Don't go out to bid in May, Dec '96

APPROVAL OF CONSENT CALENDAR, ACTION ITEMS (continued)	Placed on Agenda by	Disposition	Page(s)
9. Approval of Purchases in Excess of $15,000	C.E.James 644-6674		39-41
10. Approval of **Resolution No. 7109:** Authorization (Pursuant to Title 5, Section 80027) to approve credentialed teachers to be assigned in single subject classes outside of their major or minor areas of preparation	F.Brunetti 644-6150		42-43
11. Approval of **Resolution No. 7110:** Approval of Additional Child Development Funds for Materials and Supplies from the State Department of Education to the Early Childhood Education Department	N.Spaeth 644-6257		44-51
12. Approval of **Resolution NO. 7111:** Approval of Authorization of Signatures	J.McLaughlin 644-6147		52
13. Approval of BSEP funds to Berkeley Adult School, and Annual Plan for BSEP School Enrichment Program monies (Fund 5) for FY 1997	M.Thyberg 644-8717		53-58
APPROVAL OF ACTION ITEMS	Placed on Agenda by	Disposition	Page(s)
8:30 p.m. 14. Acceptance of Citizens Construction Advisory Committee Yearly Report	S.Wood 644-6526 L.Jones 644-4594		59-93
15. Approval to set January 22, 1997 as date to consider the adoption of the Final Environmental Impact Report (FEIR), possible adoption of overriding considerations and, Thousand Oaks Elementary School Project Approval	L.Jones 644-4594		94
16. Approval of Special Education Addendum to the Policy on **Pupil Discipline: Suspension and Expulsion**	R.Tryon 644-6315		95-100
17. Approval of First Interim Report, FY 1997 and Discussion of Budget Review Process for FY 1998	G.Sirogiannis 644-8911		101-132
18. Approval of the Expenditure of one-time money by School Sites	J.McLaughlin 644-6147		133-153
19. Approval of a plan to proceed with a Loss Portfolio Transfer of existing Self-insured Workers' Compensation claims to American Home Assurance through a financed purchase to be paid over three (3) years	C.E.James 644-6674		154

Berkeley Unified School District

Date: December 9, 1996

To: Board of Education

From: Jack McLaughlin, Superintendent

Subject: Citizens Construction Advisory Committee Yearly Report

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RECOMMENDATION

We recommend that the Board accept the Yearly Report from the Citizens Construction Program Advisory Committee. Further, we recommend that the Board consider the financial implications of the Committee's recommendations along with its other priorities in the Facilities Plan.

SUMMARY AND DISCUSSION

The Citizens Advisory Committee has been in existence for two years. The Committee meets on the fourth Thursday of the month in the BSEP Conference Room. There have been additional sub-committee meetings in defined subject areas.

The attached report is the second annual report of the Committee.

FINANCIAL IMPLICATIONS

The financial implications of the recommendations have not yet been analyzed.

Prepared By:

Lew Jones, Manager of Facilities Planning

Reviewed By:

Steve Wood, Director of Facilities

Reviewed By:

Catherine E. James, Associate Superintendent of Business

Citizens Construction Program Advisory Committee Annual Report to the BUSD and the Citizens of Berkeley

PARTICIPATING MEMBERS:

Vic Kley, Chair	Doug Abadie	Agnes Farris
Dorothy Lindheim	Corvin Tademy	Bruce Wicinas

INTRODUCTION

The Citizens Construction Program Advisory Committee was formed by the Berkeley School Board to assist their oversight of the extensive construction and rehabilitation activities of the District.

The Citizens Construction Program Advisory Committee meets on the fourth Thursday of the month in the BSEP Conference Room at 2134 Martin Luther King Jr. Way from 7:30 PM until 9:00 PM. Meetings are open to the public.

The Committee meets to address issues raised by the public and to review the progress of construction activities through reports from the District and from sub-committee investigations.

The Committee makes this annual report to the Board, the Citizens, and the Superintendent in December.

The Committee is presenting this report focussed on five areas of concern: Energy Policy Implementation, Computer Control Systems, Budget Monitoring, Public Information and Moving.

The Board is encouraged to appoint members who have the time to effectively contribute to the responsibilities of the Committee. Board Members are urged not to appoint members who have missed more than 10 meetings.

We hope that the Board will consider the recommendations contained in this report as it reviews its annual Facilities Plan. We recognize that some of the recommendations may have cost implications.

FOCUS IN 1997

The Committee will continue to monitor and supplement the five areas of concern we reported out this year. In addition, we will pursue any new issues as they are presented by the School Directors and the public along with the following topics:

Review in depth the circumstances and elements that have and are contributing to Construction Cost Inflation across the District's construction efforts.

Examine and report on the Emergency Services and Resources in new and existing schools with special emphasis on earthquake and urban fire situations.

Energy, Environmental, Construction Documents, Seismic Safety

The Sub-Committee has focussed on the implementation of the District policies concerning Indoor Air Quality and Energy. In this year the primary focus has been the energy policy.

Policy Statement

Design for new and substantially renovated buildings shall be demonstrated to exceed State energy code (Title 24) by a minimum of 35%.

Sub-Committee Objectives

It was the Sub-Committee's goal to review the analysis, options and decisions made for three sites (Cragmont, Malcolm X and Longfellow) and make a detailed report on energy policy implementation. These three sites include one entirely new building (Cragmont), one entire renovation (Malcolm X) and one which includes both types of construction (Longfellow).

Sub-Committee Findings

CRAGMONT ELEMENTARY SCHOOL

The Sub-Committee attended a life cycle cost alternatives workshop on February 20, 1996. The design team, led by Elbasani and Logan Architects (ELS), presented a comprehensive energy feasibility study and energy conservation recommendations. The team demonstrated a clear understanding of the goals outlined in the Policy and addressed the staff's concerns regarding maintenance and operational needs. Through the efforts of the entire design team, it is estimated that Cragmont will exceed Title 24 energy standards by an estimated 47%. A summary of energy recommendations and life cycle cost analysis from the design team are shown in Attachment 1. Additional detailed information regarding the life cycle cost workshop is included as Appendix 1.

MALCOLM X ELEMENTARY SCHOOL

The Sub-Committee attended a life cycle cost alternatives workshop on March 13, 1996. The design team, led by VBN Architects, presented an informative update to the schematic design and types of material to be used in the seismic upgrade. However, the presentation of the energy policy implementation was not clear and there seemed to be a lack of understanding of the policy goals. Some of the life cycle cost analysis was not presented; some was not presented in a concise format, making it difficult for staff to make effective decisions. The design team was asked to resubmit their recommendations to correct the deficiencies. The revised report addressed some of the concerns, but additional information comparing the base case (Title 24) versus the proposed energy savings

component would be helpful. Some additional information is required prior to formulating an opinion of whether this design team has met the objectives of the Policy. The report from the workshop and the revised analysis is included as Appendix 2.

LONGFELLOW MIDDLE SCHOOL

The life cycle workshop has not been held. When the meeting has taken place and the information finalized, either this report will be updated or the information will be added to next year's report.

Summary

Implementation of the Energy Design Standards Policy began with the three projects referenced above. The staff has demonstrated their commitment to achieve the goals outlined in the Policy during the workshops. As with any new policy, refinement and an evaluation review can enhance the effectiveness of the program. To this end, the Committee would like to offer the following suggestions:

Recommendation: It is recommended that the staff should conduct a pre-meeting with the principals of the design team prior to the commencement of the design to review the Energy Policy and the expectations of the Workshop.

Recommendation: It is recommended that the staff should develop a summary matrix to be used by all design teams for recommended energy saving components.

Recommendation: It is recommended that the designers should submit a final report which shall be made available to the public.

Next Steps

In the next year the Sub-Committee will review the tracking mechanism employed by the District to ensure that the planned energy savings become realized savings. The Sub-Committee will also begin review of the Indoor Air Quality (IAQ) Policy.

Computer Control Systems

Summary

The BUSD has had a goal for the last three years to implement Computer Control Systems to track and generate reports for the management of ongoing construction and cost associated with all construction and maintenance activities. If we succeed in getting these tools in place, the information flow will be facilitated. This goal has been partially funded with Measure A funds. Two principal software packages have been adopted to these ends, and the principal construction planning firm, Vanir/Don Todd, has adapted the packages to meet the District's needs.

Three schools have had their specific construction plans inputted into these packages - Thousand Oaks, Columbus and Cragmont. In addition, Vanir/Don Todd has built and is currently testing a cost reporting package which will link the Facilities Department under Lew Jones, Manager of Facilities Planning, to the Accounting Department under the direction of Associate Superintendent of Business Cathy James. At this time, neither package is being used by the District for ongoing planning and cost analysis.

Recommendation: It is recommended that the Board approve including in the Facilities Planning staff at least one individual who has the experience and operational knowledge to support the software, and interface with construction providers and with the computer system analysts of the Accounting Department.

Software Packages

The two packages adopted by the District are Primavera Project Planner 5.0 and Microsoft Access.

Primavera Project Planner 5.0 is a DOS based application extensively used by the construction industry. It has a relatively simple user interface and training, upgrades and ongoing support are readily available.

Microsoft Access is a Windows based simple report generation package which has been scripted by Vanir/Don Todd under contract to the District to generate cost analysis reports through a direct computer link to the main accounting network. The specific reports are strongly supported by Vanir with a dedicated programmer. The District will obtain the source code (or source script) for all the custom work done by Vanir.

Staff

The Facilities Planning staff (the manager and two staffers) have been trained on Primavera (two years ago) but they have not used the program recently and clearly are uncomfortable with their own present level of readiness. Although staff seems to be open to benefits from the computer systems, there is the need for additional training and there is no in-house champion of the tools.

The Accounting Department has no interaction with Primavera or the Report package under Microsoft Access. No one is assigned to interact with the Facilities Planning Department for ongoing support of report generation.

Needs

The Facilities Planning and the Accounting Department both need to create better communication regarding the cost report generation. The Accounting Department has some staff who are competent and comfortable with computer tools and software. The Facilities Department needs at least one individual capable and focussed on supporting the Computer Planning and Tracking software tools in addition to his or her other responsibilities.

Budget Monitoring

The primary role of this Sub-Committee is to ensure that the costs of each school project are within the budget, that the progress of each project is within the current cost parameters and that any deviation is questioned by the entire Committee and addressed. For example, deviations could be the result of contractor cost overruns or Board changes in a project which could have ramifications on other projects. In order to do this, it is necessary for the Committee to receive timely reports of construction progress from the Facilities Planning Department.

Another aspect of the Committee's function is its relationship with the various Site Committees and the general public. We are a "citizens' committee" and should be a vehicle for people to express their questions and concerns. Site Committees are involved in planning. This Committee should be a resource for Site Committees and the public once construction has begun. To that end, there should be more awareness of the function of this Committee. If a project gets off course, this Committee can investigate and report to the Board both our concerns and any Site Committee and public concerns.

The Committee has been immeasurably helped in its work by the active participation of Catherine E. James, Associate Superintendent of Business, Lew Jones, Manager of Facilities Planning, and Steve Wood, Director of Facilities. They have generously given explanation, technical knowledge and interpretation of the regular detailed reports to the Committee.

Moving

This Sub-Committee studied the topic of moving. This includes large moves necessitated by the construction process (moving out of a site scheduled for construction and moving back in when construction is completed) and the smaller moves done in the District around re-configuration.

The review of completed moves has identified certain issues. We have learned that a move that happens during the instructional year has different challenges than a move that happens during the summer recess.

Recommendation: It is recommended that the staff identify the needs of the classroom for the program that is going into the classroom space: furniture, plumbing (if needed), carpet/flooring, communications, shelving, etc. After these needs are identified, define what type of packing, moving and unpacking has to be accomplished. All elements of the move need to be identified. When items are left out, it creates a double-move problem. This needs to be done for offices and other spaces as well.

Recommendation: It is recommended that the staff schedule moves well in advance. Scheduled well in advance, proper lead time and planning will result in an efficient move within budget. Establish who will do the move: professional contract movers, in-house staff, or a combination of both.

Recommendation: It is recommended that the staff establish a timeline. Once the needs and the timeline are assembled for the proposed move, adequate resources need to be identified and allocated.

We stress the need for good communication during the entire process! This has to work on all levels with all participants. Parents, teachers, unions, Board Members, maintenance/custodial staff, vendors/contractors, architects, principals and administrators can all be participants in the process.

We recommend that the Board approve and adopt these guidelines so that future moves will be accomplished with the fewest complications.

LIFECYCLE COST ANALYSIS SUMMARY				
	CRAGMONT			
BOILER PLANT				
BASE CASE(MEETS TITLE 24)78%EFF.	35,342			
ALT.(PAYBACK IN 5.18 YEARS) 88%EFF.		**40,010**		
ENERGY MANAGEMENT SYSTEM				
BASE CASE(MEETS TITLE 24)	7,830			
ALT.PAYBACK IN 11.9 YEARS)		**43,423**		
INSULATION				
BASE CASE(MEETS TITLE 24)R-11&R-19	**31,254**			
ALT.(PAYBACK IN 1,522 YEARS)		76,575		
GLAZING				
BASE CASE(MEETS TITLE 24)SINGLE PANE	**32,837**			
ALT.(PAYBACK IN 66 YEARS)		51,378		
LIGHTING				
BASE CASE(MEETS TITLE 24)	233,884			
ALT.(PAYBACK IN 8.2 YEARS)		**272,263**		
OCCUPANCY SENSORS				
BASE CASE(MEETS TITLE 24)	2,953			
ALT.(PAYBACK IN 5.16 YEARS)		**12,219**		
BOLD AND UNDERLINED COST REPRESENTS BUILDING COMPONENTS RECOMMENDED BY THE DESIGN TEAM.				
	Savings per year		**percentage**	
MECHANICAL SYSTEM	$23,023		16.50%	
LIGHTING	$24,071		22.00%	
ENERGY MANAGEMENT SYSTEM	$19,564		8.50%	
TOTAL ENERGY SAVINGS OVER TITLE 24	**$66,658**		**47.00%**	

BUILDING SYSTEMS MANAGEMENT

PHONE: (916) 368-4488

FAX (916) 368-4490

10556 Old Placerville Road, Sacramento, CA 95827-2503

Energy Strategy, Inc.

February 20, 1996 (with revisions 4/30/96)

Mr. David Petta
Elbasani & Logan Architects
2040 Addison Street
Berkeley, CA 94704

RE: Cragmont Elementary

Dear David:

We have completed our final analysis on Cragmont Elementary following our Lifecycle Workshop on February 2, 1996. Following is a summary of our final energy feasibility study and the energy conservation measures that were modeled in our simulation.

I. INSULATION

As discussed at the workshop, increasing the ceiling, wall and floor insulation would offer some savings, but the payback for the increased cost would be in excess of 1,500 years. This is totally due to the moderate climate Berkeley enjoys. Therefore, the district can achieve substantial energy savings by using state guidelines as indicated by the following recommendations:

CEILINGS:	**R-19**
WALLS:	**R-11**
SLAB PERIMETER:	**R-11**

II. GLAZING

There is a significant amount of glazing, but well within the Title 24 general guidelines of 40% of wall area. Cragmont Elementary is approximately 38%. Due to the location and school schedule, we would recommend minimum Title 24 compliance on glazing. This would be single pane glazing in all locations, clear tint on northern exposures, Solex Green with 75% light transmission and a shading coefficient of 69% (heat gain) on south, west and east exposures. We do not recommend dual pane glazing as the maintenance (replacement) cost is the largest factor in considering the payback. It is not necessary for compliance with Title 24 and would carry an excessive payback. The main savings from tinted glazing occurs as a result of saved cooling costs in the summer months.

Therefore, our recommendations for glazing are as follows:

Single pane glass: Clear/North, Solexgreen-South/West/East

III. MECHANICAL EQUIPMENT

Boilers: Our final evaluation compared base case standard Title 24 efficiency gas furnaces of 78% with a high efficiency 88% efficiency forced draft boiler. It was decided at the February 2nd meeting that the boilers (Scheme 2) would be the system of choice. Both systems are utilizing high efficiency motors, economizers for maximizing "free" outside air, and energy management control systems. **They yield substantial gas savings, which in combination with the operation of the energy management system, yields 46% gas savings over the gas furnace system. The high efficiency boiler system would yield savings of 16.5% over a standard Title 24 boiler system.**

The simple payback for the boiler system would be 5.18 years.
Estimated gas energy savings would be $23,023/year

Energy Management System: The district will be installing an energy management system that will be consistent with the operation of other systems within the district. This system is installed in place of a Title 24 time clock. The EMS system is highly recommended due to its ability to program in various school schedules and holidays and the most energy saving feature is the optimized start/stop. **The EMS would exceed a Title 24 "time clock" energy usage by 8.5%.**

The simple payback for the energy management system would be 11.9 years.
Estimated electrical and gas energy savings would be $19,564/year

IV. LIGHTING EQUIPMENT

The recommended system is compared to a base case lighting system that would meet the Allowed Lighting Power as specified by Title 24. This would commonly be magnetic ballasts with F-34 lamps and either an automatically timed on/off system for buildings over 5,000 square feet or wall switches for smaller buildings. The recommended system for classrooms and auxiliary spaces would include high efficiency fluorescent fixtures with electronic ballasts and T-8 (32watt) lamps, low wattage exit signs and occupancy sensors. The Multi-purpose room will utilize Metal Halide pendant fixtures with a possibility of retrofitting some existing fixtures. Lighting will be the largest electrical energy saver in this project. Particularly, in line with the weather and occupancy schedule. **Energy usage for this energy savings system exceeds Title 24 requirements by 22%.**

The Simple Payback for this Lighting System is 8.2 years.
Estimated electrical energy savings would be $24,071/year

Summary of Recommendations:

RECOMMENDED:

Mechanical Equipment: Boiler System over Furnaces: Energy savings estimated at 38% over gas furnaces. Energy Savings over a standard Title 24 Boiler system would be 16.5%.

Energy Management System: We are estimating an 8.5% savings over a standard T-24 timeclock.

Lighting: Upgrade to recommended system. Savings over Title 24 standards are estimated at 22% annually.

Total combined electrical and gas energy savings with above three energy upgrades is estimated at 47%.

Summary Table of Energy Savings

Energy Savings Over Title 24

High Efficiency Boilers	16.5%
High Efficiency Lighting	22.0%
Energy Mgmt. System	8.5%
Total Energy Savings:	47.0%

We hope this will answer all of your questions regarding the energy efficient levels of the various alternatives. If there is any other way in which we may assist you with this project, please let me know.

Sincerely,

Rosemary Lieberman
President

JYA CONSULTING ENGINEERS, INC.
89 DAVIS ROAD SUITE 120
ORINDA, CALIFORNIA 94563
TELEPHONE: 510 253-8044
FAX: 510 253-8040

July 25, 1996

RECEIVED
JUL 26 1996
BY:

Dan Odasz
VBN Architects
501 14th Street, #300
Oakland, CA 94612

Subject: MALCOLM X SCHOOL
LIFE CYCLE ANALYSIS

JYA #9537

Dear Dan,

Attached is our revised Energy Conservation Report and Life Cycle Analysis. We have deleted the back-up calculations to reduce paper although they are available in our office. We have incorporated Lew Jones' comments except as described below.

1. State of California Energy Code requires mechanical ventilation of outside air if operable sash is farther than 20 feet. For improved indoor air quality the Malcolm X design provides for 15 CFM minimum outside air per person. The relief of this air during times when windows are shut is through exfiltration permitted by loose fitting windows.

2. Air conditioning is deleted except in computer room.

5. The auditorium system utilizes CO_2 sensing to vary air quantity into auditorium. During majority of use hours, system will utilize minimum air flow with minimum energy use but can provide required high indoor air quality when auditorium is fully occupied.

6. Total electric usage was not modeled and includes only electric associated with heating for these comparisons.

8. 95, 96 and 98% efficient boilers are available on the market. The pulse type such as Fulton and Weil-McLain do have higher maintenance factors. On Malcolm X we are specifying PVI which is similar in maintenance to other powered burner boilers.

9. The $131,146 is from the Comply 24/Doe 24 energy use program for the base building without modifications.

10. The format selected is as described in the Code of Federal Regulations 10, parts 435 and 436 and was selected to avoid deceptive presentations. We have simplified at your request.

11. Roof insulation corrected. 3000 sq ft is a "typo". Exterior wall is 30,000 sq ft.

The attached is a simplified summary sheet as requested. In our LCC the base cost is zero.

Please note that in a renovation of this type Title 24 requirements are triggered when additions, exterior modifications, or new equipment are installed; small energy improvements may have significant impact, such as comparing roof insulation to no insulation. In addition, we did not consider cooling energy savings since building is not cooled as was used in example at Cragmont School.

Very truly yours,

JYA CONSULTING ENGINEERS, INC.

Peter H. Johnson, P.E

PHJ/ny
Encl.

ENERGY USE LCC COMPARISONS

	ENHANCED ADDITIONAL COST	ABOVE T24	PAYBACK INCL. MAINT. & REPLACEMENT
BOILERS	10,000	15%	6
ENERGY MANAGEMENT	40,000	4%(1)	5(2)
ROOF INSULATION	49,500	7%	9(3)
WALL INSULATION	217,500	1%	NONE
DOUBLE GLAZING	21,000	2%	20(4)
LIGHTING			(6)
OCCUPANCY SENSORS			(6)
AUDITORIUM CO_2 CONTROL	5,000	7%	4
VARIABLE FLOW PUMP DRIVES	4,000	3%	10(5)
TOTAL SAVINGS OVER T-24		39%	

(1) THIS IS SUBJECTIVE.

(2) INCLUDES MAINTENANCE LABOR SAVINGS.

(3) PAYBACK IS NOT OVERWHELMING, BUT COMFORT IS SIGNIFICANTLY IMPROVED ESPECIALLY IN WARM WEATHER.

(4) INCLUDES MAINTENANCE AND REPAIR.

(5) VARIABLE SPEED DRIVE INCORPORATES CERTAIN PERFORMANCE ADVANTAGES.

(6) SEE ELECTRICAL TITLE 24.

MALCOLM X SCHOOL

ENERGY CONSERVATION REPORT

AND

LIFE CYCLE COST ANALYSIS

25 JULY1996

VBN ARCHITECTS
501 14TH STREET, SUITE 300
OAKLAND, CA 94612
(510) 763-1313

JYA CONSULTING ENGINEERS, INC.
89 DAVIS ROAD, SUITE 120
ORINDA, CA 94563
(510) 253-8044

Table of Contents

1. Introduction

This report summarizes energy conservation measures incorporated into the designs of Malcolm X School.

The life cycle cost alternatives are evaluated using the National Institute of Standards and Technology, BLCC 4.2 Life Cycle Program, and the Comply 24/Doe 24 Energy Use Program.

Systems evaluated were only those that would provide acceptable levels of comfort and safety and those that could integrate into this particular existing building.

Certain core energy conserving alternatives were evaluated with simplified life cycle costs since they are incorporated as a directive from BUSD or due to past experience providing overwhelming proof of payback and are usually eligible for energy rebates. These include:

- Central energy management system.
- Premium efficiency motors.
- High efficiency fluorescent lamps and electronic ballasts.
- Occupancy sensors.
- Variable air flow in Auditorium controlled by CO_2.
- Variable flow pumping.

Other alternatives were not evaluated due to inappropriate functional results or not part of BUSD directives. These include:

- Weatherstripping doors and windows.
- Reducing window area.
- Air conditioning.

Passive systems that are incorporated to reduce discomfort in south facing rooms are described.

The alternatives considered for life cycle costing included both base case and alternatives that would well serve the project in performance and respond to the district's overall energy objectives. They include:

- Insulating existing roof.
- Insulating existing walls.
- Utilizing double pane windows.
- High efficiency boiler.

2. Executive Summary

The analysis indicates that all alternatives are energy conserving. The most desirable investments are the high efficiency boilers and insulating the roof or double pane glass. Insulating walls will not pay back.

Alternative	Simple Payback
• Roof Insulation (R-30)	9 Years
• Wall Insulation (R-13)	No Payback
• Double Pane Glass	9 Years
• High Efficiency Boiler	6 Years

3. T-24 Energy Statement

The BUSD energy use objective is to exceed Title 24 requirements by 35%. The T-24 energy requirements for renovation of an existing conditioned structure is limited. Any new mechanical equipment, lighting, appliances, or building construction must meet Title 24 for that component only. The building is not required to be brought to T-24 standards in its entirety. No new square footage is being added. Any new exterior wall or fenestration will meet T-24 requirements.

The building shell energy saving alternatives are evaluated against existing base building which complies with T-24 as an existing conditioned structure. The recommended energy saving measures dramatically reduce energy consumption.

- The roof insulation reduces shell heat loss by 14%.
- The lighting upgrades reduce electrical consumption significantly over Title 24 minimums. Reduction is 15%.

- The proposed boiler plant exceeds Title 24 efficiencies by 18.75%.

- The variable flow air system for the Auditorium minimizes energy consumption while maximizing indoor air quality. The Auditorium's system energy use is reduced by 70%.

- The central energy control systems insures mechanical/electrical system shut down when not needed and proper set points for optimum energy use.

The new systems do incorporate Title 24 and BUSD indoor air quality recommendations. This will increase energy use. The renovated building is over 40% more efficient than the Title 24 minimum.

Recommendations

JYA recommends the core items including:

- Central Energy Management

- High Efficiency Lamps and Ballasts

- Occupancy Sensors

- Variable Air Flow in Auditorium

JYA recommends adoption of the evaluated alternatives including insulating the roof and utilizing a super efficiency boiler. Insulating the roof is a long payback but is significant in increasing summer comfort. The wall insulation is a poor investment. Double pane fenestration is not recommended due to maintenance reasons and lack of payback.

4. Report Summary

(1) Site: Malcolm X School, Berkeley

(2) Energy Types: Electricity and natural gas.

(3) Building Energy Consumption (MBTU/YR): 9500800.

(4) Metering Provided: Natural gas and electricity is metered at the Building.

(5) Floor area: 73530 sq ft.

(6) KBTU/sq. ft.: 129.21.

(7) Energy Consumption Method:

The method used for simulating building energy consumption is:

a. COMPLY 24/DOE 24 (PC version) - a PC implementation of Energy Simulation Computer Program was used to estimate energy consumption.

Quality Assurance

All test and calculations have been checked for proper application, uniformity, accuracy, quality, and compliance with the report specification and other documented agreements.

Professional Engineers Stamp:

5. Building Description

The project consists of the renovation of two existing school buildings.

A. Building Envelope

(1) Roof U-Value R-30
Wall U-Value R-0

(2) Fenestration:
Single pane glazing 1.1
Portion of wall occupied by fenestration = 6900 s.f.

B. Building Lighting Systems and Controls

(1) Interior - Zoned manual local switching with occupancy sensing, combination motion and infrared, T-8 lamps, and electronic ballasts.

(2) Exterior lighting is photocell and timer.

C. Building Heating Systems

(1) New boilers provide heating water to the Main Building and Annex through variable flow pumping system and low temperature water to reduce losses.

(2) Air Distribution Systems

The Auditorium has a 100% outside air variable flow system controlled by a carbon dioxide sensor.

The classrooms and other significant rooms have direct drive and belt drive fan coils and unit ventilators with heating coil, filtration and economizer supplying each zone. Fan motor will be premium efficiency exceeding Title 24.

(3) Automatic Temperature Controls

A central energy management system will program on/off on all boilers, pumps, fans, and water heaters.

Classrooms will be provided with individual zone temperature controls.

D. Domestic Hot Water Systems

(1) General

Gas-fired high efficiency water heaters.

E. Passive Systems

The south and west facing rooms, notably the third floor main building, are subject to significant solar heat gain, resulting in uncomfortable spaces. BUSD avoids mechanical cooling due to costs, energy use and maintenance. The following is incorporated to reduce discomfort without mechanical refrigeration.

- Solar reflective blinds in selected rooms.
- Restore all operable sash.
- R-30 roof insulation.
- Unit ventilators with 100% outside air capability to increase air circulation.

Note: Unit ventilators can accept a future cooling coil if required for special functions such as computer rooms.

6. Documentation

A. The Comply 24/Doc 24 Energy Use documentation is available at JYA. This compliance documentation has been produced for the base-case Building design and alternatives.

In addition, the following technologies are included in the base-case design where appropriate:

- Energy Monitoring and Control System (EMCS)
- T-8 fluorescent lamps with electronic ballasts.
- Occupancy sensors.
- Variable speed pumps.
- CO_2 controlled auditorium ventilation.

B. The BLCC 4 documentation for each life cycle alternative is available at JYA.

7. Base-Case and Alternatives Building Energy Consumption

A. General

Comply 24/DOE 24 (PC 586) was used to perform the base-case and alternative energy use consumption calculations. Weather data for Berkeley, California was used.

Base-case annual building and alternatives energy consumption is reported in Table 4.1. The information provided in Table 4.1 was derived from the base-case Comply 24 Energy Simulation.

Building energy is that used primarily for heating, ventilating, energy distribution, and lighting.

B. Table 4.1 Base-Case and Alternative Annual Energy Consumption

	Natural Gas Use
Base Case	9,500,800 KBTU/Yr.
Roof Insulation	8,757,420 KBTU/Yr.
Wall Insulation	8,613,300 KBTU/Yr.
Double Pane	9,335,370 KBTU/Yr.
High EFF Boiler	8,042,800 KBTU/Yr.

8. Renewable Energy Sources

A. General

Renewable energy sources were not analyzed for this project due to the low cost and plentiful supply of natural gas and electricity, the high efficiency of the systems being included in the design of this project, and the limited amount of space available for additional equipment.

9. Life Cycle Cost

A. General

10 year life cycle cost for each alternative is compared against the base case building in the BLCC 4. The results are summarized in Table 6.1 below.

B. Table 6.1

	Invest Cost	LCC	Simple Payback
Base Case	-0-	$131,146	N/A
Roof Insulation	$ 49,500	$134,763	10
Wall Insulation	$217,500	$279,746	None
Double Pane	$ 21,000	$130,932	9(1)
High Eff. Boiler	$ 10,000	$125,696	6

(1) Simple payback is without maintenance.

LIFE CYCLE COSTS

MALCOLM X SCHOOL

1. Insulate existing roof with R-30.

   Base case: No insulation

   Alternate: R30 Batt

   33000 sq.ft. x $1.50 = $49,500

2. Insulate existing walls with R-13.

   Base case: No insulation

   Alternate: R13 Batt

   Remove wall; install Batt and wall.

   30,000 sq. ft. x 7.25 = $ 217,500

3. 80% EFF boiler vs. 96% EFF boiler

   Base case: 80% efficiency

   Alternate: 96% efficiency

   $ 10,000 Investment Cost

4. Single vs. Double Pane

Base case: Single glaze

Alternate: Double pane

7,000 sq. ft. x $3.00 = $21,000 (Invest)

Maintenance = $2,000/yr.