including California) often build covered exterior passageways and other spaces, whose square footages are likely not counted in the data, which could possible skew the size of schools in these states down. Finally, in calculating per student data, we use school enrollment rather than building capacity data. Capacity is a better measure, but the data are not available. Therefore, overcrowded schools and under-utilized schools will affect the data trends.

Still, these trends do follow perceptions stated in the focus groups and interviews, as well as other published findings. For example, in regards to school size, the California Department of Education's School Facilities Planning Division (2007) also recently found that California school districts are building smaller schools and building less square footage per student than national trends reveal.

REGIONAL MARKET CONDITIONS

Regional market trends impact all construction, and school construction is no exception. Changes in land and construction prices are a major driver of public school construction costs. California's rapid growth and high cost of living have important consequences for public school construction costs.

CALIFORNIA FOCUS GROUP AND INTERVIEW ANALYSIS

COST FACTOR	EXPLANATION
Land Availability	Finding suitable, affordable land for new schools is becoming increasingly difficult given changing site standards and market conditions. In existing urban areas the problem is especially apparent, and often requires taking land that currently has housing or provides jobs and/or has toxicity issues. Public opposition further limits site options.
Lack of School District Master Planning *"We started buying in a rural area at about $125,000 per acre. We're now at about $800,000 an acre. Same exact school, just a few years later."*	Land prices in California are among the highest in the nation, and are increasing. In urban and rapidly growing areas they can be extremely expensive. State law works against school districts acquiring land at reduced rates. Participants felt state law requires districts to buy land at the highest and best value. Therefore if a developer has bought a large swath of land and rezoned it for residential development – thereby increasing its value perhaps ten-fold – the school districts have to buy it at the new higher price. One method around this is for the local municipality to be able to zone new school sites for school use, which would likely significantly lower the land's value. Another method is for schools to accurately forecast future development and acquire "greenfield" sites ahead of zoning changes. However, this requires school districts to accurately forecast and raise enough money for this purchase before it is needed. One participant noted, "If the school district can go off and make a reasonable determination that they are going to need a school in this area, and purchase that property and get state assistance to do so, I think over the long run this is going to save the school district and the taxpayer money."
Shortage of Labor and Materials ***"The availability of quality construction firms is limited."***	Strong construction activity in recent years has increased the demand for both construction firms and materials. Because contractors have more work to bid on, there is less competition for school jobs, which ultimately increases the bids. This has been especially evident in the Los Angeles area, partly due to Los Angeles Unified's massive building program. Participants also noted the abundance of work on the market was partly the result of the massive Hurricane Katrina reconstruction in the Gulf Coast. In general, there is not enough competition among contractors for hard-to-get-to sites.
Industry Relationships Among Contractors	General contractors (GC) have different reputations among subcontractors. Some GCs are known for paying on time, managing projects well, etc., while others are not. Participants noted that due to this, they have seen different sub-bids by the same subcontractors depending on who the GC is. Thus, the subs will adjust their bids for GCs they perceive to be harder to work for. This is one way the choice of a GC affects cost.
Fuel Cost Escalation	Rising fuel costs are heavily impacting school construction costs. This includes materials transportation and getting workers to and from job sites.

STATISTICAL ANALYSIS

The majority of the literature cited previously suggests that California school districts are spending more on school construction costs than their counterparts in other states. We test this assertion by using our sample of new school construction projects awarded in 2003 and adjusting them for regional cost differences associated with materials and labor using the RS Means Construction Cost Index. Exhibit 8 below summarizes the findings.

Our analysis finds that new school construction projects in California cost more than those in the seven comparison states. However, the difference in costs and cost per square foot between California and each comparison state differs substantially. While Arizona projects were nearly 30 percent less than California's, New Jersey projects were only 3.6 percent less than California. The two states with the most similar state policy environment as California – New Jersey and Florida – were the two states with the smallest cost per square foot difference, which suggests that state policy may play a role in affecting construction costs. However, the opposite does not appear to be true; that is, states with the fewest state policies did not necessarily have the biggest cost differences with California. Furthermore, New Jersey is the closest in cost per square foot to California, and it is also the only other state addressing school facility inequity concerns through state policy as California.

Exhibit 8: Adjusted School Construction Costs by State, 2003

State	Adjustment Factor	N	Median Total Cost	Median Cost per Square Foot	Difference in $/SF from California
Arizona	0.85	43	$7,455,621.30	$131.95	-28.9%
California	**1.08**	**176**	**$8,442,998.14**	**$185.70**	**-**
Florida	0.81	66	$14,724,953.68	$156.29	-15.8%
Michigan	0.96	20	$17,864,583.33	$155.78	-16.1%
New Jersey	1.07	18	$10,890,775.02	$179.03	-3.6%
Ohio	0.95	63	$11,583,914.47	$123.96	-33.2%
Texas	0.77	112	$12,970,167.96	$137.53	-25.9%
Virginia	0.80	20	$12,962,010.03	$146.34	-21.2%

The findings above require a note of caution with regard to assuming these data prove that school construction costs more in California than other states. What these and other calculations assume is that the schools that school districts are building are relatively similar, when in fact they likely are not. These data do not take into account quality of design or materials in understanding costs. Thus, while California school districts spent more per square foot on new school construction projects than districts in other states did, it is possible that California school districts are building schools of higher quality (either by local choice or by meeting various policy mandates), and paying more for that product.

Construction industry conditions were found to predict school construction costs in our econometric modeling. Nationally, construction wage rate was highly significant but had a low effect on cost per square foot (.6 percent). Using fixed-effects to control for state and year , wage remained very significant but its effect went down even further (.2 percent). However, wage was not at all significant in any of the comparison state models and all of

the coefficients were very low. The amount of school construction activity at the time of a project is significant in impacting costs. Nationally, doubling the amount spent within the state on school construction results in an increase of 3.5 percent in cost per square foot. Therefore, our analysis supports what was suggested by focus group participants; that more construction activity increases costs because there is less competition for construction contracts. When controlling for state and year fixed-effects, the impact of construction activity increases to nearly 13 percent per square foot. School construction activity was only found to be significant in California and Ohio, but in all states the effect of increased activity on costs is comparable to the national findings. In Ohio, however, the impact was much larger (17.5 percent).

Project: Cragmont Elementary School. Architect: ELS Architecture. Photo: Timothy Hursley

5 SUMMARY & ANALYSIS OF FINDINGS & RECOMMENDATIONS

This year-long study found three major findings. We follow each with specific recommendations.

Finding 1: School construction costs are complex, multi-faceted, and inconsistently reported.

Embedded within the complex nature of school construction exist a variety of state regulatory factors, local school district and project factors, and construction market conditions that together have cumulative effects on school construction costs. These factors come together in unique ways depending on the local context, particularly relative to school district characteristics, as well as local and regional community characteristics.

Of particular importance to understanding and comparing school construction costs is the fact that school planning, design, and construction are highly local activities, and a large amount of variation exists in this work. This reality was found in the focus groups, the state policy interviews, and suggested by the statistical analysis. The regression results further suggest that the factors affecting school construction costs may vary from state to state.

The cost implications of the complex nature of school construction can be illustrated in an analysis of one of the many key factors – site location. School districts choose sites based on a host of criteria including land costs, acreage needs, and development suitability. Sites vary on how they meet these and other criteria. Site location introduces a multitude of variables and how their expense might be accounted for. Key questions include:

- is the land donated (appraisal value) or purchased (market value)?
- is all of the site useable for school purposes (e.g., building pads and playfields that are level vs. terraced, intensive grading requirements)?
- what are the soil conditions that must be addressed (compaction issues vs. seismic zone issues)?
- are there reachable site utilities with sufficient capacity or does the site require extensive access roads, long utility runs, water-pressure systems, sewer and storm drain systems, etc.?

- are there significant CEQA issues which require extensive hazardous materials clean-up; is the site in a useable configuration for a school or does it meet the CDE area requirement but is configured in an inefficient lot proportion?
- are there physical constraints to the site that add to the cost of school building construction (e.g., water elements, topography, easements, freeway or airport proximity)?

These are just a sample of the kinds of issues that arise with a given site.

Further, it is extremely difficult to determine and compare school construction costs across districts and states, because costs are reported with varying scope and accuracy. This is in part due to the varied complexity of each project as described in the site example above. There is no universal standard format by which school construction costs are accounted. Not only is this true across states, but it appears to be true within most states, including California. There is no historical database for California school construction costs that compares like cost components. Comparing industry data is similarly difficult because they too differ in what costs are included. Some sources include only hard construction cost, some include land, others exclude land acquisition but include site development, others include hard and soft costs, but exclude "after-bid" (i.e., actual change order) costs. While these cost components differ widely, adjustments made to compare across projects or states also differ. Some sources utilize indices to adjust for bid date and/or regional geographic differences.

The unsystematic way school construction expenditures and costs are reported limits any research ability to adequately determine the full range of factors driving school construction costs.

Recommendation 1: The State of California and/or local governing entities should develop more systematic school construction cost data collection systems, guided by professional oversight to enable appropriate cost analysis.

Our first finding highlights the need for more systematic tracking and detailed analysis of new school project characteristics to better understand the school construction cost differences between states and the factors that affect these costs. What is needed is an accurate standard format for measuring, categorizing, and reporting school construction costs.

Very few states maintain publicly accessible statewide inventories of public school facilities or their construction costs. Such data systems are essential if policy makers, professionals, and advocacy groups seek to have reliable data on school construction projects and their costs to fully determine the factors driving these costs. The states that do collect and provide this information have a much better understanding of the school facilities in their state and the construction costs associated with them.

A statewide database is not useful unless data elements, collection methodology, accuracy, and timeliness of the information are maintained. In order for the information to be consistent, it needs centralized direction, training for data entry, and

funding to maintain the system. States can collect the data themselves, hire contractors to collect it, or utilize staff at local school district levels. However, using local districts does require that the state provide training and funding, when necessary, so that the information reported is consistent from area to area. Standards for consistent and comparable data require a centralized process , oversight, and a clear definition of terms.

The most difficult aspect of establishing a school construction cost database in California, may be defining the data elements to be included. The Project Information Worksheet (PIW) currently being developed by OPSC or a similar survey sent to school districts and/or design and construction firms, are potential sources. As part of our research, we constructed a sample survey instrument that could be used for this research (See Appendix 5). Data should include: physical and characteristic variables of the school, quality variables measuring materials and design, variables measuring the planning process and school district project management, detailed cost breakdowns for planning and construction stages as well as building components, and variables on the educational programming and the school building elements needed to support them. The Florida Department of Education's Annual Report of Cost of Construction data may be a replicable model.[7] However this project information is gathered, a strong support and incentive structure for school districts to participate is needed to ensure reliable data collection.

Making information about school construction costs public has a two-fold purpose. First, it informs parents and children about the taxpayer supported investments being made into structures in their community. Secondly, it holds public officials accountable for their planning and expenditures on new public school facilities.

Finding 2: Three central areas of factors affecting school construction costs are: a) state regulatory structures, b) local school politics, practices, and design, and c) regional market conditions.

a) State Regulatory Structures Affect Cost and Vary Significantly Across the Country

State policies governing school planning, design, and construction vary widely between states and have a variety of effects on project costs. California has many state agencies involved in school construction oversight and has among the nation's most comprehensive set of school construction policies and regulations. These policies are largely aimed at establishing and upholding statewide standards of safety, liability, equity, and design for all children.

Interview and focus group data reveal key elements of state regulatory structures that affect school construction costs:

- *Design and construction specifications*. These include increased design and construction specifications, seismic structural requirements, allowable construction techniques, energy specifications, ADA compliance, telephone/communication system requirements, over-design by architects to meet specifications, and classroom size
- *School facilities finance structure*. This includes the level of state grant adequacy and inconsistency in funding availability.

[7] See http://www.fldoe.org/edfacil/oef/cocps.asp. Florida DOE reports project level cost data on: legal and administrative costs, architectural and engineering fees, site improvement cost, construction contract costs, furniture and equipment, hurricane shelter cost, site cost, public utilities cost, site drainage and/or retention area cost, public road access cost, and environmental costs.

- *Public approvals process*. This includes time associated with the process, in particular, school siting approval and DSA approval, lack of state knowledge of unique projects, public contract code, prevailing wage laws, inspector of record, processing change orders, and state and local code conflict
- *Project management regulations*. This includes allowable project delivery methods

Our statistical analysis supports the notion that state regulations considerably affect school construction costs. Nationally, although policies vary widely between states, the states with greater numbers of state regulations (as measured by our School Construction Regulation Index) had higher school construction costs. Looking at specific policies, we found that the presence of school siting laws and prevailing wage laws had the most significant cost impacts, increasing cost per square foot by 12 percent and 9.6 percent, respectively. However, further research is needed to better understand these factors' impact on cost. For example, the presence of school siting laws may correlate with whether a state has other school construction-related policies, therefore the impact may not be completely attributed to the siting laws. In measuring the effect of PWL, a concern is that using accepted bid price as a measure of project cost (which is what the McGraw-Hill data represent) may be inappropriate because these data do not account for the prevalence or absence of change orders after a construction bid has been accepted, which can greatly affect total project cost. Some proponents of PWLs assert that their presence increases workmanship and decreases change orders.

The findings from this report should not lead one to conclude that California's school facility policies should simply be removed outright. While it appears the case that California school construction costs are higher than costs in other states and that California's policies may play a part in increasing these costs, systematic cost-benefit analysis of the state's school construction policies has not been conducted. For example, California tax payers may be getting higher quality schools (and paying more for them) than taxpayers in some other states, which may in part be a function of state policies. Our research did not seek to measure these benefits.

b) Local School Politics, Practices, and Design Affect Cost and Vary Widely

The local political context and the choices school districts make regarding practices and design ultimately affect school construction costs. These factors can vary widely from district to district and even from project to project. Oftentimes, an idiosyncratic decision-making structure drives the local planning process and the desires for local flexibility in siting and design often conflict with regulations and/or cost efficiencies.

Interview and focus group data reveal key elements of local school politics, practices, and design that affect school construction costs:

- *School characteristics and design choices*: These include school design, grade configuration, school size/building size, classroom size and shape, classroom type, educational trends, school curriculum focus, shared use, school location, and types of plans used
- *School capital financing practices*: These include the separation of capital and program funds, the fact that lifecycle costing is rarely done, and local bond language that may affect project requirements
- *Public approvals process*: This includes state and local code conflict, public opposition to new schools, the quality of the school district relationship with local governments, project labor agreement requirements, landscaping requirements,

infrastructure improvements, and the fact that districts have a responsibility to build schools regardless of the construction/economic market conditions

- *Project management*: This includes school district capacity managing construction projects, lack of school district master planning, speed of district payment for construction services, project delivery method choice, increase in the use of construction management firms, and no damage for delay clause
- *Local weather/climate*. Schools must be built differently and/or have different components depending on local climate and weather conditions

Our statistical analysis found that California tends to build smaller schools and fewer square feet per student and spend more per square foot than other states. We found that size (square feet) of a school is a strong predictor of costs and that there are economies of scale realized in school construction. Nationally, building above and below grade adds about 1- 3 percent in cost per square foot. High schools and middle schools tend to be more expensive than elementary schools, likely due to the more sophisticated spaces needed in middle and high schools. We also found that building in urban locales (i.e., higher density) tends to be more expensive than building in other locations.

c) Regional Market Conditions Affect Cost and Vary Within States and Between States

Regional market conditions impact all construction, and school construction is no exception. Changes in land and construction prices are a major driver of public school construction costs. California's rapid growth and high cost of living have important consequences for public school construction costs.

Interview and focus group data reveal key elements of regional market conditions that affect school construction costs:

- Land availability
- Land prices and acquisition
- Shortage of labor and materials
- Industry relationships among contractors
- Fuel costs

While our statistical analysis finds that California schools tend to cost more per square foot than schools in other states, this difference varies widely when comparing California to different states, from about four percent to more than 30 percent in square foot costs. We found that regional market conditions have impacts on school construction costs. Nationally, construction wage rate was highly significant in predicting costs, but actually had a very low affect on cost per square foot (.6 percent). When controlling nationally for state and year fixed-effects, wage remained very significant but its affect went down even further (.2 percent). The amount of school construction activity at the time of a project is also significant in impacting costs. Nationally, doubling the amount being spent within the state on school construction results in an increase of 3.5 to 13 percent in cost per square foot. Therefore, as suggested by focus group participants, more construction activity increases costs because there is less competition for construction contracts. This finding is particularly important given California's ongoing major school construction investment.

Additionally, while regional market conditions affect all construction activity, school construction has a unique relationship to these market conditions; school construction is driven largely by enrollment growth and needs for upgrading existing schools. School

Project: Camino Nuevo Charter Academic Elem. Architect: Daly Genik. Photo: Tim Griffith

districts are not typically able to carry out construction solely during more favorable market conditions. Rather, to utilize state funding and meet local bond promises, they must build schools whether market conditions are favorable or unfavorable.

Recommendation 2: The State of California and the school construction and architecture professional community should work together to develop greater policy directives and oversight systems to guide future school construction policies and practices.

Specific areas for collaborative work include:

- **Collectively defining "good" or "complete" school construction projects that are driven by curricular goals and outcomes and establishing tools to measure school facility quality.** Such guidelines should be informed by research on how school facilities design and attributes support educational programming needs and student outcomes. New policies or guidelines should also be flexible or adaptable to quickly changing market conditions or changes in the overall construction industry.

- **State offices involved in school construction should work with other comparable state-level leaders and authorities to better determine what patterns are developing across the nation and how they might differ from region to region.** Currently, there is very little communication or sharing of information among state-level school facility policy makers, though many states have important information that could benefits other states. This would aid states that are just beginning to develop their new school construction policies and programs and enable California to learn from other states aggressively funding school construction. The construction/architectural professional community should play a role in providing data and crafting best practices.

- **Establishing recommendations or guidelines for effective school facilities planning, both at a district wide level and at an individual project level.** Our research finds that the quality of upfront project planning plays a key role in determining construction costs, and that school districts vary in their capacity and experience for effective planning well before construction even starts. Here, the role of district facility master plans, educational specifications, and project design documents are important elements in the process.

Finding 3: School construction has not yet been studied in a rigorous or systematic way, partly due to the lack of process and data standardization in the field.

School construction appears to be the one area of educational policy that has not undergone the intense analysis or process and data standardization affecting most other areas of educational reform and policy making. There is very little empirical literature on school construction, its costs, or the factors that affect these costs. This is understandable given the relative newness of larger school facility investments in California and elsewhere, while at the same time alarming given the enormous ongoing public investment states like California are making in their school facilities. Available data sources reporting state or regional cost trends appear inconsistent in terms of

understanding the school construction cost differences between states.

Recommendation 3: Conduct further empirical research on school construction that appropriately analyzes actual costs at the project level to provide more comprehensive analysis of all school construction cost components, drivers, and results.

Our research finds that given the void in current research, an overall better understanding of actual school construction costs and the factors that affect them is greatly needed. The creation of a school construction database in Recommendation 1 will greatly aid future research, which should focus on three key areas:

a) Examine and compare school construction costs.

- **To accurately study school construction costs, a detailed, context specific understanding is needed that utilizes both quantitative and qualitative methods.** Statistical analysis and econometric modeling will likely not get at the full array of cost factors, as revealed by our focus group findings. For example, looking at construction costs in isolation of the planning process will not capture the "capacity" of school districts as project owners. Detailed understanding of local design and construction practices is needed because, for example, the upfront planning and design stages ultimately impact construction costs.
- **Future study on school construction costs should incorporate aspects of design and construction quality into analysis.** A fundamental problem with any discussion or research on school construction costs is that the question of quality of design and construction is often left out. School districts build all types of schools with varying levels of "quality" – both in material and design as it relates to school/student use, which support or inhibit student (and teacher) performance. A framework and measurement tool for assessing quality, which utilizes both quantitative and qualitative data, and considers condition, design, and utilization is necessary for true cost/benefit analysis. Research on how school facilities design and attributes support educational programming and student outcomes will support recommendation two.
- **Research should seek to understand the costs associated with the different components, rooms, and resources needed in schools.** For example, labs and media rooms likely cost more than conventional classrooms, as noted by focus group participants.

b) Compare school construction and other types of construction.

- Research should compare public school construction cost trends with construction costs of other structures, such as private schools, other public facilities, or prime office space. This analysis would provide insight into whether or not public school construction is changing in unique ways and if school construction costs are more expensive or escalating at a faster rate than other construction projects. For example, analyzing private schools may yield insights in quality and cost per square foot, while comparing to other public facilities may reveal process cost differentials. This research would aid in understanding the unique nature of public school construction work and how it relates to market conditions.
- Research should analyze the market conditions specific to school construction, especially the role of design and construction firms. Research should investigate the following questions: What are the characteristics of design and construction firms qualified and willing to do public school construction work in California? Are these firms adequate in number and evenly distributed relative to public school construction need? How do the characteristics of this pool of firms affect public

Project: Cragmont Elementary School. Architect: ELS Architecture. Photo: Timothy Hursley

school construction costs? Is there limited competition which may increase costs? How can California public school construction jobs be made more attractive to building industry contractors (in order to increase competition)?

c) Analyze the cost impacts of state and local policies and practices.

More research is needed to understand and measure the cost impacts of the various state and local policies and practices that affect school construction.

Specific research questions include:

- How do individual state policies on school construction correlate to project costs? State policies governing school construction (e.g., policies dictating site sizes, classroom sizes, and required infrastructure and educational elements in schools) should be analyzed to better understand the effect of individual policies.

- How do costs compare between states that encourage or mandate more coordinated local planning among school districts and local governments? By often not being a part of local land use planning processes, how much infrastructure costs are California school districts covering?
- In what ways do school districts in California acquire land for new schools? How do these process and practices affect school construction costs?
- What effect do soft costs have on total project costs? Research should understand the "soft cost" investments and how these lead to construction costs efficiencies or expenses. For example, our research findings suggest that one main cause of change orders is insufficient or ineffective planning and/or design on the front-end of a project. While neither the state nor school districts have much control over the cost of construction materials or labor (which make up the vast bulk of "hard costs"), they can have much more control over the planning and design of projects, which may lead to construction cost savings/efficiencies.

CONCLUSION

School districts in California are working to build the best schools they can within the constraints of limited capital budgets and very complex regulatory environments. In terms of finding ways to decrease the cost to build a new school in California, the complex interplay between state regulatory structures, local school politics, practices, and design, coupled with varying market conditions must be rigorously investigated. In order for this to occur at a level beyond the analysis completed in this report, accurate project level data must be systematically collected and made available for future analysis. Incentives for gaining access to such data are likely to require state resources and professional oversight to ensure accuracy and consistency of reporting. As one focus group participant rightly noted, "there's no silver bullet" to reducing school construction costs as it is based on so many complex factors. This study is an important step toward truly understanding and unpacking the "black box" of what factors drive school construction costs in California.

WORKS CITED

ACCESS Network, Campaign for Fiscal Equity, Inc. http://www.schoolfunding.info/index.php3

Associated Builders and Contractors. 2007. States Without Prevailing Wage Laws for School Construction. Available online: http://www.abc.org/wmspage.cfm?parm1=2142

Azari-Rad, Hamid, Peter Philips, and Mark Prus. 2003. State Prevailing Wage Law and School Construction Costs. *Industrial Relations* 42(3): 445-457.

Bachman Paul and David G. Tuerck. 2006. Project Labor Agreements and the Cost of Public School Construction in New York State. Cambridge, MA: Beacon Hill Institute at Suffolk University.

Bachman, Paul, Darlene C. Chisholm, Jonathan Haughton, and David G. Tuerck. 2003. Project Labor Agreements and the Cost of Public School Construction in Massachussetts. Cambridge, MA: Beacon Hill Institute at Suffolk University.

Bachman, Paul, Jonathan Haughton. 2004. Project Labor Agreements and the Cost of Public School Construction in Connecticut. Cambridge, MA: Beacon Hill Institute at Suffolk University.

Beaumont, Constance. 2003. State Policies for School Construction and Renovation. Washington, DC: National Trust for Historic Preservation

Belman, Dale, Russell Ormiston, William Schriver, and Richard Kelso. 2005. The Effect of Project Labor Agreements on the Cost of School Construction in New England. School of Labor and Industrial Relations, Michigan State University, Working Paper Series.

Billingsley, K. Lloyd. 2005. No Place to Learn. San Francisco: Pacific Research Institute.

Filardo, Mary, Jeffrey M. Vincent, Ping Sung, and Travis Stein. 2006. Growth & Disparity: A Decade of U.S. Public School Construction. Washington, DC: Building Educational Success Together.

Building Educational Success Together and Center for Cities & Schools. 2008, forthcoming. Growth & Disparity in California: A Decade of Public School Construction.

California Performance Review. 2004. Government for the People for a Change. INF 31 One-Stop Shop for School Facility Approval. Available online: http://cpr.ca.gov/report/cprrpt/issrec/inf/inf31.htm

California Seismic Safety Commission. 2007. The Field Act and Public School Construction: A 2007 Perspective. Sacramento, CA: CSSC.

Carrick, Alex. 2007. Vocational Schools Carry the Highest Construction Costs among K-12 Schools. Building Team Construction Forecast. Available online: http://www.buildingteamforecast.com/article/CA6479626.html?industryid=43720&nid=2816

Carroll, Stephen J., Cathy Krop, Jeremy Arkes, Peter A. Morrison, and Ann Flanagan. 2005. California's K-12 Public Schools: How Are They Doing? Santa Monica, CA: RAND Corporation.

Education Law Center. 2007. http://www.edlawcenter.org/index.htm

Filardo, Mary. 2007. Personal communication with authors. Filardo is the Executive Director of the 21st Century School Fund and the Building Educational Success Together (BEST) national collaborative.

Fraundorf, Martha, John P. Farrell, and Robert Mason. 1984. The Effect of the Davis-Bacon Act on Construction Costs in Rural Areas. *Review of Economics and Statistics February*: 142-146.

Izumi, Lance T. and Matt Cox. 2003. California Education Report Card: Index of Leading Education Indicators, Third Edition. San Francisco, CA: Pacific Research Institute.

Little Hoover Commission. 2000. To Build A Better School. Sacramento, CA: Little Hoover Commission.

Macias Consulting Group. 2008. Final Report, New School Construction Grant Adequacy Study. Presented to the California Office of Public School Construction.

Office of Public School Construction. School Facility Program, Statistical and Fiscal Data, December 16, 1998 through June 27, 2007. Available online: http://www.documents.dgs.ca.gov/OPSC/Resources/Stats_Fiscal_Data.pdf

Orange County Register. Many schools getting less bang for bonds, by Erica Perez, Sam Miller, and Fermin Leal. June 18, 2006.

Ortiz, Flora Ida. 2004. Essential Learning Conditions for California Youth: Educational Facilities. *Teachers College Record* 106(10): 2015-2031.

Philips, Peter. 2001. A Comparison of Public School Construction Costs, In Three Midwestern States that have Changed their Prevailing Wage Laws in the 1990s: Kentucky, Ohio, and Michigan.

Philips, Peter. 2005. A Case Study of the East Side Union High school District 2004 Project Labor Agreement in San Jose, California.

Prus, Mark J. 1999. Prevailing Wage Laws and School Construction Costs: An Analysis of Public School Construction in Maryland and the Mid Atlantic States.

Rhode Island Legal Services. 2005. Fifty State Survey of School Siting Laws, Regulations, and Policies. Available online: http://www.childproofing.org/RIReport.htm

Rider Hunt Levett & Bailey 2006. Quarterly Construction Cost Report. 2006 Fourth Quarter Issue.

Saylor, Brad. 2007. Construction Market Outlook and Cost Report Q1, 2007. Presentation at the Schools and Community Colleges in California, An Ad-Hoc Roundtable Discussion, hosted by Parsons. Los Angeles, CA. May 17.

Simonson, Kenneth. 2006. AGC's Construction Inflation Alert: Tracking the Surge in Construction Costs, 2001-2006. Associated General Contractors of America.

Tashakkori, Abbas and Charles Teddlie. 1998. *Mixed Methodology: Combining Qualitative and Quantitative Approaches*. Thousand Oaks, CA: Sage.

Washington Research Council. 1999. Special Report: More and Better Schools with Repeal of Prevailing Wage Laws. Seattle, WA: Washington Research Council.

APPENDIX 1:

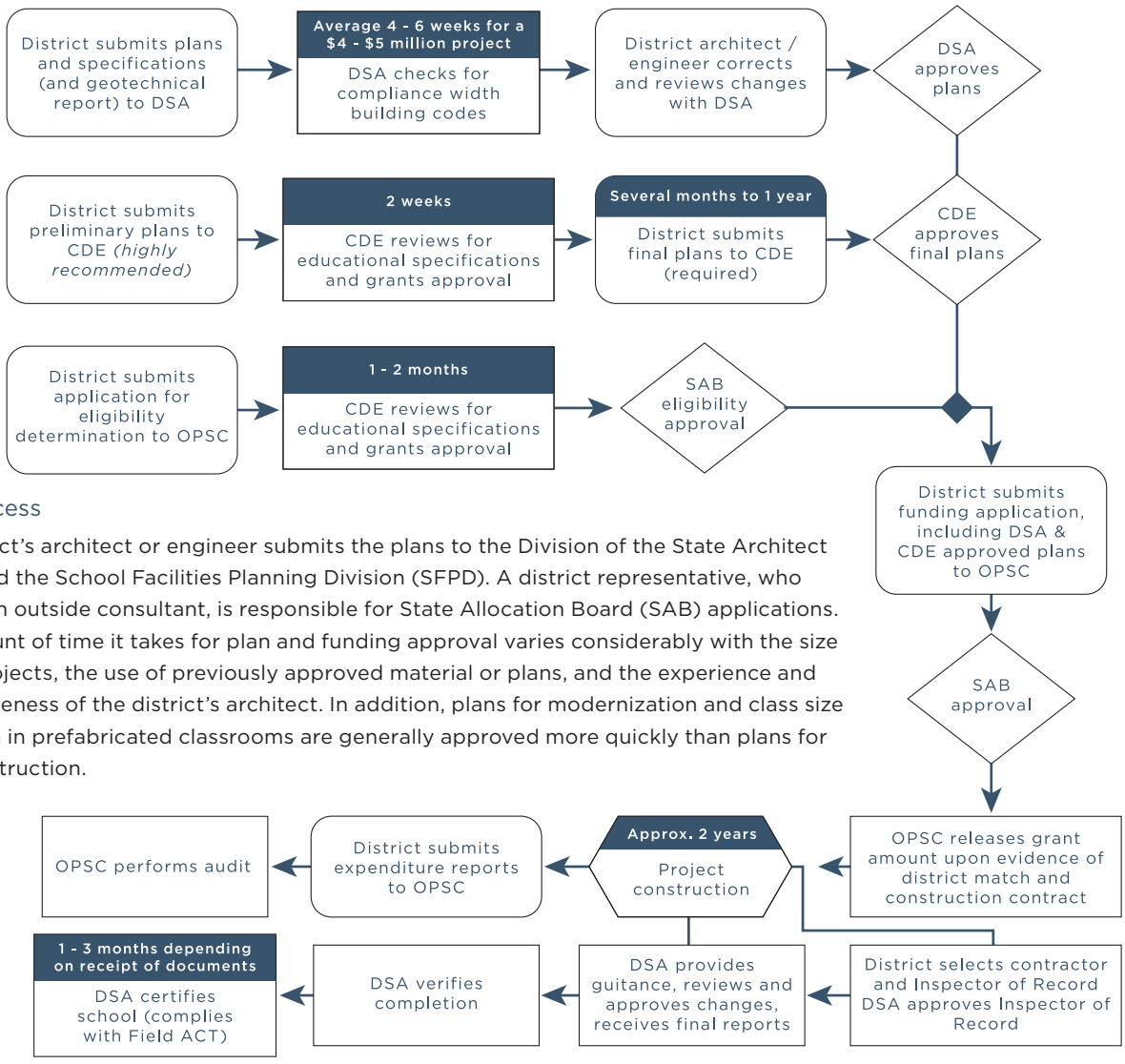
RANK OF STATES BY NUMBER OF NEW PUBLIC SCHOOLS BUILT, 1995-2004

Rank	State	Number of New Schools	Total Cost in 2005 Dollars	Avg. Cost Per Project
1	**Texas**	**1790**	**$16,712,305,061**	**$9,336,483**
2	**California**	**1369**	**$12,506,014,726**	**$9,135,146**
3	**Florida**	**855**	**$8,840,392,789**	**$10,339,641**
4	Georgia	566	$5,861,056,606	$10,355,224
5	**Ohio**	**477**	**$5,255,298,184**	**$11,017,397**
6	**Arizona**	**445**	**$3,044,062,730**	**$6,840,590**
7	North Carolina	424	$4,577,485,871	$10,795,957
8	Illinois	379	$4,932,277,299	$13,013,924
9	**Michigan**	**306**	**$4,465,481,892**	**$14,593,078**
10	Tennessee	296	$2,716,724,482	$9,178,123
11	Arkansas	267	$794,099,745	$2,974,156
12	Oklahoma	266	$628,530,923	$2,362,898
13	South Carolina	259	$2,813,911,098	$10,864,522
14	Washington	258	$2,635,875,100	$10,216,570
15	Alabama	256	$1,744,128,026	$6,813,000
16	Pennsylvania	256	$3,333,914,630	$13,023,104
17	Missouri	250	$1,612,724,169	$6,450,897
18	Massachusetts	230	$3,831,111,541	$16,657,007
19	**Virginia**	**228**	**$3,782,317,898**	**$16,589,114**
20	Louisiana	213	$684,114,693	$3,211,806

Source: Filardo et al. 2006

APPENDIX 2:

CALIFORNIA SCHOOL CONSTRUCTION APPROVAL PROCESS



The Process

The district's architect or engineer submits the plans to the Division of the State Architect (DSA) and the School Facilities Planning Division (SFPD). A district representative, who may be an outside consultant, is responsible for State Allocation Board (SAB) applications. The amount of time it takes for plan and funding approval varies considerably with the size of the projects, the use of previously approved material or plans, and the experience and responsiveness of the district's architect. In addition, plans for modernization and class size reduction in prefabricated classrooms are generally approved more quickly than plans for new construction.

DSA: Division of the State Architect, Dept. of General Services
SFPD: School Facilities Planning Division, Dept. of Education
SAB: State Allocation Board
OPSC: Office of Public School Construction, under SAB

Source: California Performance Review. Available online: http://cpr.ca.gov/report/cprrpt/issrec/inf/inf31.htm#10b.

APPENDIX 3:

FOCUS GROUP AND INTERVIEW METHODOLOGY

The study incorporated a mixed-methods approach using quantitative and qualitative data to understand and measure factors affecting public school construction costs in California. By incorporating a combination of qualitative and quantitative data, the study achieves a higher validity and is more nuanced and detailed than any individual method alone (Tashakkori and Teddlie 1998). Qualitative data was obtained through focus groups, open-ended, structured interviews, and case study methodology. Quantitative data was obtained via a variety of sources, namely the BEST national database on school facilities expenditures.

Information, stories, and opinions on school construction costs in California were collected from individuals working in public school facilities development across California. Two focus groups, attended by more than 30 professionals in the field, were held; one in Sacramento and one in the Los Angeles area. Additionally, more than a dozen interviews and follow-up conversations were held with focus group participants and additional professionals. In total, more than 50 individuals were involved in some aspect of public school facilities development in California contributed to the findings of this report. The objectives of the focus groups and interviews were to:

1. Identify the factors that affect school construction costs in California
2. Understand the ways in which these factors affect school construction costs in California

The focus groups were facilitated through a discussion addressing these two key objectives. The backdrop of these discussions included identifying factors that appear to be unique to California; that is, factors that may be different – or nonexistent – in other states as a way to address the overarching goals of this study. Due to the complex nature of school construction in California, the focus group discussions were framed around six categories of factors that are assumed to contribute to the cost of building new school facilities in California:

1. School Characteristics
2. Design Specifications
3. Construction Specifications
4. Public Approvals Process
5. Project Management
6. External Factors

When attempting to categorize factors contributing to cost, the focus group participants were able to fit most items in one of the predetermined categories, but generally found that factors and categories overlapped significantly, particularly in the areas of design and construction specs. Still, the pre-defined categories served as a useful tool to guide the discussions.

APPENDIX 4:

NATIONAL DATABASE AND REGRESSION METHODOLOGY AND FINDINGS IN DETAIL

To better understand school construction costs across the country, BEST (Building Educational Success Together) developed a unique dataset on new public school construction projects undertaken in all 50 states and the District of Columbia between 1995 and 2004. Because there is no comprehensive public data on public school construction spending, BEST utilized raw data provided by McGraw-Hill Construction, a segment of McGraw Hill Companies, which collects detailed project-level data on every building project valued at more than $100,000 undertaken by the nation's school districts. BEST analyzed the McGraw-Hill data and linked it to other datasets for its recent report, *Growth & Disparity: A Decade of U.S. Public School Construction* (Filardo et al. 2006), and it represents the most robust dataset available on public school construction at the project level (hereafter referred to as "BEST data"). These "construction start" data reflect the contract value, or accepted bid price, of each project and represent the construction hard costs: the basic labor and material expenses of the project. The additional change orders and soft costs – such as site acquisition, architectural, engineering, and project management – are not collected by McGraw-Hill. Hard costs typically account for about 70 percent of a project's total cost, although this can vary by project and locale. Therefore, it is important to note that in this study we analyze the hard construction costs for new schools as a measure of final costs.

McGraw Hill Construction data has been used in other studies of school construction. However, their scope and usefulness must be understood and they must be used appropriately. These proprietary McGraw Hill data are collected in real time for the purpose of informing construction industry manufacturers, contractors, and subcontractors of projects that will be under construction, so they can market their goods or services to the project owner and contractor. These "construction start" data reflect the contract value of each project and only represent the construction "hard costs." Because they exclude soft costs (and site costs), they do not represent the full project cost. Because construction costs can rise during the course of a project, the "construction start" McGraw-Hill data can be used *only as an estimated* measure of actual final project costs, and are highly applicable to assessing local, regional, state, and national *relationships and trends* in construction spending, as we have done in this report. These data do not lend themselves to measuring what it actually costs to build a school, as has been attempted recently in California by Macias Consulting Group (2008).

The BEST data contain detailed cost and characteristic data for thousands of new school construction projects nationwide, which enables comparison across states. We link these data at the project level to school district and census data and other sources to measure factors affecting school construction costs identified in the literature and our focus groups and interviews. We then model school construction costs to test the significance and influence of different factors on these costs, using econometric (regression) modeling.

Regression is a statistical tool used to measure the significance of difference factors (independent variables) on an outcome (dependent variable). In this case, we are interested in the significance of different factors (such as location, square footage, school type) in affecting new school construction cost per square foot. Results from a regression model illustrate any given factors' significance in affecting cost relative to the other factors. The R2 shows the overall "fit" that the model has to the dependent variable. In other words, an R2 of 0.634, means that the variables in the model explain 63 percent of the variance in cost of the projects. The higher the R-square, the more the variables explain cost, and vice versa. An R2 of 1.0 would perfectly explain costs.

National Public School Construction Database of New Schools

For this study, the new school construction projects were identified in the BEST data by analyzing the project descriptions contained in the data. We were able to identify 9,813 projects as new school construction projects; not renovations or additions. These projects were then matched to National Center for Education Statistics (NCES) Common Core Data (CCD) and U.S. Census data. A total of 2,645 projects were successfully matched to these datasets.[8] The CCD indicates that 20,840 schools were opened (but not necessarily newly built) in the period from 1995 to 2004, thus our matched data is at least a 15 percent sample.[9] The median cost of construction per square foot is about $120. Nationally, the median size of an elementary school is 75,000 square feet, while that of a high school is about 130,000. Finally, the cost data in the BEST dataset were normalized to 2005 constant dollars for comparison using the Turner Building Cost Index, a national construction cost index that factors labor rates and productivity, material prices, and the competitive condition of the marketplace, in addition to inflation.[10]

Regression Model on School Construction Costs

Regression Model

The public school construction regression models use the BEST data described above in addition to other selected variables. Very little modeling of school construction costs appears in the literature. Most notably, a few studies have done so with the goal of assessing the affect of prevailing wage laws on school construction costs. These models have measured hard costs as a function of size (square feet), year-built fixed effects, unemployment rate, and a few school physical characteristics for individual projects (e.g., Prus 1999; Azari-Rad et al. 2003). Our model builds off the model used by Azari-Rad et al. (2003) and incorporates a variety of additional data to assess the potential contributions of factors affecting cost that were identified in the focus groups and interviews. These data are both point-in-time and longitudinal. Additionally, our model measures cost per square foot in addition to total hard cost of the project, to gain additional insights into the broader set of factors that contribute to higher (or lower) costs.

To determine the factors that affect school construction costs nationally, we constructed a series of models, measuring costs, cost per square foot, state fixed effects, and year fixed-effects, based on the following:

---

[8] We conducted a distribution analysis of the schools in our sample and found it does not significantly under- or over-represent any one state compared to the entire population of schools, nor the newly added schools each year, as in the NCES data (differences were between -3 and 3 percent).

[9] When schools change names, or are subdivided into smaller schools, they are also recorded as new schools.

[10] The Turner Index does not adjust for regional cost variations.

$$\ln Cost_i = \omega_i + \beta_1 School\ Characteristics_i + X_2 Locality\ Characteristics_i + X_3 School\ Construction\ Activity_i + X_4 Regulatory\ Index\ (SCRI)_i + \varepsilon_i \quad (1)$$

Where School Characteristics are area (square feet), stories above/below grade, and school type (dummy variables for intermediate and high school where primary is the reference case); Locality Characteristics are population density (thousand people per square mile by zipcode), unemployment rate (zipcode), construction wage (county), school district enrollment (School District); School Construction Activity is represented by the natural log of the dollar value of all school construction work in a three year period around the data a bid was accepted; and the Regulatory Index (SCRI) is the School Construction Regulation Index, a variable between zero and 4 that represents the number of regulations a state has on the books. In this model α_i is the constant, or intercept, term. Three national models are used to measure year and state fixed effects. State models are used to measure the factors that affect school construction costs in individual states.

We use the natural log (ln) of each project's size, *Square Feet*, to measure cost savings from economies of scale. The variables, *Stories Above Grade, Bid Year*, and *School Type* (elementary, middle, or high schools) are all project characteristic data found in the McGraw-Hill data. *Population Density* captures the project's urban locale type from 2000 Census data and is reported per 1,000 residents. County level 2004 *Construction Wage* is used to capture differences in local wages. Zipcode level *Unemployment Rate* is used to capture local business cycles. *School District Enrollment* totals are used to capture differences in size of school districts managing school construction projects. To capture local and regional school construction activity at the time of each project, we use *School Construction Activity*, which is the total school construction (new and renovations/additions) dollars spent by all school districts (calculated from the McGraw-Hill data) within each state the year before, the year of, and the year, after the specified project.

Finally, to capture the effect of state school construction regulations on costs, we compiled data on state policy for four school construction regulations (state funding of school construction, school siting laws, prevailing wage laws for school construction, and school facility litigation). These four measures are added together for each state to create the state's *School Construction Regulation Index (SCRI);* a score of four indicating that the state has all four regulations, ranking high on the SCRI. The table below shows the distribution of states' SCRI scores.

SCRI	Number of States
0	2
1	10
2	14
3	16
4	9

Table A: Distribution of States on the School Construction Regulation Index

We initially included two other variables – *Time to Build* and *Median Household Income* – that we ended up excluding from the model. Focus group participants repeatedly noted that "time is money" and delays in construction add time and add costs as inflation rises. We tried to measure the effect of time to build using the contract date data found in the McGraw-Hill data, but were unable to find reliable national data on when each school opened.[11] There was some suggestion by focus group members and state policy contacts that districts in more affluent areas may spend more on school construction, partially as a function of having greater local funding. For this reason we initially included median

[11] The only way we could assess this length of time was to take the difference between the bid date in the McGraw-Hill data and the year the school appeared in the NCES database. What we found through this analysis was that the vast majority of schools had construction periods of less than one year, which is highly unlikely given the fact that the commonly-held assumption around the state is that schools multiple years to build. This suggests that schools may show up in NCES before they are officially open, thereby making these data inappropriate for this purpose

household income in our model, but found no correlation between school construction costs and household income, so we excluded this variable.

Regression Results

The results from the models are presented in Table B. The first three columns are the national models followed by the state models.[12] National Models 1B and 1C measure year and state fixed effects. T-ratios are below the coefficient for each variable.[13] The table reports the R2 of each model using both Cost (ln) and Cost per Square Foot (ln). The coefficients and t-ratios reported correspond to the dependent variable, Cost per Square Foot (ln).

Consistent with previous studies, a project's total cost is largely explained by project size. This is evident in that all models had a high adjusted R2 (ranging from 0.791-0.877) when the dependent variables is the cost (ln).[14] This outcome is expected given the fact that size is a strong predictor of construction cost. Size alone accounts for more than 60 percent of the project costs in our data. Measuring cost per square foot, however, yields different results with the variables having much lower explanatory power, ranging from 0.060 in California to .420 nationally.

Consistent with previous studies, we find that there are economies of scale in school construction. The negative coefficient of the log of project size, shown in the table, indicates that a doubling of the project size results in a decrease in the cost per square foot. This decrease ranges from 13 percent in California and Florida to 23 percent in Ohio.

Other project characteristics were also found to be significant in the model. We find that stories above and/or below grade add to the cost per square foot; about 1.4 to 3.4 percent on average nationally. However, for the comparison states, only in Arizona were these findings significant. As predicted, both intermediate schools (7.5 percent) and high schools (13.1 percent) were found to be more expensive in cost per square foot relative to elementary schools, nationally. The pattern held true for most of the states, particularly with regard to high schools. This is likely due to the more sophisticated spaces need to accommodate high school curricula, technology, and security measures.

The size of school districts (measured by enrollment) was not found to be very significant in predicting costs, nationally. However, when controlling for state and year fixed-effects in the national model, the significance of school districts size increased (1.790), but not to a statistically significant level. Still, the influence of district size on cost was minimal; less than a 1 percent increase per square foot when school district size was doubled. We predicted that the coefficient might be negative, showing that larger school districts were able to build schools cheaper, as some focus group participants had suggested. In no states was school district size significant at all, except for Texas. The fact that school district enrollment is not significant means that school district size is not associated with

[12] Due to low numbers of projects in some of the original seven comparison states, we were only able to run state models for Arizona, Florida, Ohio, and Texas.

[13] The coefficients denote the affect the specified independent variable has on the dependent variable. The t ratios denote the significance of a variable, with scores above 1.964 being significant and the higher the more significant.

[14] The adjusted R2 indicates that, for example, in National Model 1A, the variables account for about 81 percent of the variation seen in each of the project's costs

higher or lower project costs. That is, larger school districts do not appear able to build schools more cheaply than smaller districts.

Local factors were found to be highly significant in predicting school construction costs. Both population density and the unemployment rate were highly significant in predicting cost, but each only affects school construction cost per square foot nationally by very small amounts, 1.1 percent and .5 percent, respectively. Therefore, higher density urban locales tend to be higher in costs. The unemployment rate was less significant (3.080) than all of the other factors, nationally. In the comparison states, neither of these variables was found to be significant.

Construction industry conditions were found to predict school construction costs. Nationally, construction wage rate was highly significant (10.890), but had a low effect on cost per square foot (.6 percent). When controlling nationally for state and year fixed-effects, wage remained very significant but its effect went down even further (.2 percent). However, wage was not at all significant in any of the comparison state models and all of the coefficients were very low. The amount of school construction activity at the time of a project is significant in impacting costs. Nationally, doubling the amount being spent within the state on school construction results in an increase of 3.5 percent in cost per square foot. Therefore, as suggested by focus group participants, more construction activity increases costs because there is less competition for construction contracts. When controlling for state and year fixed-effects, the impact of construction activity increases to nearly 13 percent per square foot. School construction activity was only found to be significant in California and Ohio, but in all states the effect of increased activity on costs is comparable to the national findings. In Ohio, however, the impact was much larger (17.5 percent).

Project: Horace Mann Elementary School.
BFGC Architects Planners in association with Moore Rubel Yudell. Photo: John Edward Linden

Table B: Regression Results: Factors Affecting School Construction Costs

Variable	Model 1A National	Model 1B National State fixed effects	Model 1C National Year fixed effects	Model 2 Arizona SCRI score=3	Model 3 California SCRI score=4	Model 4 Florida SCRI score=3	Model 5 Ohio SCRI score=3	Model 6 Texas SCRI score=3
Square feet (ln)	**-0.172**	**-0.154**	**-0.155**	**-0.185**	**-0.127**	**-0.130**	**-0.231**	**-0.150**
	-17.990	-16.490	-16.590	-4.435	-4.380	-4.156	-5.067	-6.220
Stories Above Grade	**0.034**	**0.025**	**0.024**	***-0.003***	***0.040***	***-0.017***	***0.085***	***0.024***
	4.310	3.310	3.190	*-0.040*	*1.227*	*-0.355*	*1.682*	*0.779*
Stories Below Grade	**0.191**	**0.145**	**0.143**	**1.463**	***0.119***	***n/a***	***-0.179***	***0.114***
	4.560	3.720	3.660	3.719	*0.849*		*-1.152*	*0.587*
Intermediate School	**0.075**	**0.062**	**0.063**	***0.191***	***0.060***	***0.058***	***0.054***	**0.102**
	4.980	4.430	4.510	*1.939*	*1.189*	*0.940*	*0.762*	2.690
High School	**0.131**	**0.132**	**0.132**	**0.348**	**0.115**	**0.217**	***0.191***	**0.177**
	6.910	7.320	7.350	4.819	2.200	2.866	*1.886*	3.515
School District Enrollment (ln)	***0.001***	***0.008***	***0.008***	***-0.010***	***0.005***	***0.002***	***0.029***	***0.021***
	0.310	*1.730*	*1.790*	*-0.473*	*0.377*	*0.082*	*1.577*	*1.959*
Population Density, 2000 (/1,000) (Zipcode)	**0.011**	**0.009**	**0.009**	***0.005***	***-0.001***	***0.009***	***0.010***	***-0.001***
	8.920	7.160	7.260	*0.352*	*-0.276*	*0.747*	*0.617*	*-0.118*
Unemployment Rate, 2000 (Zipcode)	**0.005**	***0.003***	***0.002***	***0.003***	***0.000***	***-0.004***	***0.011***	***-0.008***
	3.080	*1.720*	*1.570*	*0.492*	*-0.039*	*-0.380*	*1.246*	*-1.738*
Construction Wage, 2004 (County)	**0.006**	**0.002**	**0.002**	***0.003***	***0.002***	***0.006***	***0.004***	***0.002***
	10.890	4.260	4.170	*0.588*	*0.720*	*1.379*	*1.066*	*1.318*
School Construction Activity (ln)	**0.035**	**0.098**	**0.129**	***0.090***	***0.078***	**0.093**	**0.175**	***0.066***
	4.800	6.540	3.900	*0.892*	*1.025*	2.900	3.119	*1.615*
School Construction Regulation Index (SCRI)	**0.062**	**0.129**	**0.124**					
	7.970	2.680	2.530					
N	**2624**	**2624**	**2624**	**114**	**355**	**165**	**84**	**319**
Adjusted R^2 (Dependent Variable = Cost/SF ln)	**0.310**	**0.410**	**0.420**	**0.228**	**0.060**	**0.100**	**0.347**	**0.108**
Adjusted R^2 (Dependent Variable = Cost ln)	**0.805**	**0.835**	**0.807**	**0.841**	**0.791**	**0.861**	**0.888**	**0.862**

NOTE: T ratios are below the coefficients for each variable. All coefficients are for model with Cost per Square Foot (ln) as the dependent variable. Italicized outputs indicate that the variable was not found to be significant to the .05 level in the model

Table C: Regression Results: SCRI Components Affect on School Construction Costs

SCRI Components	National
State Funds School Construction	0.013
	(0.745)
State has School Sitting Laws	0.12
	(8.797)
State has Prevailing Wage Law for School Construction	0.096
	(6.721)
State has had Successful School Facility Litigation	-0.025
	(-1.797)

Note: T ratios are below the coefficients for each variable. Outputs in the table above are for the national model with Cost per Square Foot (ln) as the dependent variable.

The affect of state regulations on school construction costs was measured with the School Construction Regulation Index (SCRI). The SCRI is highly significant in the national model; each additional point in a state's SCRI score raises school construction cost per square foot by 6.2 percent. However, when controlling for state and year fixed-effects, the influence on costs doubles to nearly 13 percent. This suggests that the impact of state regulations was being masked by other variations between states and may have more impact than indicated by National Model 1A.

To further investigate the effect of the individual components within the SCRI, we put each one into the national model (Model 1A) separately. Table B shows the outputs on these four variables. *Successful School Facility Litigation* and *Funds School Construction* were not found to be significant in impacting costs. We thought that when a state funds school construction, it may trigger a larger set of regulations a that project must adhere to, and would therefore be significant in our model and way to gauge the overall impact of state involvement in school construction. Rather, what we found was that the specific policies of state school siting laws and prevailing wage were significant. If a state has school siting laws, which may limit site selection options for school districts, costs tend to increase by 12 percent per square foot. Similarly, the presence of a state prevailing wage law (PWL) specific for school construction was found to be significant in increasing costs by nearly 10 percent per square foot. Our findings on the effect of PWL on school construction accepted bid costs falls much less than the effect found by Fraundorf et al (1984) (26-38 percent) and a bit more than found by Azari-Rad et al. (2003) (0.8-2.5 percent). As Azari-Rad et al. (2003) note, further research is needed on the effects of PWL. One central concern is that using accepted bid price as a measure of project cost (which is what the McGraw-Hill data represent) may be inappropriate to assess the effect of PWLs on total project cost. This data limitation does not account for the prevalence or absence of change orders after a construction bid has been accepted, which can greatly affect total project cost. Some proponents of PWLs assert that their presence increases workmanship and decreases change orders.

Comparing the state models reveals that no two states had the same set of significant variables. That is, no two states were identical in terms of the set of factors that were significant in predicting the cost per square foot of the schools built in that state between

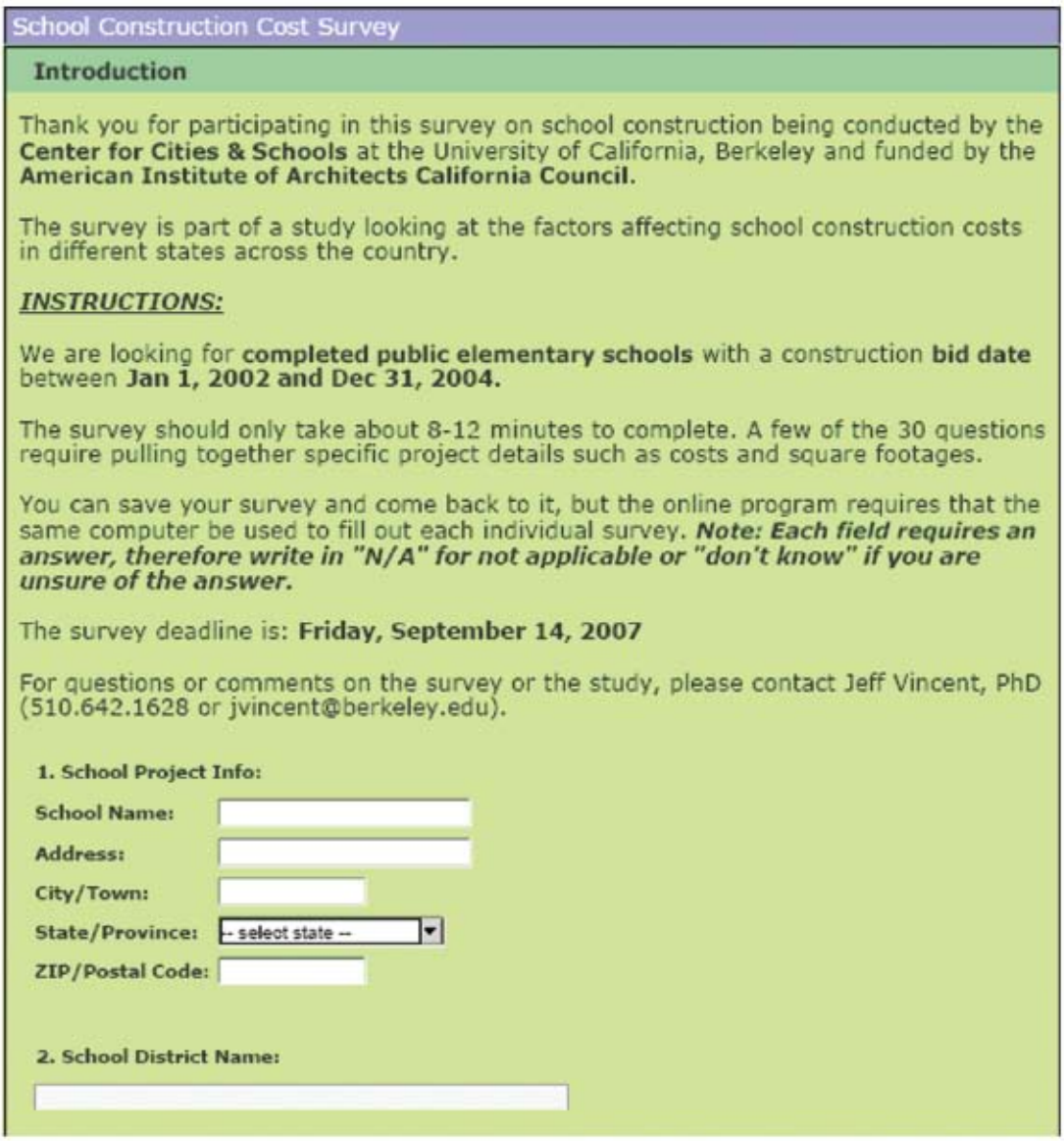
1995 and 2004. For all states, project size was significant and high schools were more expensive relative to elementary schools and middle schools. In California, only one other variable was significant, *School Construction Activity*. Doubling school construction activity within the state increases cost per square foot by 9.3 percent, an influence higher than found in Arizona (9 percent), Florida (7.8 percent), and Texas (6.6 percent), but lower than seen in Ohio (17.5 percent). California appears to benefit the least from economies of scale when increasing school size, because it had the lowest coefficient (-0.127).

However, the state models have much less robust findings than the national models. Because the R2's are low, the models' explanatory power is low. Still, what these findings suggest is that school construction costs may have low predictability, and may be highly dependent on more detailed project characteristics and local practices guiding planning, design, and construction. They further suggest that costs become less predictable when more projects are analyzed. The lowest R2's were found in the two states where the most schools were built and the most money was spent overall in school construction, California (0.060) and Texas (0.108). These two states also had the highest number of sample school projects in the model (355 and 319, respectively). What these findings suggest is that costs per square foot can vary widely within states and the more schools that are analyzed, the more variation there tends to be, possibly because there is a wide variation in the size and characteristics that school districts build.

For California, school construction costs may be less predictable than they are nationally and in these four comparison states. Further, our models point to at least three possibilities for California: 1) school construction costs in the state may vary widely by region and/or over time, 2) the state's school districts are making local decisions to build a wide variety of school types and designs that may have a multitude of cost implications, and 3) the state regulations on school construction may affect projects differently depending on local circumstances, thus affecting construction costs differently.

APPENDIX 5:

SAMPLE SURVEY INSTRUMENT FOR DETAILED PROJECT-LEVEL ANALYSIS



School Construction Cost Survey

Introduction

Thank you for participating in this survey on school construction being conducted by the **Center for Cities & Schools** at the University of California, Berkeley and funded by the **American Institute of Architects California Council.**

The survey is part of a study looking at the factors affecting school construction costs in different states across the country.

INSTRUCTIONS:

We are looking for **completed public elementary schools** with a construction **bid date** between **Jan 1, 2002 and Dec 31, 2004.**

The survey should only take about 8-12 minutes to complete. A few of the 30 questions require pulling together specific project details such as costs and square footages.

You can save your survey and come back to it, but the online program requires that the same computer be used to fill out each individual survey. ***Note: Each field requires an answer, therefore write in "N/A" for not applicable or "don't know" if you are unsure of the answer.***

The survey deadline is: **Friday, September 14, 2007**

For questions or comments on the survey or the study, please contact Jeff Vincent, PhD (510.642.1628 or jvincent@berkeley.edu).

1. School Project Info:

School Name:

Address:

City/Town:

State/Province: -- select state --

ZIP/Postal Code:

2. School District Name:

3. Architect/Project Contact Info:

Name:

email:

Firm/Company

City/Town:

Zipcode:

Phone:

4. Please provide the date (mm/yyyy) for the following:

Construction bid date

School Occupancy date

5. What type of project delivery method was used for this project?

- ◯ Design/Bid/Build
- ◯ Construction Management (CM)
- ◯ Construction Management at Risk (CM@Risk)
- ◯ Design/Build
- ◯ Other

If other, please specify

6. For this school project, did you reuse/modify a previous design or draw up entirely new plans?

- ◯ Reused/modified previous design
- ◯ Drew up entirely new design

7. What grade levels does the school serve?

- ◯ K-2
- ◯ K-5
- ◯ K-6
- ◯ K-8
- ◯ Other

If other, please specify

8. What is the enrollment CAPACITY of this school?

9. Does this school district have a staff architect and/or dedicated facility planning staff with facilities planning experience/expertise?

- ◯ Yes
- ◯ No

10. What is the Gross Site Acreage?

11. Please provide the square footages for the following uses:

Outdoor turf and field areas:

Outdoor hardcourts:

Apparatus areas:

Parking and drop-off areas:

12. How many parking spaces are provided on site?

13. Please provide the total building square footages...

Excluding exterior covered spaces:

Including exterior covered spaces:

14. Please provide the square footages for the following spaces:

Kindergarten Classroom(s):

Classrooms/Teaching Stations:

Portables/Relocatables:

Administrative/Support:

Kitchen/Multipurpose/Gymnasium:

Library/Media:

Educational Support (special edu, resource rooms, computer/science labs):

Bathrooms:

Indoor corridors/circulation:

Covered exterior spaces (e.g., covered walkways):

Custodial/Storage/Electrical/Mechanical:

Other:

15. How many of the following does this school have?

Kindergarten classroom(s):

Classrooms/Teaching station (s):

Project Characteristics

16. Number of buildings at this school:

17. Number of stories above grade:

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ More than 3

18. Number of stories below grade:

- ◯ None
- ◯ 1
- ◯ More than 1

19. Building frame type(s): (check all that apply)

- [ ] Steel frame with masonry walls (load bearing or infill)
- [ ] Steel frame (light weight walls)
- [ ] Pre engineered metal (with or w/o masonry infill walls)
- [ ] Conventional wood frame (to include trusses and panelized walls)
- [ ] Wood glue-laminated or heavy timber
- [ ] Concrete poured in place
- [ ] Concrete precast (including concrete planks)
- [ ] Concrete tilt-up
- [ ] Modular/portable
- [ ] Other

If other, please specify

20. What type of kitchen does this school have? (Check all that apply)

- [ ] Warming kitchen
- [ ] Full service kitchen
- [ ] Central kitchen serving other sites
- [ ] Food kiosks and/or carts run by outside vendors
- [ ] No kitchen

Project Funding

21. Please provide the project costs:

Site purchase cost:

Site preparation cost (e.g., remediation, clean up) (if not included in construction bid):

Construction bid price (materials and labor):

Construction final cost (materials and labor):

Off-site improvements (e.g., roads, utility extensions):

22. For the "Site preparation cost" and "Off-site improvements" cost you entered above, please list the expenses that are included in these costs:

Site preparation cost:

Off-site improvements:

23. Did the state contribute funding to this project?

- ( ) Don't Know
- ( ) No
- ( ) Yes

If yes, how much (or what percentage of cost)?

24. Did any other entity provide project funding besides the state and/or the school district? (e.g., other local education association, county, joint use partner, etc.)

- ◯ Don't know
- ◯ No
- ◯ Yes

If yes, who contributed and how much?

State Approval Process

25. On a scale of 1 to 4, how would you rate the complexity of the STATE (NOT LOCAL) school construction regulations and/or processes in this school's state?

	1 - Not at all complex	2 - Somewhat complex	3 - Moderately complex	4 - Highly complex	Don't know
State Regulations	◯	◯	◯	◯	◯

26. To what degree would you ESTIMATE that STATE (NOT LOCAL) regulations and/or processes affected the cost of this school?

- ◯ Significantly decreased cost
- ◯ Somewhat decreased cost
- ◯ Did not affect cost
- ◯ Somewhat increased cost
- ◯ Significantly increased cost
- ◯ Don't know

Local Design Process

27. On a scale of 1 to 4, to what degree would you say that LOCAL (NOT STATE) politics and/or practices affected the process?

	1 - Did not affect process	2 - Somewhat affected process	3 - Moderately affected process	4 - Significantly affected process	Don't know
Local Politics and Practices	◯	◯	◯	◯	◯

28. To what degree would you ESTIMATE that LOCAL (NOT STATE) politics and/or practices affected the cost of this school?

- ◯ Significantly decreased cost
- ◯ Somewhat decreased cost
- ◯ Did not affect cost
- ◯ Somewhat increased cost
- ◯ Significantly increased cost
- ◯ Don't know