# First Cost Reduction Strategies in School Construction

Schools are an expensive type of building to produce, but there are ways to make the process less expensive and higher quality while still getting the 21st Century classrooms that are needed. Various techniques are described below.

**Pre-Checked or Re-useable Plans.** The concept is well understood by most: items that are "custom" are typically more expensive than similar items purchased "off the rack". The same logic holds true whether you are considering a skirt or a school, but when it comes to school designs, there are additional factors at play that help the use of standardized plans save even more. The use of "re-useable" plans is neither a new idea nor one foreign to Prop 39. Ed Code Section 15278, which governs the Bond Oversight Committees set up by Prop 39 specifically calls on those BOCs to see whether the District is taking advantage of the savings associated with re-useable plans. First however, the cost structure of professional services for construction projects should be addressed.

There are three compensation models for the Architects, Engineers, Construction Managers and other professionals to which Districts usually turn to help build facilities: hourly, lump sum, and percentage[1]. Hourly and lump sum are easily understood but rarely used in schools. Partly this is a function of tradition, partly it is a function of trying to understand the scope of work in advance that will be needed, and partly it is due to the fact that it is fairly lucrative for the professionals involved, so the pressure to change is minimal.

The problem is that the Percentage of Construction Cost method sets up a very basic conflict of interest in that the designer of the project is penalized if the cost of the project goes down, and is incentivized if the cost of the project goes up.

> "Percentage of construction cost" is a method which has been used extensively in the past for establishing compensation for professional services. Compensation based on this method is not necessarily best suited to professional encouragement and reward, since it penalizes rather than rewards the Architect for reducing construction costs through economical design.[2]"

Any of the three compensation models can be used with a project, whether it is a re-use, a Pre-checked plan, or a design started from a clean sheet of vellum, but there are special opportunities that occur when combining the less-used models with Re-use or Pre-check.

Re-Use. What may be surprising to many is that in most cases the District that paid for a school design does not actually own the rights to that design, the Architect that was in charge of the design team does.[3] Because of this, the Architect owns the rights to build a second, third, or forty-third copy of a plan, not the District that paid for it the first time[4].

---

[1] http://www.dennisglynn.com/files/Compensation_Methods_for_Architectural_Services.pdf

[2] Ibid

[3] http://corporate.findlaw.com/intellectual-property/llp-owner-vs-architect-who-owns-the-design.html

[4] For any designs that the District *is* having drawn from a blank sheet, care should be taken that these increasingly valuable rights are not given away. A District paying for an entirely new set of plans should either have rights to

A Re-use plan has several advantages. The plans still go to the Division of the State Architect (DSA) to go through a rigorous review process, but because they have already been recently reviewed and back-checked, the number of new items to be addressed should be quite low. Additionally, the review process at DSA can be significantly faster when the previously approved plans and the identical new plans are available to be reviewed side by side. This in turn can give the design team an important benchmark in terms of pricing a lump-sum or hourly/not to exceed offer for their design services because they can have a much higher confidence level in how many hours a Re-use project will take than they do in how many hours a new set of plans will take to get through the DSA process.

Re-used plans, either ones built in the District or ones built in a District a hundred miles away can often be offered by architects to Districts at a deep discount. For the design team, getting paid multiple times for a design instead of just once is a potentially beneficial business decision. Because of this ability to be drawn once but sold multiple times, the firms that engage in this process can design beautiful, functional, long lasting instructional spaces that are prepared for 21st century educational needs, but offer those plans at a discounted rate and still come out ahead.

A Re-used school design that has recently been built has other advantages as well. In addition to being available at a discount and being much faster to deploy, Re-used plans also save money by avoiding Change orders. Change orders are common in school projects, and in some cases end up being 30% or more of the final cost of the school. Re-used plans avoid Change orders in several different ways. First, because the plans have been built one or several times before, the inevitable "kinks" that occur in building any complex structure the first time will have already been worked out. In addition to reducing costs, this "already been built" aspect means that construction quality is typically higher as well. Second, in order to keep the DSA process as smooth as possible, as few changes to the plans as is possible are preferred. This acts to temper the desire of many parties to continually change the plans, with the result of additional cost savings.

A school that has recently been built can also be visited by school leaders, staff, and even kids to get a feel for what the final product would look like. Lastly, while local variations in prevailing wages rates and geotechnical conditions are certainly variables, the District can know with a fairly high degree of certainty what the cost will be to build a given school design. This allows different complete designs to be evaluated against each other for aesthetics, functionality, and price.

Pre-Checked (PC) plans are similar, but slightly different concept, and are already available through DSA. Some PC plans are for things such as portables, or shade structures, while others are for full permanent structures. These plans go through a rigorous pre-inspection process, and then are offer to potential building owners. As opposed to the typical year-long design and DSA review process typical of custom plans, Pre-Checked plans can be approved in a remarkably short time, in some cases in a single "over the

---

use it at a substantial discount (preferably lump-sum) in the future or a portion of the royalties stemming from its subsequent use in a complete or substantially complete manner in other jurisdictions

counter" meeting with DSA where the only items being looked at are the site adaptations. A few examples of a DSA approved PC school permanent structure plans can be found here[5] and here[6].

Pre-Checked plans are even faster than Re-used plans in getting through DSA review. Second, the DSA process only allows minor changes to Pre-Checked plans. This acts to temper the desire for changes even further than with Re-used plans, with the result of additional cost savings.

Use of both Re-used and Pre-Checked plans can also help reduce construction costs in another way: contractor experience. Bids for contracting work, including the quantities of materials to be used and labor involved in the construction are based upon estimation. Estimators look at the plans, and although they are typically looking at a set of plans the first time, they can apply their own experience with general construction principles to arrive at an anticipated cost. This estimated cost, along with a necessary safety factor and a profit margin result in a contractor's final bid. After a contractor has finished building a particular design however, this situation is considerably different. Having completed construction of a given design, the builder and their team will know it much better than they ever could simply by looking at the plans. This allows contractors and subs that have built a given design to be much more aggressive in future bidding for the same plans, further helping to reduce the price.

Moving away from "Percentage of Cost" and towards Re-Used/PC plan sets are thus complimentary, but not the only ways in that the current delivery model can be modified. As mentioned above, currently Architects and the design team as a whole have a *disincentive* to reduce costs and an economic *incentive* to increase costs. There are places in public works contracting however where this situation is reversed. CalTrans has had a program for a number of years whereby if a contractor or Design team member is able to come up with a cost saving method, they get a portion of the savings[7]. This program, called the Cost Reduction Incentive Program, or CRIP, has been wildly successful. Not only does it save money, but it encourages contractors to be constantly aware of new techniques and materials that can reduce costs, savings that then are incorporated into all future CalTrans projects. The Federal EPA has also had the similar Construction Incentive (CI) program since 1978.

> The CI clause offers a mechanism by which construction contractors can be motivated to apply their construction expertise to reduce contract costs. This positive motivation is achieved through substantial monetary incentives for submitting a CICP that reduces a facility's construction costs, without compromising its reliability or performance characteristics[8].

Overall, Re-Used or PC plans offer tremendous benefits to a District in terms of speed, quality, and cost, particularly when paired with available but under-utilized compensation models for design costs. Most importantly though, both the Re-use and PC approaches as well as the Hourly and Lump Sum compensation models offer reasonable and preferable ways to deal with the current conflict of interest

---

[5] http://www.projectfrog.com/projects/featured_projects/jacoby_creek_school/
[6] http://www.projectfrog.com/projects/featured_projects/lincoln_elementary_cdc/
[7] http://www.dot.ca.gov/hq/esc/osfp/osfp-manual/manual-sections/5-03.pdf
[8] http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=2000GHCP.TXT

inherent in "Percentage of Contract Cost" fee arrangements. Examples of public works contract language that contains language for Lump Sum architectural fees are available here[9] and here[10].

**Cooperative/Leveraged Purchasing Arrangements.** This is again an idea that is well understood in our regular lives but rarely seen in school construction: Wal-Mart gets better prices on rubber ducks than does the small shop around the corner because of the volume at which they buy. Multiple programs around California allow Districts to receive substantial discounts on the equipment and materials that go into schools by employing group purchasing power, and can result in substantial reductions in cost.

These mechanisms still include competitive bidding, but it happens at a higher level. Organizations such as the California Department of General Services (through the CMAS Program[11]) or the Foundation for California Community Colleges (through the CollegeBuys[12] and SchoolBuys programs) actually conduct highly competitive bidding processes, the end result of which are Master Purchase Agreements. Once an MPA is in place, local governments such as School District can purchase the materials or equipment through the MPA, often for savings of 50% or more.

Incidentally, use of Re-Used or Pre-Checked plans makes this system even more cost effective, because as the number of individual item purchases (from light switches to HVAC units) going through the MPA goes up, the unit price almost always goes down.

Beyond simple first cost, many MPAs include substantial additional elements in their terms that further increase value, while still keeping cost low. For example, instead of being held to the warranty terms that a given manufacturer wishes to offer, MPAs will typically have warranty terms that are not only much more favorable to Districts in the long term than those typical for "off the shelf" projects, but are also vested at the manufacturer level instead of at the local contractor level. Because these MPAs are for multiple Districts over multiple years, the originators of these MPAs can devote the staff time needed to thoroughly research the terms unique to each class off equipment or material.

Use of Cooperative/Leveraged Purchasing offers Districts the ability to leverage the economies of scale inherent in combining the buying power of a group, and can lead to substantial reductions in both construction and operating costs

**Contractor or District purchasing.** The traditional method of construction delivery is called "Contractor Furnished/Contractor Installed" (CFCI). In this process the subcontractor typically buys the materials or equipment, and they sell that to the general contractor along with a mark-up on both labor and materials. The general contractor in turn marks up the costs from the sub-contractors and passes that on to the District, with the cost being even further inflated by the fees typically applied by Architects, Construction Managers, etc. The alternative method is Owner Furnished/Contractor Installed (OFCI),

---

[9] http://architecture.mt.gov/content/arra/docs/Standard_Form_of_Agreement_Between_Owner_AE_ARRA.
[10] http://www.usg.edu/building_project_procedures/chapter3/App3G.doc
[11] http://www.dgs.ca.gov/pd/programs/leveraged/cmas.aspx
[12] http://www.foundationccc.org/Default.aspx?tabid=484

where the District purchases the items directly, and the contractors simply provide installation services. OFCI is not uncommon, even in the Sacramento area. Forexample, RT is currently using this method in conjuction with the line extension to Consumnes River College where they are purchasing the track directly[13]

Both methods can be used with cooperative purchasing mechanisms, and both have advantages. Under traditional CFCI, there is no question as to responsibility for when the equipment or materials arrive on the job site, a critical issue given the tight construction timelines typical in school construction. Additionally, CFCI provides a clear tie to longstanding state requirements surrounding warranty. On the other hand, OFCI provides substantial cost reductions.

One thing to keep in mind is that other changes in the contracting process can make this less disruptive than it would have been in previous times. For example, it is not uncommon in California public works contract documents to specify delivery dates[14] and who is responsible for coordination[15]. Additionally, through the use of Cooperative/Leveraged purchasing mechanisms, not only can warranty issues be resolved, but more favorable terms can be obtained.

**Life Cycle Cost Analysis.** The nature of the split between bond fund expenditures and operating funds gives rise to a well understood tension. Bond funds are only to be used for capital improvements, while operating funds are only to be used for operations. The problem is that the amount of Bond funds spent can impact future operating funds. Due to political and other pressures, in many cases Operating funds are given a higher priority than Bond funds. At the extreme end, this can result in perverse outcomes.

For example, imagine a Direct Digital Control system for an elementary school. Compared to a more basic alternative, this system has an incremental cost of $350,000. The system is able to save an average of $10,000 per year over its life, and has an expected useful life of 15 years. Does this marginal expenditure make sense?

To a normal business, the answer would clearly be no. Even without taking into account the bond interest that would accrue on the $350k, the DDC system would only give $150K in return. More importantly, the total cost of the system to taxpayers of a system could be over $700,000 including interest, while the net present value of the stream of savings could be under $95,000. However, to a District with severe operating budget pressures, the thought of a revenue stream that rises from $8,100 per annum to over $12,000 per annum could be very appealing when considering that the first cost to the operating budget is zero.

What this fails to recognize though is that actions like this, when discovered, have a profoundly negative and corrosive effect on the faith that voters have in the fiscal rectitude of the District. When instances

---

[13] http://www.sacta.org/pdf/ITOC/052914/ITOC052914-04AT.pdf. (page 23)

[14] http://www.countyofsb.org/uploadedFiles/General_Services/Capital_Projects/8551/ProjectManual/Section%2001640%20-%20Owner%20Furnished%20Contractor%20Installed%20(OFCI)%20Items%20Ver%205.6%20-%20June,%202005.doc.

[15] https://www.calstate.edu/cpdc/cm/Division_One/Detailed_Format/01640_Owner-Furnished_Products.doc.

like this are brought to the attention of the media, particularly during future campaigns, the impacts can easily sway the vote against future bond measures for years to come. Ultimately, not only is this wasteful of limited capital project funds, any short term benefit to the operating budget is more than offset by long term harm to future generations of students.

The way to deal with this is straightforward: life cycle cost analysis. From the standpoint of the Taxpayer's Association, this does not need to show a significantly positive return on investment, nor does it need to discount future avoided cost cash flows. Instead, a simple analysis that shows that incremental expenditures, including the time cost of those dollars will be less than the total avoided operational costs over the federally recognized Expected Useful Life of the equipment is sufficient. This analysis should be completed by a competent professional, all calculations and assumptions should be shown, and the results attested to by a licensed Engineer or Architect in a signed and stamped document. This analysis, in this format, ensures that they are placing their Errors and Omissions insurance behind the calculator on this form.

For more information regarding our extensive Debt Tool Kit, please go to:

*http://kern.org/finance/district-advisory-services/tools-resources/*

For more information regarding Kerntax:

Kern County Taxpayers Association
Michael Turipseed, Executive Director
331 Truxtun Ave
Bakersfield. CA – 93301
Ph: (661) 322-2973