IPRO 314 Final Proposal

Fall 2008

Greening and Reuse of Queen of Peace High School Facilities

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Executive Summary

The problem posed at Queen of Peace (QoP) High School is one of sustainability. Queen of Peace, a private, all-girl high school in the southern suburb of Burbank, has experienced a decline in enrollment in the past 3-5 years. At its peak, QoP was comprised of 1500 students but has decreased over the years to a current population of approximately 650 students. Reasons for this decline include a competing school turning co-educational as well as many schools overlapping into Peace's drawing radius. The Illinois Institute of Technology IPRO 314 class decided, after consideration of the scope of the problem, to focus their efforts on integrating the principles of "reduce, reuse, recycle, and reputation" into the QoP environment. The overall proposal following this summary is comprised of five sub-proposals designed to utilize the four principles with the intent of potentially: increasing revenue, decreasing costs and strengthening the schools status for the purpose of attracting new enrollment.

The initial area of interest is the under-utilization of school facilities. The first area identified for reuse is the school's convent building currently partially used for storage and additional office space but mostly empty square footage. The idea proposed is to convert the space into a multi-purpose center by partially reconstructing and remodeling the facility. The multi-purpose building is intended to generate new revenue streams for the school by providing daycare, pre-schooling and rental space. To determine how to best use the space, the team conducted market research on the current needs of the community surrounding the school. By adapting to the needs of the area, the school can increase their visibility and standing in the community potentially attracting new enrollment. Furthermore, the team proposed recycling portions of the current structure, like the stone and brick, to be reused in the new construction. An additional space currently under-utilized but holding great potential is the school library. With the school providing a laptop to every student and wireless internet throughout the building, the usefulness of a centralized library on school grounds has diminished. The idea proposed is to reuse the square footage of the library by converting it into a multi-media communications center equipped with internet classrooms, conference meeting capability and additional multi-media. The purpose of the communications center is to provide the students and faculty with additional educational venues in addition to accelerating the reputation of the school as being a technologically-advanced teaching establishment also potentially attracting additional enrollment. In addition to the space reuse concept, the team also directed its focus to reducing the schools utilities spend and their carbon footprint on the environment. The last spaces identified for space reuse also hold potential for cost savings. The school's rooftop and multiple courtyards have been proposed as areas to incorporate solar panel technology, reflective roofing, and a water collection system. The intention of these advancements is to provide thermal transfer reduction through reflective roofing and added roof insulation and to increase the schools reputation as an eco-friendly, technology school through the inclusion of solar panel technology and a water collection system. After additional visits to the school, the windows were determined to be inefficient, allowing excessive thermal transfer during the cold months and insufficient shading during the warm months. The proposal to replace the current windows with more proficient double-paned windows is intended to reduce the schools utilities spend thus saving money month over month by decreasing their energy consumption used to heat the building. Additionally, the team was informed that the school funded a lighting retrofit recently on the main building but the convent and gymnasium were still running outdated lighting fixtures. The proposal to replace the old fixtures and lamps with cost-effective, lower wattage fixtures will also reduce utilities spend and energy consumption. The rooftop and courtyard improvements in conjunction with the increased efficiency of the windows and lighting will transform the schools facilities into an energy saving environment and subsequently increase the character of the school as being an eco-friendly establishment.

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Multi-Purpose Center Proposal

1. Background

   The purpose of this proposal is to create a solution to help with the problem of decreased enrollment at Queen of Peace High School and at the same time, minimize the costs arising from maintenance of unused space on campus. The idea of the proposal is to reconstruct the old convent in favor of a multi-purpose center. The convent is severely under-utilized and contributes to a large percent of the overall costs for running and maintaining the school.

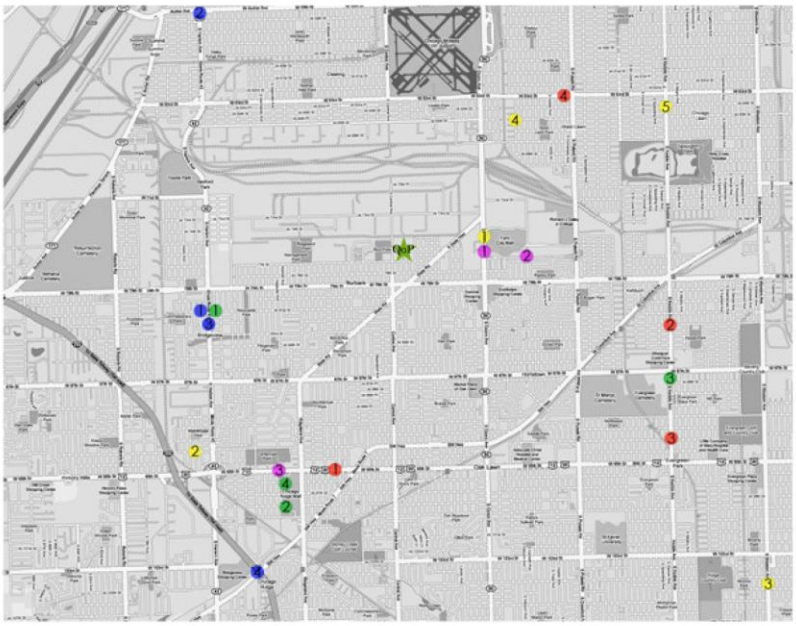
2. Goals

   The suggestion to tear down the convent and construct a new building is more beneficial, in the long-term, to the school because the costs involved in restoring the building to a usable condition is fiscally comparable to a new construction. In addition, tearing down the convent will create an opportunity to develop a new, more energy and cost efficient building. The new building will serve as a multi-purpose center for the students of QoP and the Burbank community at large. The multi-purpose center will contain spaces and activities that are missing or insufficient in the surrounding area based on the market research conducted. The services provided in the center, because they are currently in short supply, are aimed at increasing the presence of the school in the area. By attracting people from various age groups and neighborhoods to utilize the new non-high school services available on campus, the long-term hope is that QoP will become a new possibility for high school enrollment to families that would have otherwise not considered or not know about the school.

3. Methodology

   A thorough analysis has been conducted to determine what services are prevalent in the area surrounding the school and what services are currently in short supply. Upon completion of the market analysis, a shortage of several programs have been identified which could be potential areas of opportunity for QoP to implement into the multi-purpose center. All of the programs implemented in the design of the new center will serve the interests of Queen of Peace by attracting more students and through the generation of new revenue streams for the school.
   The following maps are graphic representations of our research findings, showing the prevalence of different services in the surrounding area in relation to QoP.
   During the research to find the proximity of amenities such as youth group centers, movie theatres, coffee shops, etc. it was made known that the closest of any of these amenities was over 1.5 miles away. This shows that people going to Queen of Peace or people living near the area would be more likely to use a facility containing these amenities since it would be within a closer proximity. It also guarantees that the facility would be greatly used and would bring in a profit as opposed to not being used and thus being closed down.

All-Girl High Schools
PK-8 All-Girl Private Schools



Youth Groups
Movie Theatres
Coffee Shops
Tutoring Centers
Senior Homes

1. New Hope For Youth; 7601 S. Cicero Ave. Chicago, IL. 60652; 1.56 mi
2. Mosque Foundation; 7360 W. 93rd St. Bridgeview, IL. 60455; 3.88 mi
3. Garden of Prayer Youth Center; 10540 S. Western Ave. Chicago, IL. 60643; 7.58 mi
4. St. Mary Star of the Sea Youth; 6435 S. Kilbourn Ave. Chicago, IL. 60629; 2.69 mi
5. Southwest Youth Collaborative; 6400 S. Kedzie Ave. Chicago, IL. 60629; 4.39 mi

1. Ford City 14 Cinema; 4440 W. 77th St. Chicago, IL. 60652; 1.89 mi
2. AMC Theatre; 7601 S. Cicero Ave. Chicago, IL. 60652; 1.56 mi
3. AMC Loews Chicago Ridge 6; 500 Chicago Ridge Mall Chicago Ridge, IL. 60415; 3.60 mi

1. Starbucks Coffee Company; 8021 S. Harlem Ave. Burbank, IL. 60459; 2.61 mi
2. The Cafe Mocha Inc.; 711 Chicago Ridge Mall Chicago Ridge, IL. 60415; 3.26 mi
3. Starbucks Coffee Company; 8740 S. Kedzie Ave. Evergreen Park, IL. 60805; 4.29 mi
4. Gloria Jeans Coffee; 305 Chicago Ridge Mall Chicago Ridge, IL. 60415; 3.23 mi

1. Huntington Learning Center; 6253 W. 95th St. Oak Lawn, IL. 60453; 3.1 mi
2. Turner Learning Center; 8308 S. Kedzie Ave. Chicago, IL. 60652; 3.75 mi
3. Creative Learning Solutions; 9300 S. Kedzie Ave. Evergreen Park, IL. 60805; 4.99 mi
4. Chicago Tutoring Center; 4037 W. 63rd St. Chicago, IL. 60629; 3.44 mi

1. Bridgeview Healthcare Center; 8100 S. Harlem Ave. Bridgeview, IL. 60455; 2.71 mi
2. Senior Suites-Garfield Ridge; 5839 S. Harlem Ave. Chicago, IL. 60638; 5.18 mi
3. Moraine Court; 8080 S. Harlem Ave. Bridgeview, IL. 60455; 2.69 mi
4. Lexington Center-Chicago Ridge; 10300 Southwest Hwy. Chicago Ridge, IL. 60415; 4.12 mi

- Not on map; Eta Creative Arts Foundation; 7558 S. Chicago Ave. Chicago, IL. 60619; 9.37 mi
- Not on map; Town Hall; 3600 N. Halsted St. Chicago, IL. 60613; 19.33 mi

The usage of the new center can be broken down into three primary categories; public event space, space for clubs/school activities, and space for a preschool and childcare. Each individual space will contain multiple activities occurring at different times of the day.

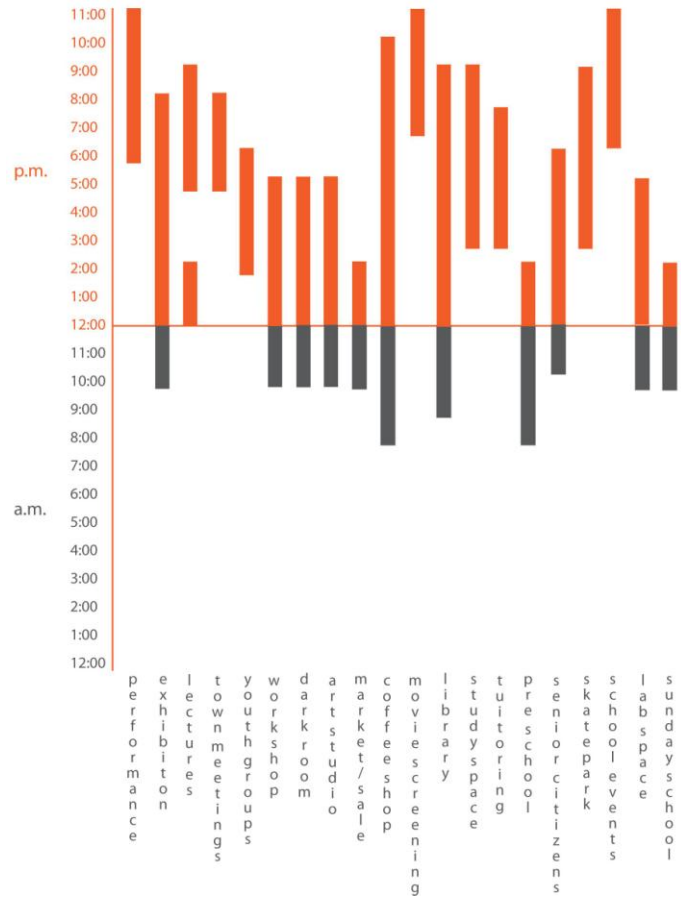
A. Public Event Space
    a. *Performance Space* – This space allows for school activities such as plays and musical performances to be opened to the public realm. An additional possibility for new revenue is to open the space for public rental (traveling theatre, musical performances, etc.), provided the message coincides with that of Queen of Peace.
    b. *Town / Church meetings* – This space increases the identity of the school as a member of the community. The space can be used for private QoP sponsored events and open to the community for rental as a public forum.
    c. *Lectures* – This gives a place for inspirational speakers, ministry leaders, etc. to speak that is directly linked to the school.
    d. *Exhibitions* – This provides a space for students and local talent (based on a rental or donation basis) to share creative endeavors in the arts, technology (robotics), etc
    e. *Movie Nights* – This idea is similar to Movies in the Park currently sponsored in the Chicago-land area. Movies at Queen of Peace creates a place where families can come to enjoy a night out and can also feel confident that their children are in a safe environment if going out with their friends. Additionally, the movie space creates a new stream of revenue for the school.

B. Club / School Activity Space
    a. *Club Rooms* – This provides space for after-school activities for QoP students and a venue for local clubs (based on a rental or donation basis).
    b. *Youth Groups* – By providing youth groups directly at the school, younger children and their families will be exposed to Queen of Peace prior to the age at which they would attend high school. Early exposure equates to increased opportunities for future enrollment.
    c. *Senior Space* – Similar to the two above, a place for senior activities and an additional opportunity for positive school status in the community.
    d. *Tutoring Center* – By having students of the school operate the program (contrary to commercial learning centers hire additional teachers), the identity of outreach will directly correlate to students. It will reinforce what the students learn in school to their after-school activities and it establishes a one to one relationship between current and possible future students.

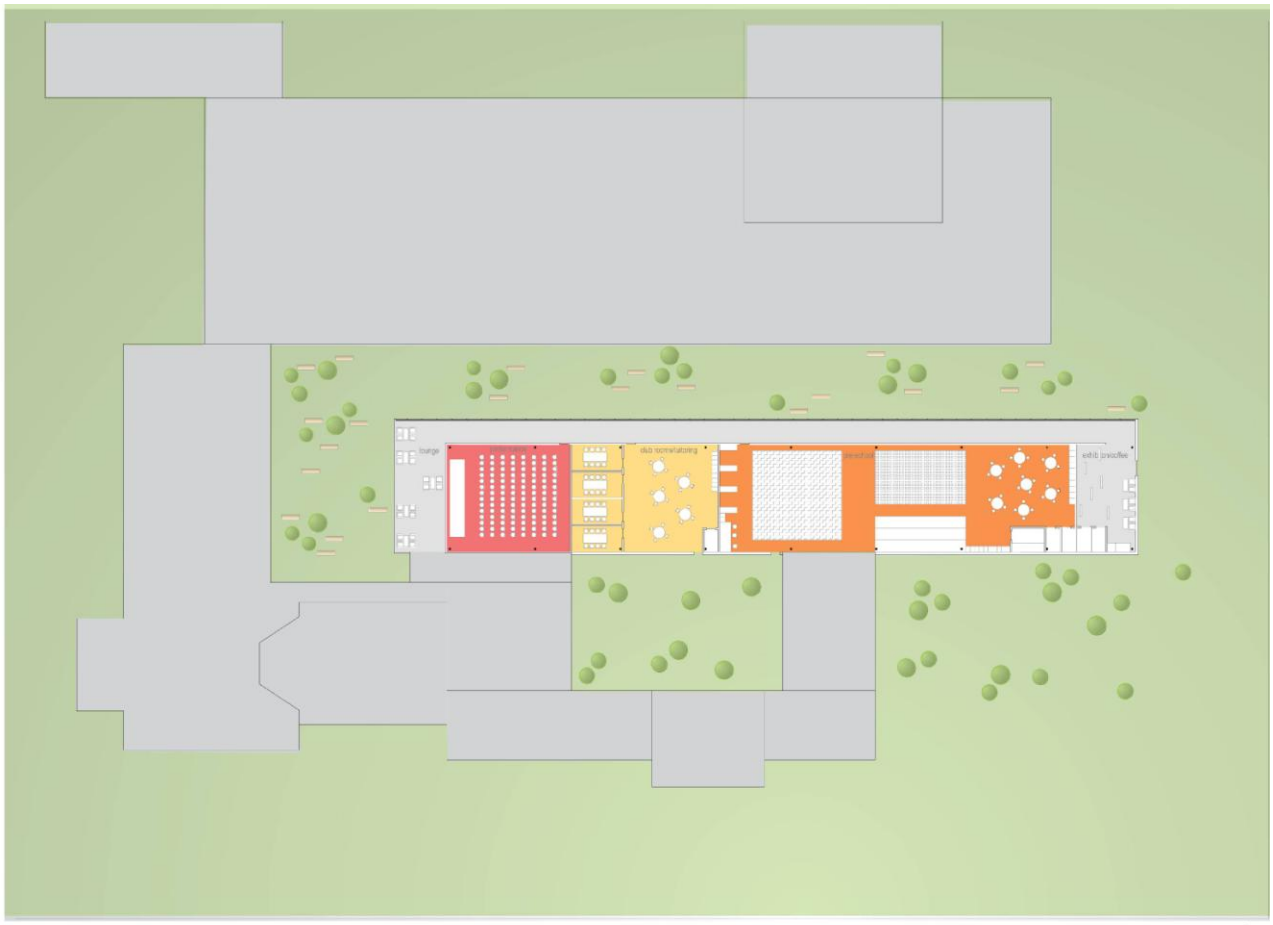
C. Pre-School and Childcare

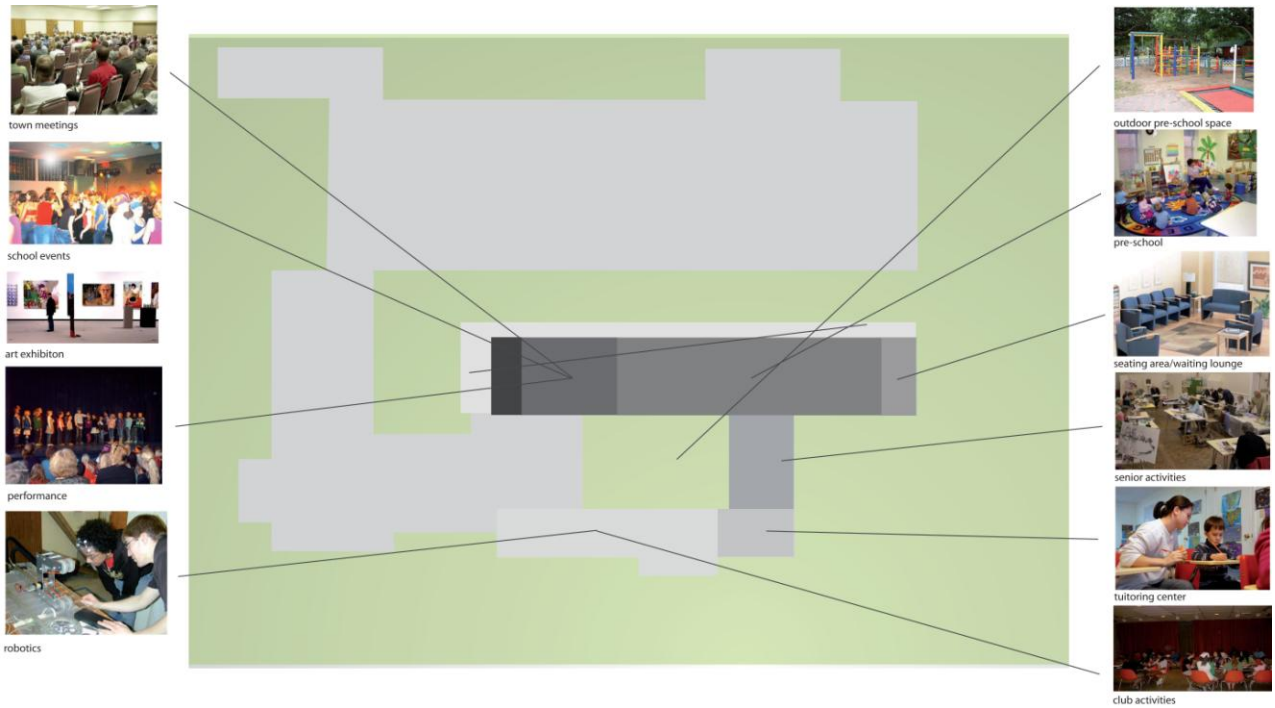
a. The preschool and childcare program will exposure children at the earliest possible age to Queen of Peace, one of the best times to have the largest impact. Not only are the children themselves exposed to the community of Queen of Peace, but their families are brought to the school grounds, this can alone be the hardest task in recruiting new or future students. This too creates a new stream of revenue for QoP.

Proposed weekly and daily schedule for multi-purpose center



4. Possible Schematic





5. Cost versus Benefit Analysis and Timeline

We suggest a teardown of the convent in favor for the construction of a new Multi-Purpose Center, by keeping the existing foundation and re-using materials such as brick, significant savings can be made. Here follows a table broken up into the different costs involved with the construction.

	Square Foot Cost Estimate Report
Estimate Name:	**Untitled**
Building Type:	**Community Center with Face Brick with Concrete Block Back-up / Steel Frame**
Location:	**National Average**
Story Count:	**2**
Story Height (L.F.):	**12**
Floor Area (S.F.):	**11272**
Labor Type:	**Union**
Basement Included:	**No**
Data Release:	**Year 2008 Quarter 1**
Cost Per Square Foot:	**$142.92**
Building Cost:	**$805,500**

			% of Total	Cost Per S.F.	Cost
A Substructure			**11.10%**	**$11.62**	**$0**
A1010	**Standard Foundations**			**$2.57**	**$0**
	Strip footing, concrete, reinforced, load 5.1 KLF, soil bearing capacity 3 KSF, 12" deep x 24" wide				
A1030	**Slab on Grade**			**$4.61**	**$0**
	Slab on grade, 4" thick, non industrial, reinforced				
A2010	**Basement Excavation**			**$0.27**	**$0**
	Excavate and fill, 10,000 SF, 4' deep, sand gravel, or common earth, on site storage				
A2020	**Basement Walls**			**$4.17**	**$0**
	Foundation wall, CIP, 4' wall height, direct chute, .148 CY/LF, 7.2 PLF, 12" thick				
B Shell			**35.90%**	**$37.62**	**$134,500**
B1020	**Roof Construction**			**$10.20**	**$57,500**
	Roof, steel joists, joist girder, 1.5" 22 ga metal deck, on columns, 45'x50' bay, 40 PSF superimposed load, 52.5" deep, 61 PSF total load				
	Roof, steel joists, joist girder, 1.5" 22 ga metal deck, on columns, 45'x50' bay, 40 PSF superimposed load, 52.5" deep, 61 PSF total load, add for columns				

B2010	**Exterior Walls**			**$17.12**	**$0**
	Brick wall, composite double wythe, standard face/CMU back-up, 8" thick, perlite core fill				
B2020	**Exterior Windows**			**$2.48**	**$28,000**
	Windows, aluminum, sliding, standard glass, 8' x 4'				
B2030	**Exterior Doors**			**$0.89**	**$10,000**
	Door, aluminum & glass, without transom, narrow stile, double door, hardware, 6'-0" x 7'-0" opening				
	Door, steel 18 gauge, hollow metal, 1 door with frame, no label, 3'-0" x 7'-0" opening				
B3010	**Roof Coverings**			**$6.74**	**$38,000**
	Roofing, asphalt flood coat, gravel, base sheet, 3 plies 15# asphalt felt, mopped				
	Insulation, rigid, roof deck, composite with 2" EPS, 1" perlite				
	Roof edges, aluminum, duranodic, .050" thick, 6" face				
	Flashing, aluminum, no backing sides, .019"				
	Gutters, box, aluminum, .027" thick, 5", enameled finish				
	Downspout, aluminum, rectangular, 2" x 3", embossed mill finish, .020" thick				
	Gravel stop, aluminum, extruded, 4", mill finish, .050" thick				
B3020	**Roof Openings**			**$0.18**	**$1,000**
	Roof hatch, with curb, 1" fiberglass insulation, 2'-6" x 3'-0", galvanized steel, 165 lbs				
C Interiors			**24.70%**	**$25.90**	**$292,000**
C1010	**Partitions**			**$3.73**	**$42,000**
	Metal partition, 5/8"fire rated gypsum board face, 1/4" sound deadening gypsum board, 2-1/2" @ 24", same opposite face, no insulation				
C1020	**Interior Doors**			**$6.03**	**$68,000**
	Door, single leaf, kd steel frame, hollow metal, commercial quality, flush, 3'-0" x 7'-0" x 1-3/8"				
C1030	**Fittings**			**$1.86**	**$21,000**
	Toilet partitions, cubicles, ceiling hung, stainless steel				
	Directory boards, outdoor, black plastic, 36" x 24"				
	Bulletin board, cork sheets, no frame, 1/4" thick				
	Chalkboards, wall hung, aluminum, wood frame & chalktrough				
	Mail boxes, horizontal, front loaded, aluminum, 10" x 12" x 15" deep				
C3010	**Wall Finishes**			**$2.57**	**$29,000**
	2 coats paint on masonry with block filler				
	Painting, interior on plaster and drywall, walls & ceilings, roller work, primer & 2 coats				
C3020	**Floor Finishes**			**$5.86**	**$66,000**
	Carpet, tufted, nylon, roll goods, 12' wide, 36 oz				
	Carpet, padding, add to above, minimum				
	Vinyl, composition tile, maximum				
C3030	**Ceiling Finishes**			**$5.86**	**$66,000**
	Acoustic ceilings, 3/4"mineral fiber, 12" x 12" tile, concealed 2" bar & channel grid, suspended support				
D Services			**26.30%**	**$27.59**	**$263,500**
D2010	**Plumbing Fixtures**			**$2.66**	**$30,000**

	Water closet, vitreous china, tank type, 2 piece close coupled				
	Urinal, vitreous china, stall type				
	Lavatory w/trim, vanity top, PE on CI, 18" round				
	Kitchen sink w/trim, countertop, PE on CI, 32" x 21" double bowl				
	Service sink w/trim, PE on CI, corner floor, wall hung w/rim guard, 22" x 18"				
	Water cooler, electric, floor mounted, dual height, 14.3 GPH				
D2020	**Domestic Water Distribution**			**$6.12**	**$87,000**
	Electric water heater, commercial, 100< F rise, 350 gal, 180 KW 738 GPH				
D2040	**Rain Water Drainage**			**$0.44**	**$5,000**
	Roof drain, CI, soil,single hub, 3" diam, 10' high				
	Roof drain, CI, soil,single hub, 4" diam, 10' high				
D3050	**Terminal & Package Units**			**$8.96**	**$50,500**
	Rooftop, single zone, air conditioner, schools and colleges, 10,000 SF, 38.33 ton				
D4010	**Sprinklers**			**$2.66**	**$15,000**
	Wet pipe sprinkler systems, steel, light hazard, 1 floor, 10,000 SF				
D5010	**Electrical Service/Distribution**			**$1.69**	**$19,000**
	Service installation, includes breakers, metering, 20' conduit & wire, 3 phase, 4 wire, 120/208 V, 200 A				
	Feeder installation 600 V, including RGS conduit and XHHW wire, 200 A				
	Switchgear installation, incl switchboard, panels & circuit breaker, 400 A				
D5020	**Lighting and Branch Wiring**			**$4.52**	**$51,000**
	Receptacles incl plate, box, conduit, wire, 2.5 per 1000 SF, .3 watts per SF				
	Miscellaneous power, 1.2 watts				
	Central air conditioning power, 3 watts				
	Incandescent fixtures recess mounted, type A, 1 watt per SF, 8 FC, 6 fixtures per 1000 SF				
D5030	**Communications and Security**			**$0.35**	**$4,000**
	Communication and alarm systems, includes outlets, boxes, conduit and wire, fire detection systems, 25 detectors				
D5090	**Other Electrical Systems**			**$0.18**	**$2,000**
	Generator sets, w/battery, charger, muffler and transfer switch, gas/gasoline operated, 3 phase, 4 wire, 277/480 V, 15 kW				
E Equipment & Furnishings			**2.00%**	**$2.13**	**$24,000**
E1010	**Commercial Equipment**			**$0.71**	**$8,000**
	Kitchen equipment, frozen food, chest type, 12 FT long				
E1090	**Other Equipment**			**$1.42**	**$16,000**
	Furnishings, wardrobes & coatrack, wall mounted rack, steel frame & shelves,12" x 15" x 50"				
	Architectural equipment, kitchen equipment, cooler, beverage, reach-in, 6 FT long				
	Architectural equipment, kitchen equipment range, restaurant type, burners, 2 ovens & 24" griddle				
	Architectural equipment, kitchen equipment, range hood, including CO2 system, economy				

F Special Construction			**0.00%**	**$0.00**	**$0**
G Building Sitework			**0.00%**	**$0.00**	**$0**
SubTotal			**100%**	**$104.86**	**$713,500**
Contractor Fees (General Conditions,Overhead,Profit)			**25.00%**	**$26.26**	**$178,375**
Architectural Fees			**9.00%**	**$11.80**	**$64,215**
User Fees			**0.00%**	**$0.00**	**$0**
Total Building Cost				**$142.92**	**$956,090**

If a mortgage is taken out in order to fund the construction there will be a 30 year pay-back time, however during this time QoP will benefit in areas other than the strict economical aspect, most importantly by promoting the school and essentially increase its enrollment.

		Cost	**Monthly Income**		**Yearly Income**
Mortgage amount		$956,090			
Mortgage Term		30 Years			
Interst Rate		7.00%			
Monthly Payments		$6,360.89			
Yearly Payments		$76,330.68			
20 Preschool Students (9 Months) ($400 per Month)			$7,200		$86,400
Future Queen of Peace Students (3 of 20 Preschoolers)					$21,300
Senior Citizen (1 of 20 have future QoP Enrollee)					$7,100
Exhibition / Community Space Rental			$400		$4,800
Sub-total					$119,600
Preschool Teachers Salary		$25,000			
Facilities Management		$10,000			
30 years income					$3,588,000
30 year cost					($1,200,000)
Total					**$2,388,000**
					($2,289,920.04)

Communications Center Proposal

1. Background

   One of the major spaces currently holding latent potential at Queen of Peace High School is the library; however, it can become a catalyst for positive change. Given its current isolated position, the proposal is to transform the current library space into a communications center. This space will also hold a few conference rooms for faculty and staff. The center will help increase the reputation of the school as being a technologically advanced teaching establishment as well as aid in the school's curriculum. With the inclusion of the laptop program already sponsored by the school, it will be beneficial to use this communication center to broaden the student's education by incorporating outside media including video and audio conferencing with other schools and resources on a local, national and international level. The center can be utilized as a teaching venue, a location for student research and study, as well as, a forum for the school to host meetings, presentations and lectures to both the physical and virtual community.

2. Goals

   A. To provide the opportunity for independent study: The communication rooms allow for a small or large number of students to take additional classes currently not offered at the school. The small classrooms are intended to consist of up to 6 students and the larger classrooms up to 20 students. Creating new classes would require additional staff, instead it is proposed that the new classrooms connect, via media, to other high schools and teaching establishments with similar communication centers. The classes can be conducted live or run like internet-based or televised replay courses and teachers are "shared." If a course is being taught live at one school, it can be shown live, via the internet, to classrooms in other schools. Additionally, it can be recorded and viewed at later time based on the student's schedule. Homework and exams can be taken and submitted electronically. Using this method, more classes can be offered using fewer

teachers. This allows more freedom and opportunity for the students at QoP without requiring additional staff.

B. Enhance the technology of the curriculum: The communications center allows for students to access classes online and go beyond what the campus currently has to offer as well as go national and international with the curriculum. Additionally, by learning how to use the new equipment, the school is preparing students for college and future careers where this equipment is more widely used.

C. To provide the opportunity for networking: This communication center would allow the students and faculty to develop a network community on a local, national and international basis. This network can be used to promote the school, allow students to connect with colleges, allow the faculty and staff to connect with alumni and the military families in the city of Burbank to talk to their loved ones far away (and possibly make a profit out of this).

D. To create formal conference rooms: The free rooms allow for student clubs to meet in a more formal setting. Also, they are available for faculty and staff to meet together in a formal and specialized space. These conference rooms are also available to become communications rooms due to the portability of the equipment.

E. To make it a more usable space: The library space is not being used to its full potential in its current state. The goal is to create a more usable space and attract students by creating study spaces, meeting rooms, lounge areas, and new media options.

3. Methodology

A. Visiting Queen of Peace in September gave us a better understanding of what resources they currently have, as well as, what the faculty and students are looking for in place of the current unused library space. Pictures of the library were also taken to help us in conducting our research. Research was then completed about schools nation-wide who currently offer a telecommunications center. Loyola University of Chicago built a new library within the past year and the new facility contains many group study rooms and telecommunications rooms. A visit was made to Loyola's new library, called "The Information Commons." We had a student worker walk us through the three floor library and show us one of the available telecommunications rooms. The room contained two large TV screens connected to a computer PC, wireless keyboard and mouse, as well as, a video camera and a dial pad speaker. We were then directed to contact their Media Services/ Information Technology Services. We first got in contact with the Media Services Manager, Chris Stormer, who then referred us to Sean Ohlinger, the telecommunications center specialist. We scheduled a meeting with Mr. Ohlinger where he demonstrated how their telecommunications room works. We were able to connect with other cites and learned how to use the dial-pad speaker. From this point, research began on LifeSize Communications and Polycom companies for videoconferencing equipment packages and prices. We put our contact information on each company's respective website and a representative from each company contacted us and provided us with a better understanding of the equipment offered, along with their specific pricing. In addition to finding out each of the package prices, we conducted research on purchasing the television screens from a variety of electronic stores. Lastly, research was completed on possible materials for wall partitions and various pieces of furniture (desks, chairs, conference tables, couches, etc).

4. Schematic

Three possible schematics are proposed in this section. For clarity purposes, the following definitions are provided:

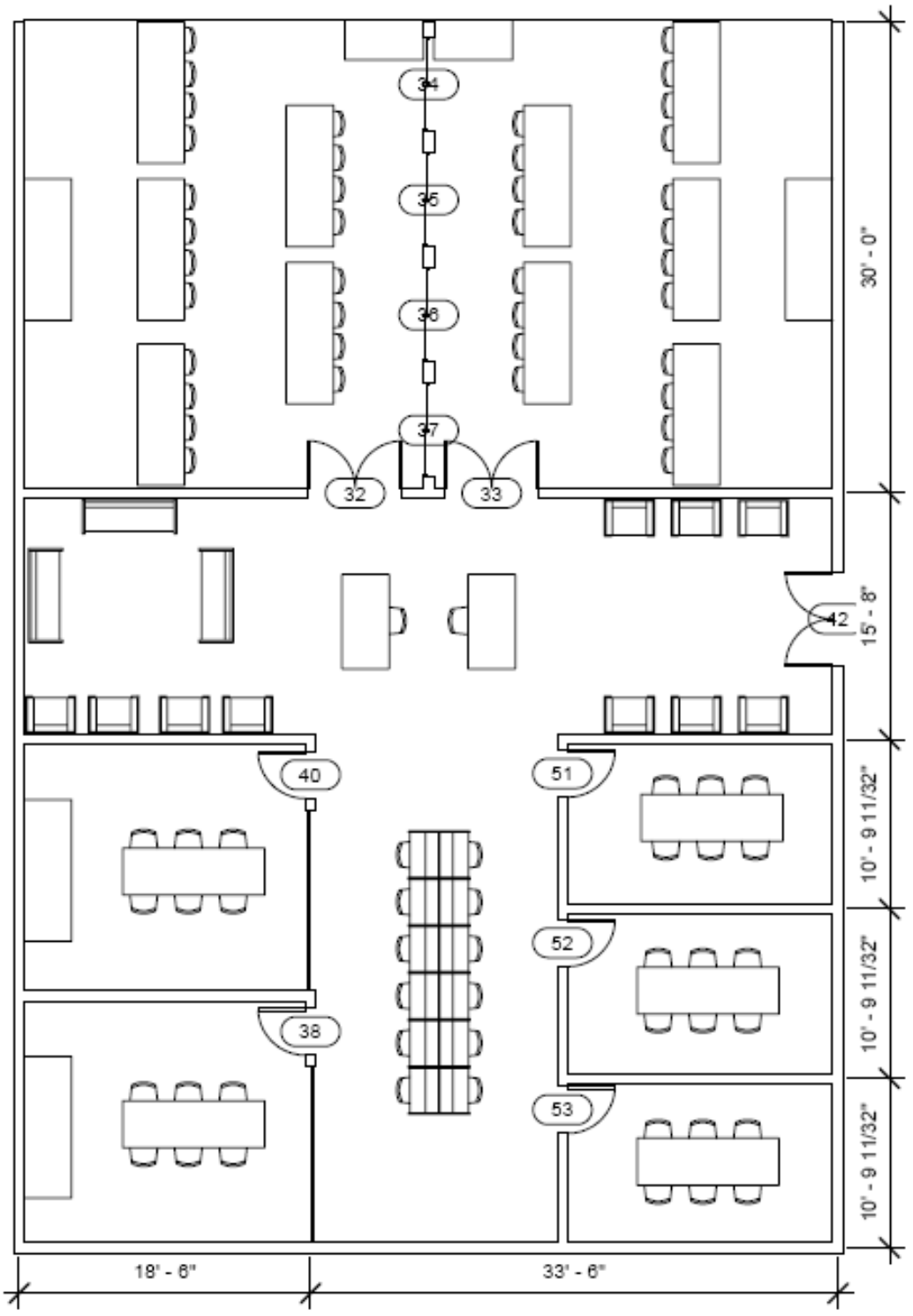
A. Large Classroom: Meant to hold up to 20 students; classes QoP would like to conduct using their instructors and offer other schools visibility can be held in this space and broadcast to outside classrooms via the communications equipment.

B. Small Classroom: Meant to hold up to 10 Students; students can use these classrooms to view courses being broadcasted from other schools and therefore do not need an instructor.

C. Conference Room: Meant to hold up to 6 people; to provide a more formal meeting area for faculty or small student organizations.

D. Entry/Study Area: Main desk to reserve classrooms and conference rooms; computer stations for use by the students and faculty; lounge areas for use by the students and faculty for studying or informal meetings.

Schematic 1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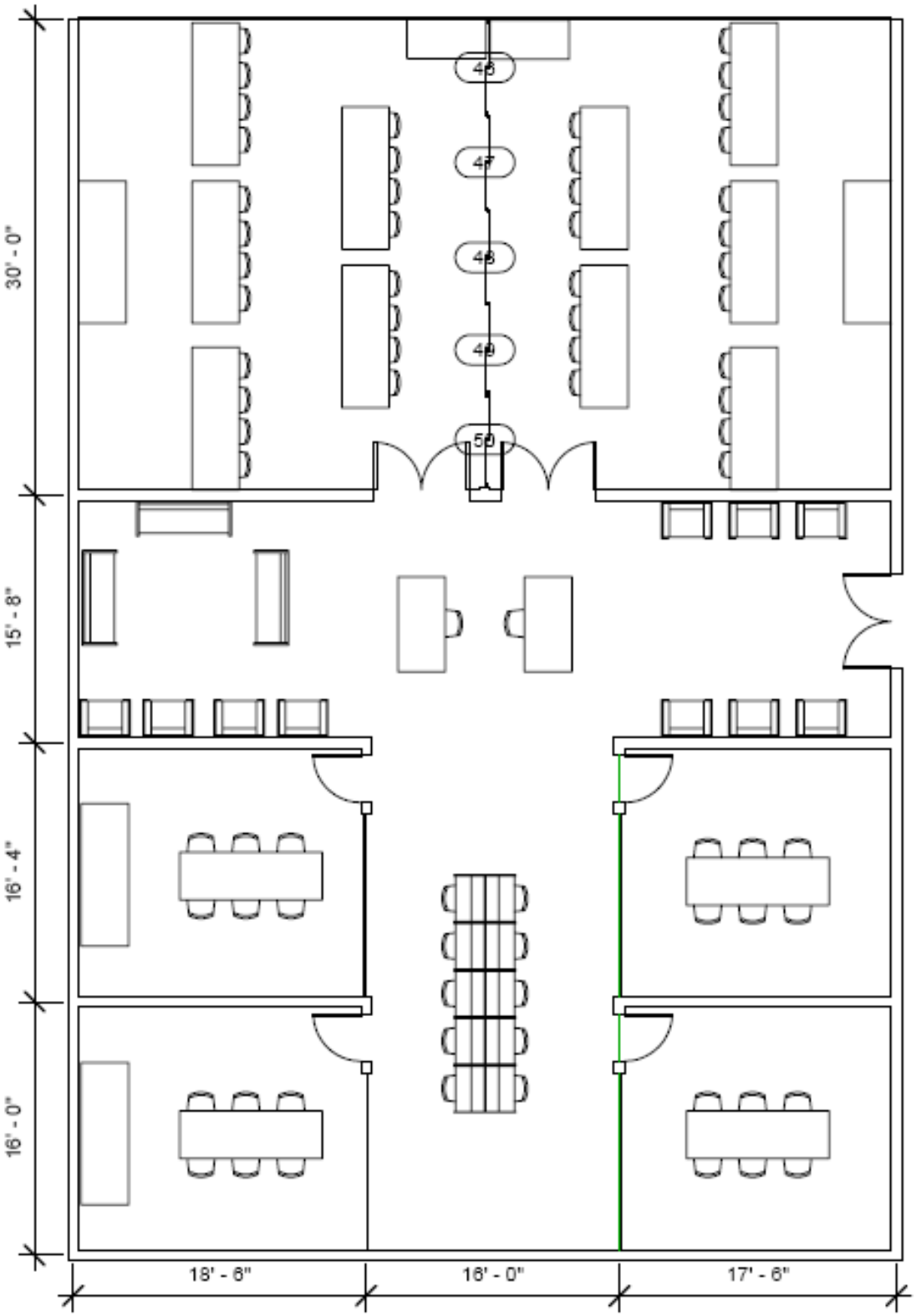
32
33
42
40
51
52
38
53
30' - 0"
15' - 8"
10' - 9 11/32"
10' - 9 11/32"
10' - 9 11/32"
18' - 6"
33' - 6"

Interior Perspectives of Schema 1:

A. Entry

B. Large Classroom

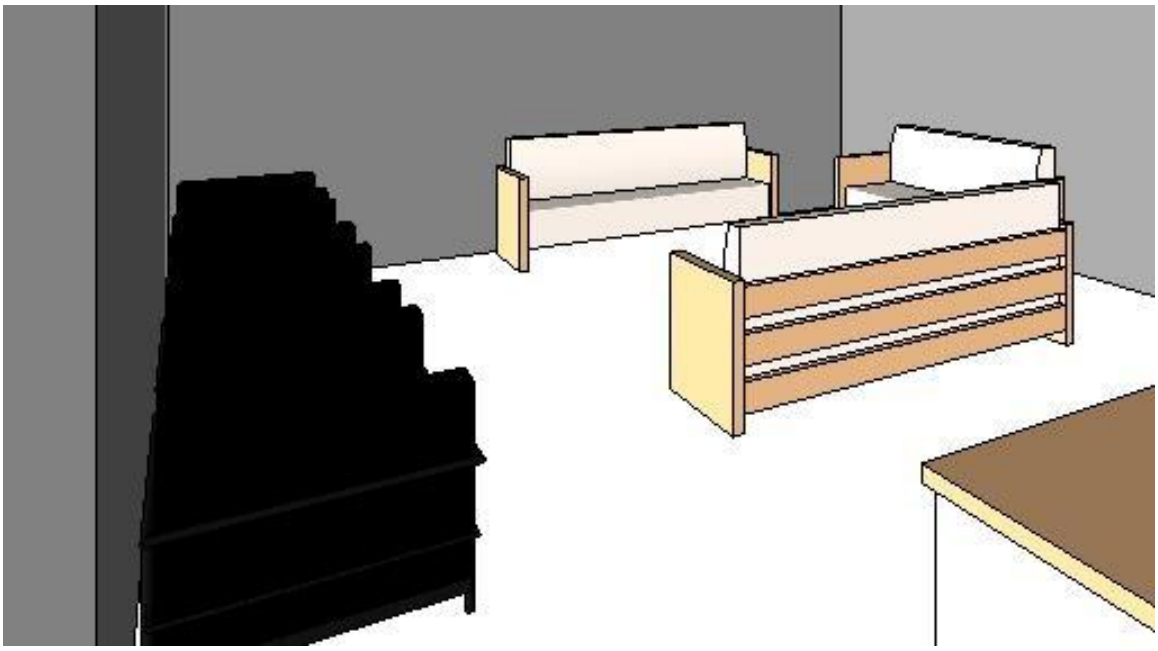
Schematic 2



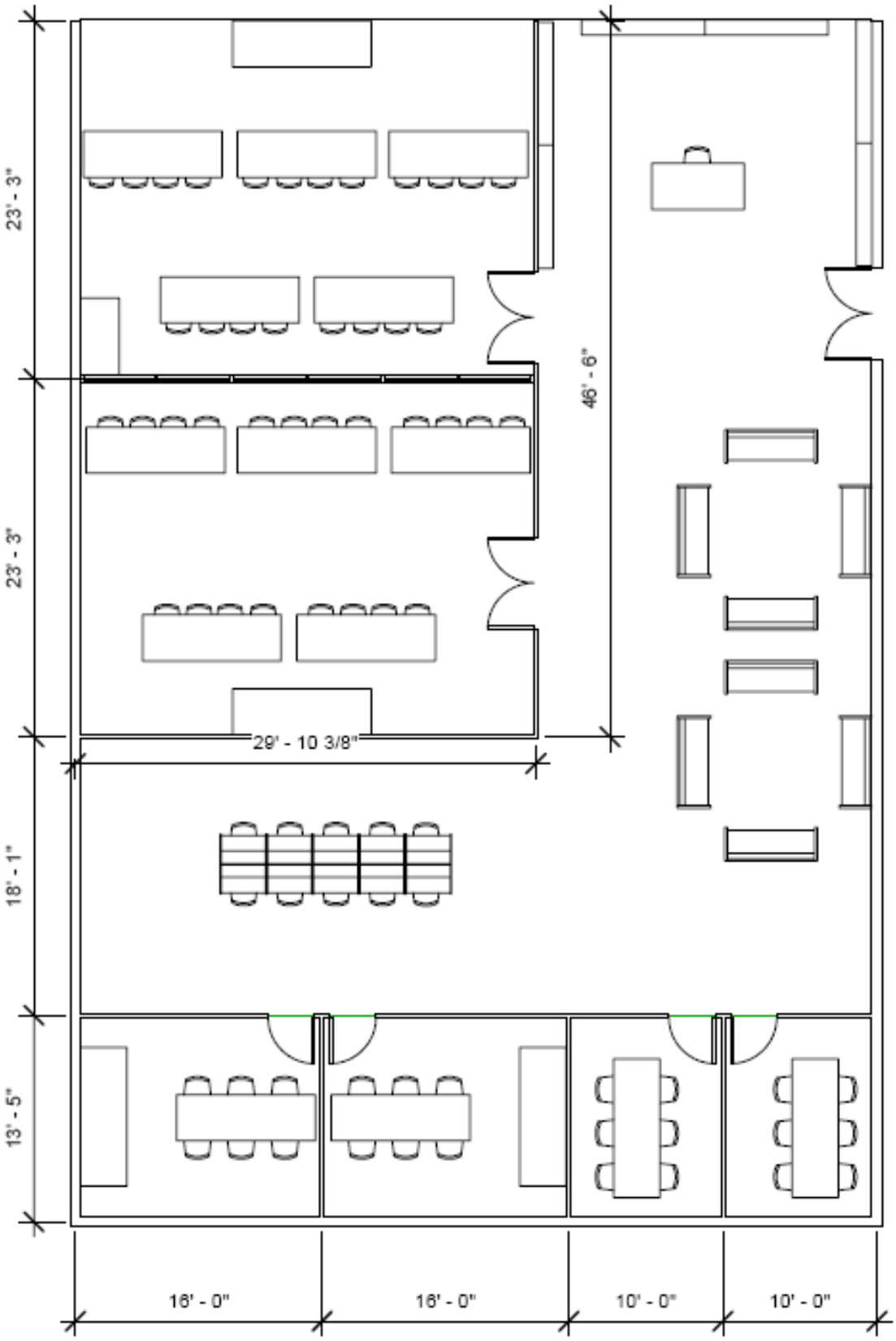
Interior Perspectives of Schematic 2:

A. Small Classroom

B. Study Lounge

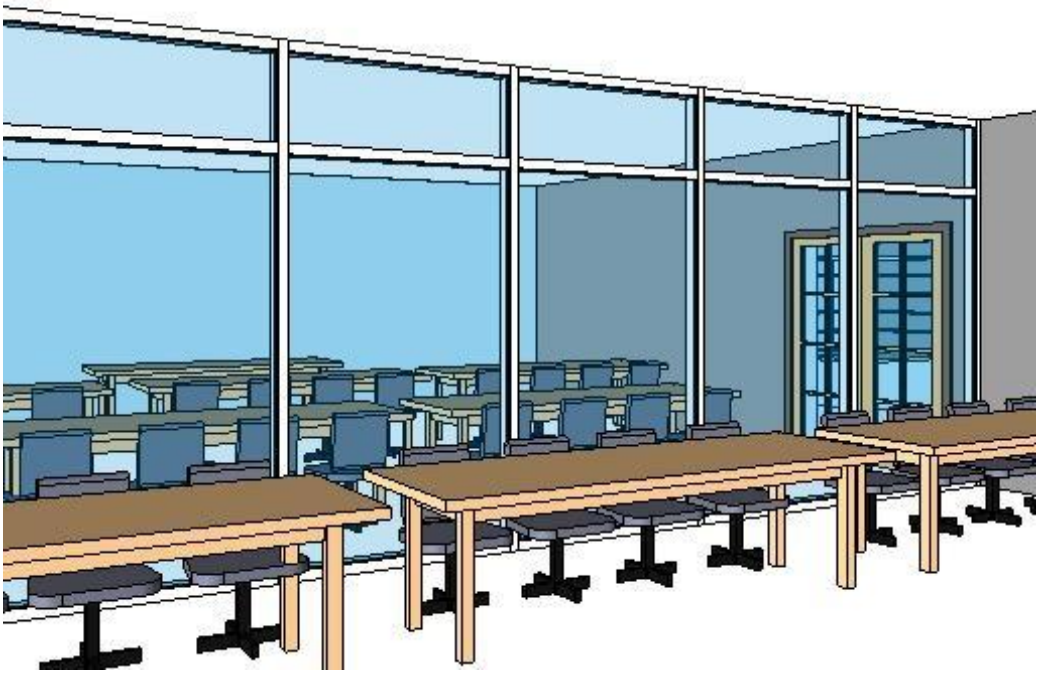


Schematic 3



Interior Perspectives of Schematic 3:

A. Large Classroom



B. Study Lounge

6. Cost versus Benefit Analysis

Audio-visual Equipment

A. LifeSize

Advantages:

a. High definition video communications (1280 x 720 resolution, 30 frames per second)
b. Support for video bandwidth from 128Kbps up to 2 Mbps
c. Supports a single monitor display
d. Standards-based support for H.263, H.263+, H.264, H.235 and H.239
e. Simple user interface
f. Dual-stream support (H.239) for sharing PC and multimedia content
g. Complete management with LifeSize® Control™ software
h. IP to ISDN connectivity with LifeSize® Networker™ enhanced gateway.

Each LifeSize system comes with:

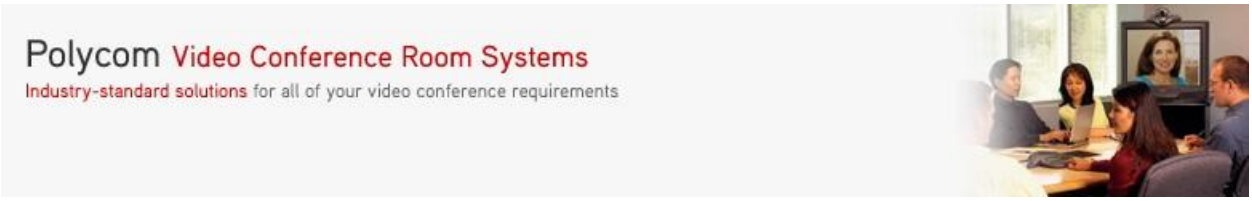
a. LifeSize Express Codec: LifeSize Express is smaller than a sheet of paper, only an inch thick, yet delivers tele-presence quality high definition video.
b. High Definition Camera: The original LifeSize® Camera™ provides high definition imagery through a 70 degree field of view wide angle lens. This fully functional pan-tilt camera supports a wide range of meeting rooms with its 4x optical zoom.

c. High Definition Audio and Wireless Remote Control: High definition video requires high definition, echo-free audio. The LifeSize® MicPod™ delivers crystal-clear sound that creates an immersive, tele-presence experience.

LifeSize® Express™: Approximately **$6,000** - Ideal for connecting with one other person in a different location.

LifeSize® Team MP 200™: Approximately **$9,000** - Ideal for connecting many people in different locations, one can view four callers simultaneously without needing external equipment, advanced scheduling, or a technician.

B. Polycom



Each Polycom system consists of a:

a. Polycom HDX Codec

b. Polycom® EagleEye™ HD Camera: High definition capture with 1280x720 resolutions up to 60fps. It has 12x zoom and 180-degree panning radius which is a perfect fit for different environments and applications. The power is supplied from the HDCI input one on the HDX codec.

c. Polycom® Microphone Array: The microphone has 360 degree coverage with 22 kHz of high fidelity audio. These Polycom HDX units can support up to four microphone arrays and includes a 15-foot cable.

People + Content™, H.239 ($155 one time fee): One will need a license for this software, which is required for the videoconferencing system and has to be bought separately. This enables both people and content to share in high definition, ensuring full interoperability. The dual images allows the far end to see the presentation and speaker at the same time

Polycom® HDX 7000™ Series: Approximately $8,300

Features and Benefits:

a. Perfect solution for a small to medium-sized environment (for 5-12 people)
b. Advanced HD video technology, offers smooth, natural motion and sharp clear images for outstanding video
c. Standards-based presence capabilities when used with the Polycom CMA solution allow for one-click dialing to other endpoints, from desktop video applicaitons to immersive telepresence rooms
d. Patent-pending Lost Packet Recovery™ (LPR™) technology provides for a quality experience on "dirty" networks or on the public internet

For more info on Polycom® HDX 7000™ Series, visit: http://www.polycom.com/common/documents/support/sales_marketing/products/video/hdx7000_features_benefits.pdf

Polycom® HDX 8002™ Series: Approximately **$13,000**

Features and Benefits:

a. Perfect solution for a medium to large-sized environment (for 20-30 people)
b. The system can be upgraded to include an internal bridge and more functionality
c. Advanced HD video technology, offers smooth, natural motion and sharp clear images for outstanding video in 4CIF, 720p or 1080p
d. Share content with remote sites in unique ways, including sharing PC data and information from other video sources
e. This series also includes: People + Content IP and People On Content™. This allows you to include movie clips, detailed pictures, CAD drawings, and more in your background from any video source connected. It also allows you to receive content from any ISDN or IP video conferencing system and can see the presenter and content on a single screen.

For more info on Polycom® HDX 8002™ Series, visit: http://www.polycom.com/common/documents/support/sales_marketing/products/video/hdx8000_features_benefits.pdf

Television Equipment

A. Best Buy

Brand	Size	Model	Price
Panasonic	42”	Viera TH-42PX80U 720p Plasma HDTV	$984.44
Westinghouse	42”	SK-42H240S LCD TV	$1,019.95

B. Sam’s Club

Brand	Size	Model	Price
Visio	42”	LCD 1080p HDTV w/ 120Hz XVT	$997.00
JVC	42”	LCD 1080p HDTV	$997.00
Magnavox	42”	LCD 1080p HDTV	$798.00
Sony	46”	Bravia SL Series LCD 1080p HDTV	$1287.00
Mitsubishi	46”	120 Hz 1080p LCD HDTV	$1,344.00
Sony	46”	Bravia LCD 1080p HDTV	$1,442.00

Wall construction

A. We are proposing to use the Portafab Product which specializes in modular building systems.

Series 300: 3” Load-bearing Aluminum Wall Framing System. This 3” wall system offers load-bearing capability with an aluminum stud system for greater heights than our Series 200 aluminum system. Series 300 closely matches the performance features of our OmniFlex Plus 3” system in a versatile system based on an anodized aluminum stud construction, instead of steel. The anodized aluminum framing system creates a modern, high-tech look while custom panel surface colors provide ability to meet both appearance and functional requirements of almost any plant environment. Clean-room applications are a frequent use of this system. Non-progressive construction makes it quick and easy to expand, modify or move finished units. Initial installation is simple enough for your own maintenance staff to handle.

Features:

a. Wall height: Maximum 18 feet.

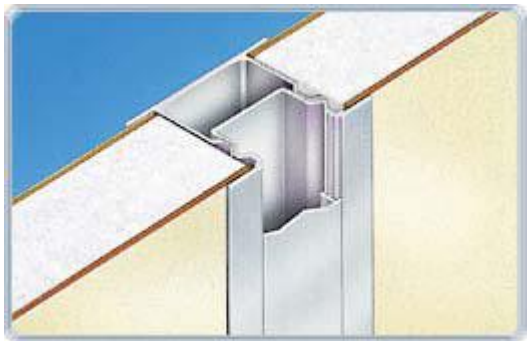
b. Wall Thickness: 3”

c. Aluminum stud construction which offers load-bearing capability.

d. Champagne, gray and white panels are standard. Optional colors can be ordered.

e. Framework in anodized aluminum finish.

f. Stud Construction: These load-bearing studs are often used for constructing clean-rooms and other environmental enclosures.



g. Beveled Windows: Beveled sills on windows provide a sloped ledge on both sides of the glass making wipe down easier.

h. Flush Mount Windows: Our simple window designs allow for flush glazing on single or double-sided windows, minimizing ledges for particles and simplifying surface cleaning.

Furniture

Alpine Chair
Price: $179.95

Lite Use Computer Task Chair
Price: $91.95

Colony Lounge Sled Base Chair
Price: $560.95

Colony Lounge Straight Leg Two Seat
Price: $855.95

Colony Lounge Sled Base Three Seat
Price: $1233.95

Colony Square End Table
Price: $588.95

Colony Coffee Table
Price: $477.95

60” W x 30”D Colony Table
Price: $589.95

72”W x 36”D Kennedy Library
Price: $564.95

Glacier Study Carrel Starter
Price: $364.95

Cost Analysis

A. The lowest costing videoconferencing package is approximately **$7,000**. This includes the LifeSize High Definition Camera, High Definition Audio and Wireless Remote Control plus the Best Buy 42" Panasonic Plasma Television.

B. The highest costing videoconferencing package is approximately **$14,642**. This includes the Polycom® HDX 8002™ Series, upgraded internal bridge, High Definition Camera, Audio Microphone, Wireless Remote, the People + Content IP and People On Content™. This package also includes Sam's Club 46" Sony HD Television.

C. The cost of the furniture package with existing furniture and new furniture is approximately **$17,550**. This quote includes:

   a. 68 existing wooden chairs

   b. 17 existing wooden tables

   c. 8 three- seat couches

   d. 10 study cubicles

   e. 12 computer chairs (for conference rooms)

D. The cost of the furniture package with all new furniture is approximately **$36,423**. This quote includes:

   a. 53 wooden chairs

   b. 17 wooden tables

   c. 8 three- seat couches

   d. 10 study cubicles

   e. 22 computer chairs (for conference rooms and cubicles)

E. The lowest cost of wall partitions is roughly **$5,000**.

F. The Grand Total range for this proposal is between **$26,500- $54,882** (depending on what packages you choose).

5. Timeline

Based on the availability of funding, the time span for transformation of the library into a communication center is approximately 6 months. The furniture will take about 3 weeks to order, ship, receive, and assemble. The interior walls will take up to a month to order and 3 months to install. An additional 2 months is padded into the timeline to account for shipping and assembly delays.

Rooftop and Courtyard Usage Proposal

1. Background

   With the intent of cutting cost and creating new energy resources for QoP high school, the installation of a green roof is proposed. The green roof will consist of reflective roofing, solar panels, and a windmill. Additionally, a water collection system is proposed that will use the roof space to house a system of gutters and the less-visible courtyard space to house cisterns.

2. Goals

   A. Installation of a reflective roof: the school can cut down the cost of heating the building during the winter months and cooling the building during the warmer months. Insulating the roof reduces the heat lost from the building through the roof. Reflective roofing minimizes the transfer of heat from the suns rays by reducing the surface temperature of the roof. The few current window air-conditioning units are not very efficient and are not included in every room. Additionally, reflective roofing contains UV-blocking pigments. Because UV rays age a roof considerably, the use of reflective roof coatings can extend the roof's life by up to 15 years. This is especially true in buildings with low slope or flat roofs, which tend to absorb sun energy at a higher rate than slanted roofs. Since roof maintenance accounts for more than 80% of a building's total maintenance cost, any product that can extend roof life will result in substantial savings.

   B. Installation of windmill technology: the windmills can generate green energy for the school's use. The energy generated can be directed to areas of the school with high energy consumption (e.g. Robotics Lab) and thereby reduce utilities cost.

   C. Installation of solar panels: using the same concepts discussed in the windmill goal, solar panels create renewable sources of energy.

   D. Installation of a rainwater collection system: rainwater is collected through a system of gutters leading to a number of cisterns. The collected rainwater is used in assisting the natural ventilation of the building. A detention pond is created in the main courtyard to collect the harvested water. Additionally, by redirecting the water, the school can cut down on their sewer utility costs.

   E. Use of the green roof as a teaching aid: the technology used in the green roof can be used a teaching aid in the science curriculum of the school.

3. Methodology

   Insulated and reflective roofing is a very energy efficient change that a lot of architects are utilizing in remodeling and new construction. Additionally, government and institutions affiliated with the EPA give recognition to strides taken in this direction offering grants, certifications, etc. There are a few materials used in insulating the roof: materials like plywood, rubber or PVC have lower conductivity values and therefore can retain the heat during winters. Clay or ceramic times could be used too; however, their maintenance to insulation ratio does not come out as high as compared to other materials. Polyurethane has a very low conductivity (of 0.026). Vermiculite flakes, polystyrene and cork granules are other insulation additives with low conductivities. Calculations and reviews from users of reflective roofing say their energy bills decreased by up to 20% (max). The school currently has an average yearly spend of $48,243 in electricity (based on the April 2005 through the March 2008 utility bills provided by the school) and $49,036 in gas (based on the October 2004 through the August 2007 utility bills provided by the school), the maximum 20% reduction would bring the utility costs to $38,294 in electricity and $39,229 in gas. Some

standard reflective materials are Aluminum sheets and acrylic paint (white). A company called Blue River Coatings has a product called Hydro-Flex PIR that is claimed to work better than normal acrylic paint due to its polyurethane top coat. This could reflect and insulate at the same time. A slightly more expensive reflective material is Rutile (TiO_2). It is white in appearance, has reflective index of 2.6 and costs $10/ton. TiO_2 occurs in other forms called anatase and brookite; they have approximately the same reflective index as Rutile but a slightly lower density and subsequently lower weight. Foil-Fiberglass-Vinyl is another material that could be used; it is 99% Aluminum foil and has a 0.25 inch fiberglass core and one layer of durable white scrim-reinforced facing material. Since it costs just over $3/Sq-ft, it is comparatively cheaper than other products.

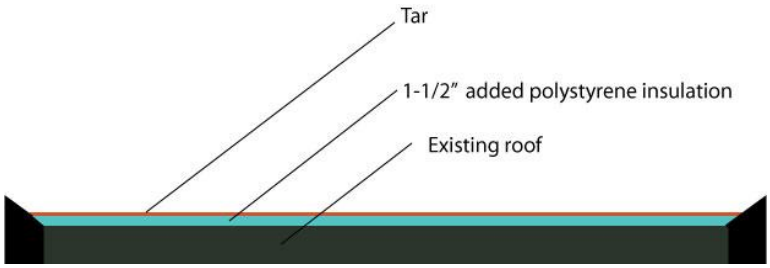
The idea of installing a windmill was initially researched by the team. However, the weather information about Burbank showed an average wind speed of 11 mph (saliflow.com). When the wind is blowing at 28mph, the turbines generate 1 kilowatt of power, enough to run a TV, DVD player and several lights. If the necessary wind force is not achieved, all we have is dead weight on the roof. Swift wind turbines are an option that could be used. They need a minimum speed of 9 mph, however, only a power of 1.5 KWh is achieved and therefore would not generate enough energy to compensate for the additional stress its weight puts on the roof. The costs of installations are moderate but maintenance is high on windmills. Therefore, the installation of one windmill might not prove to be very cost effective. Due to the large expense of purchasing, installing, and maintaining a windmill, the goal of using windmill technology in the green roof has been suspended as the costs far outweigh the benefits that could be reached with the average wind speed in the Burbank area.

An additional idea for generating green energy is the installation of solar paneling. The solar panels can be installed on east facing walls and the roof. Integrated Photovoltaic cells could be used on the roofs. They are easy to install, maintain and are light weight. Amorphous silicon panels are used and enable maximum wattage generation. They are simple tile shaped cells currently widely used in the commercial sector. One could also use photovoltaic laminates; there are flexible and can produce power from 64 W to 136 W. The company, PTL Solar, has variety of solar panel installations that could be fixed to the east facing walls. The panels are small and portable and PTL Solar has an educational kit that students could use to understand the concept of solar energy generation.

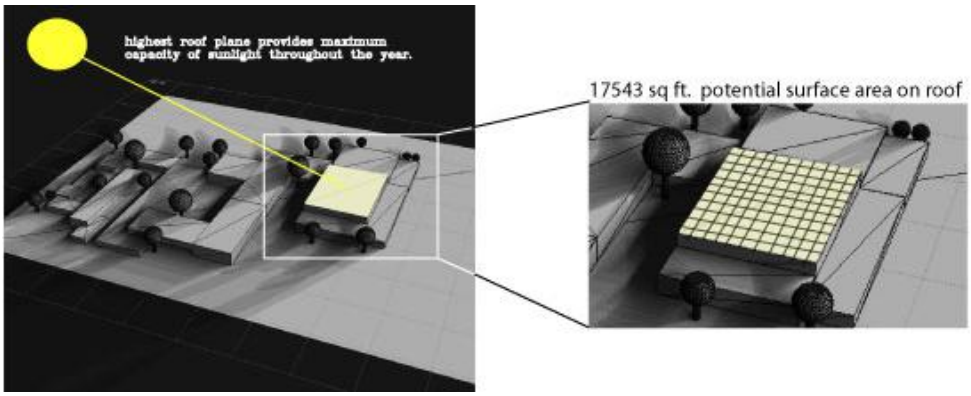
Rainwater harvesting is the gathering, or accumulating and storing, of rainwater. Generally speaking, rooftop rainwater systems are used if there is more than 254mm of precipitation a year (according to weather.com, Burbank gets approximately 975mm of precipitation a year). The system consists of a storage tank to store the water and piping (to guide the water in). Additionally, extra pressuring equipment such as pressure vessels, inline pump controllers or pressure sensitive pumps may also be required. Depending on local circumstances, a gravity-fed system may already be enough to have a pressured water collection system. In this case, no pumps/pressure vessels are required. In practice, gravity-controlled systems are usually created by placing the water harvester on an elevation (e.g. rooftops as in the case for QoP). Rainwater harvesting in urban areas can have manifold reasons: it increases soil moisture levels for urban greenery, it increases the ground water table through artificial recharge, and it mitigates urban flooding and improves the quality of groundwater.

4. Schematic

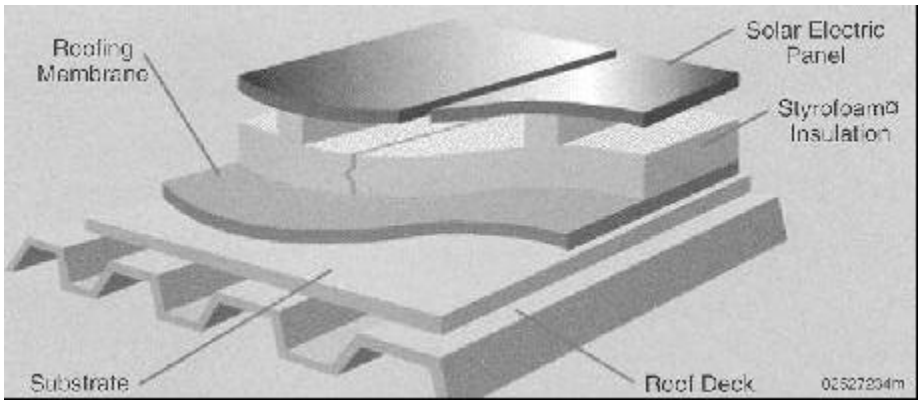
A. Roof section showing added insulation



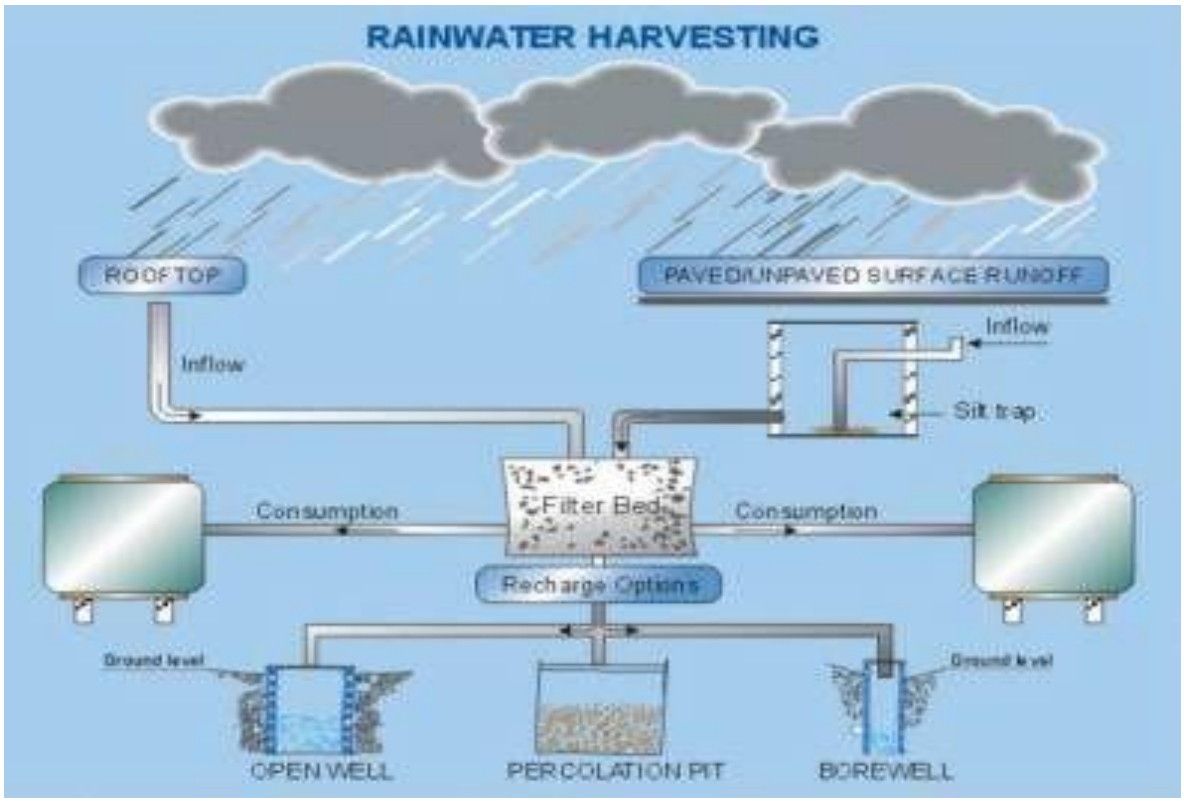
B. Solar panel placement on the roof

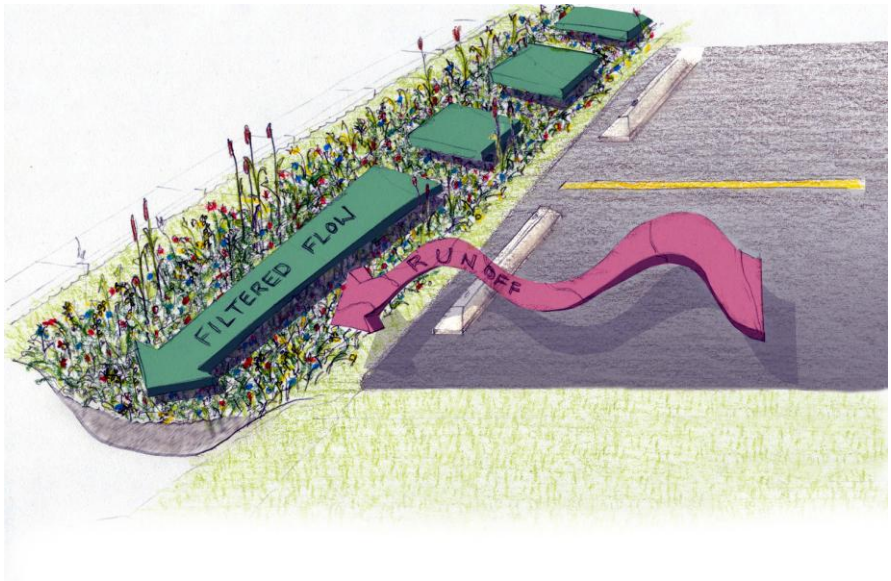


C. Section of a Building integrated Solar Panel



D. Rainwater harvesting system





5. Cost versus Benefit Analysis and Timeline

   A. Reflective roofing reflects the suns rays away from the school therefore reducing the heat transfer into the building. This will keep the building cooler during the summer months and allow the school to remain open all year long. Findings from the Lawrence Berkley Laboratory in California show that reflective roofing can save a minimum of 25% in energy usage. Furthermore, the reflective roofing blocks UV rays which are the prominent reason for roof aging, by installing the reflective panels the life of the roof can be extended up to 15 years in addition to reducing the costs of maintaining the roof.

   B. Additional roofing insulation prevents heat loss from the building during the winter months which therefore reduces energy consumption of the school used to heat the building. More testing needs to be done on the current school conditions to generate an accurate cost and savings figure for roofing insulation.

   C. Solar Panels would be a great addition to current science curriculum (e.g. robotics) at QoP. They would also increase reputation of the school as a technology leader. The proposal is for the school to purchase one solar panel for demonstration purposes to include in their science curriculum as a teaching aid. The cost of one solar panel (5' x 2') is approximately $650-$800.

   D. A water harvesting system implemented on the school grounds could also be used as a teaching aid for the school. These types of systems increase soil moisture levels for urban greenery, mitigate urban flooding, and improve the quality of groundwater. More research needs to be done to calculate a cost estimate for installing a water harvesting system at QoP.

Lighting Efficiency Proposal

1. Background

   After meeting with the QoP representatives and visiting the campus, it was noted that the currently lighting in the convent facilities and the gymnasium was out of date and costly to operate. A full assessment of the current fixtures and lamps in the convent and gymnasiums was performed and subsequently a cost versus benefit analysis was executed to determine the utilities saving potential for the school.

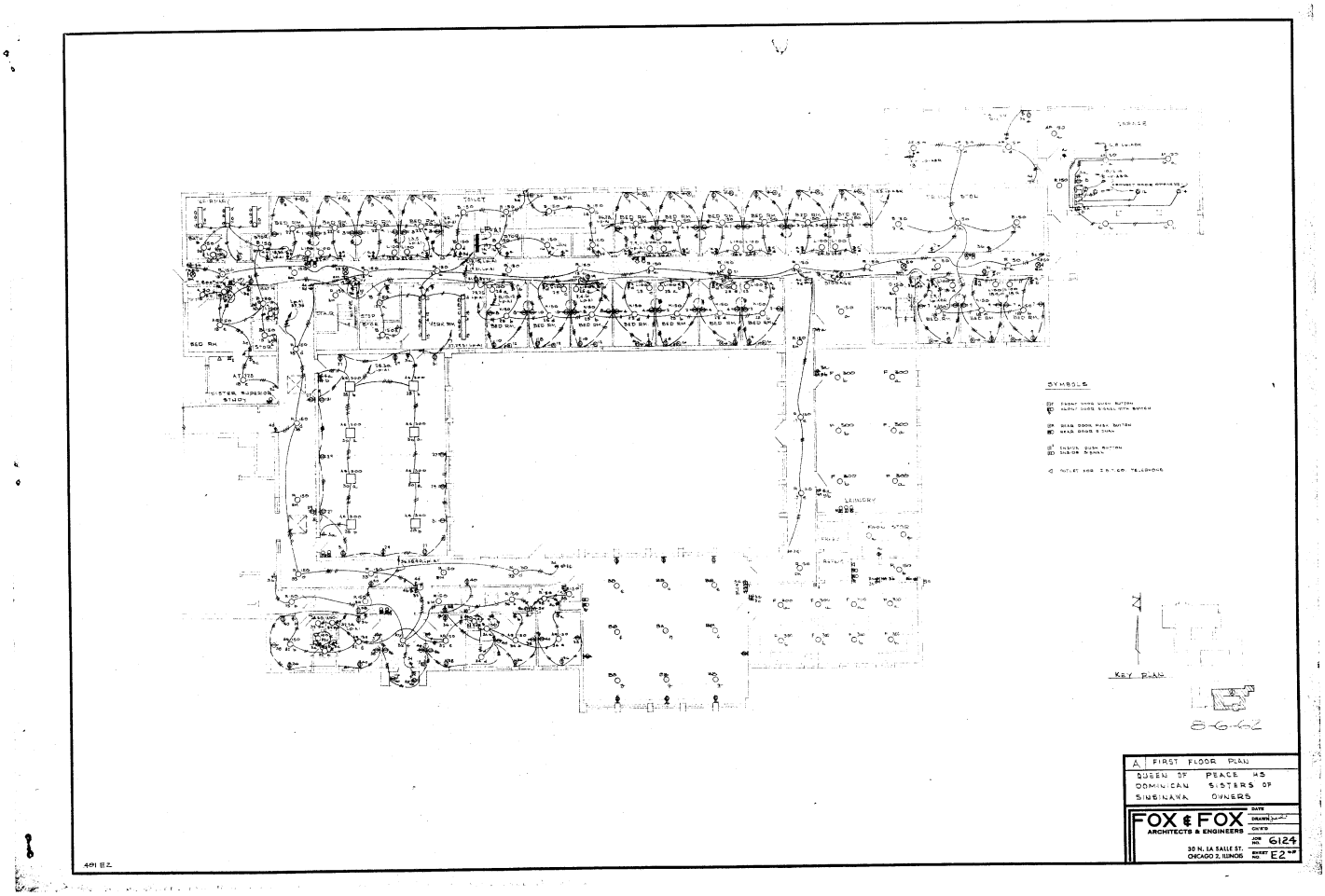
2. Goals

   The goal of a lighting efficiency assessment is to determine the current lighting costs to the school before the retrofit, then calculate the lighting costs to the school after the replacement fixtures and lamps have been installed to finally determine the total savings the school can expect year over year based on the reduction in energy (wattage) usage. Additionally, Commonwealth Edison offers an incentive plan to facilities performing a lighting retrofit that will offset some of the hardware and labor costs of performing the retrofit. An added benefit of performing the lighting retrofit is the reduction in the production and emission of the pollutants and subsequently the decrease in the carbon footprint the school leaves on the environment. Greening efforts such as these will also allow the school to qualify for additional government and private funding and grants.

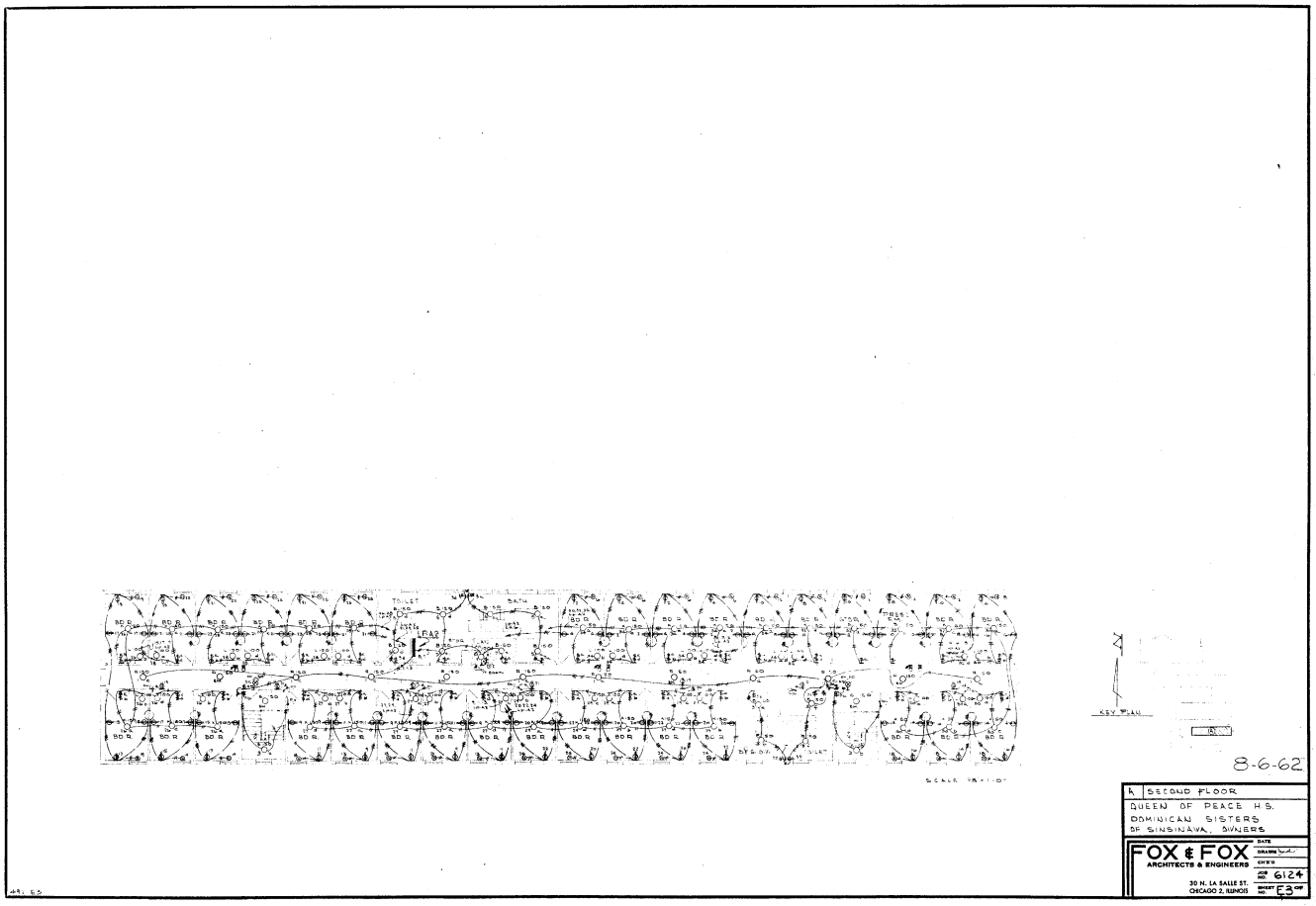
3. Methodology

   The process for performing a lighting efficiency retrofit starts with creating an inventory of the school lighting based on the original blueprints provided by QoP (blueprints and master inventory lists can be found in the schematic section of this proposal). After the inventory has been completed, a site visit is required and a room-by-room inspection is performed to ensure the lighting in the blueprints is still accurate. Any rooms having fixtures that had been replaced since the blueprints were generated were accounted for and the inventory list is modified to accommodate the changes. Once the inventory list accurately represents the currently lighting situation at the school, wattage calculations are performed to reflect the current wattage usage and subsequent energy costs. Then, replacement, lower-wattage fixtures and lamps are suggested and wattage calculations are performed to reflect potential future wattage usage and energy costs. Based on the reduction in wattage, savings calculations are performed to represent the potential year over year savings realized through the reduction in energy costs. Additionally, based on the wattage reduction, the reduction in pollutant production and emission is calculated. Further, a calculation is performed to determine the cost of the replacement fixtures, lamps, and labor fees. The ComEd incentive is then subtracted from the cost figure. Based on the initial cost of the retrofit and the annual savings associated with the lower wattage hardware a payback figure is generated to show how long it will take for the school to realize the retrofit savings benefit.

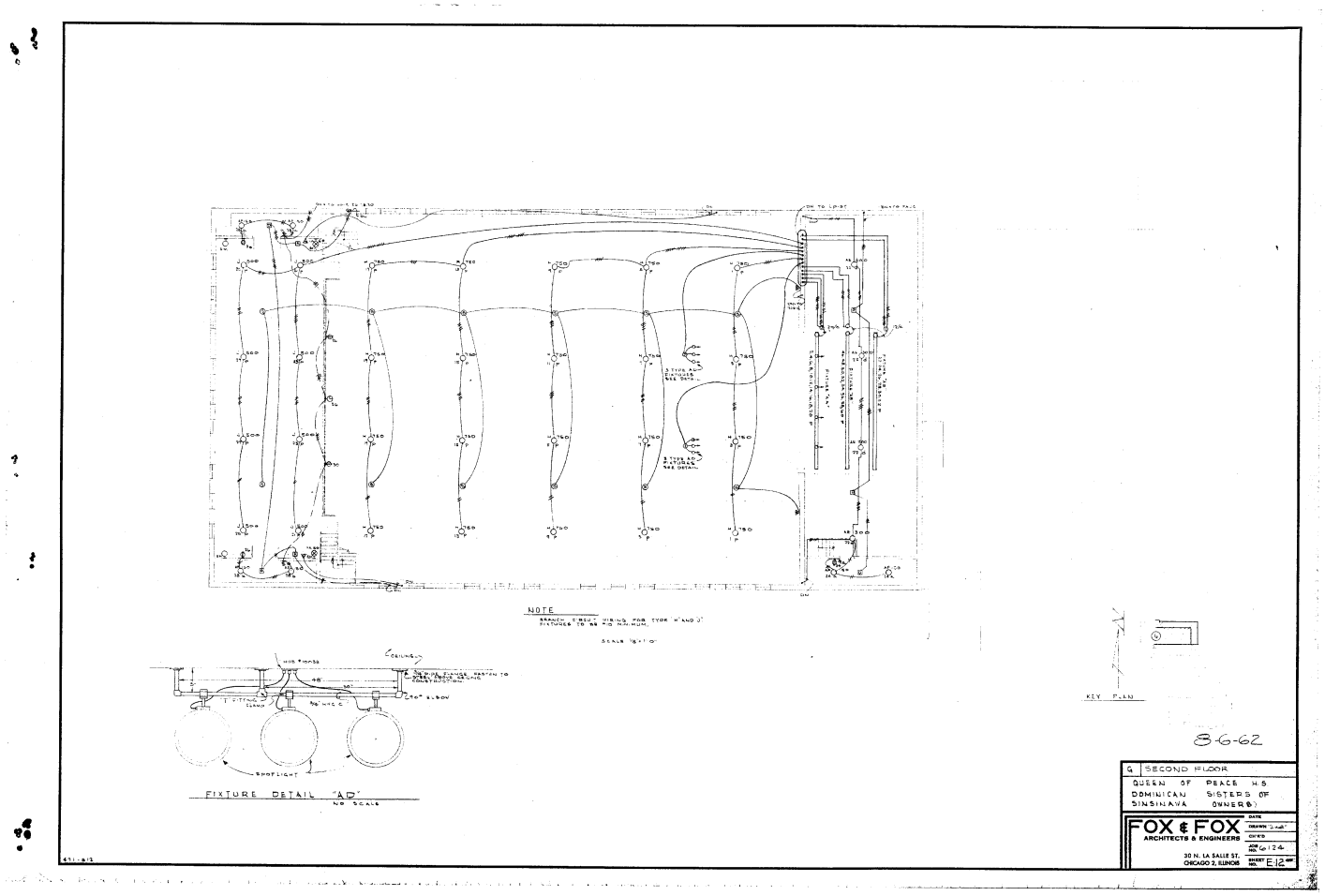
4. Schematic
   A. Electrical blueprint of convent 1st floor



B. Electrical blueprint of convent 2nd floor



C. Electrical blueprint of gymnasium



D. Current lighting inventory and replacement suggestions for convent

Room #	Room Type	Fixture Type	Fixture QTY	Lamp Type	Lamp Description	Lamp QTY	Total Fixture Wattage	Replacement Fixture	Replacement Fixture QTY	Replacement Lamp	QTY Replacement Lamp per fixture	Total Replacement Fixture Wattage
	Hall from front offices to convent	Ceiling incandescent Fixture	5	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
101	Infirmary	1x4 Wrap	3	N/A	T12	2	96	Retrofit- 2 T-8s, electronic ballast	3	T8	2	58
102	Bath	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
102	Bath	Ceiling incandescent Fixture	1	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
103	Storage	Ceiling incandescent Fixture	1	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
104	Phone	Ceiling incandescent Fixture	1	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
105	Closet	Ceiling incandescent Fixture	1	A	Hubble	1	50	Ceiling compact fluorescent	1	30	1	30
105	Bedroom	1x4 Wrap	1	N/A	T12	2	96	Retrofit- 2 T-8s, electronic ballast	1	T8	2	58
106	Bath	Ceiling incandescent Fixture	1	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
106	Bath	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
107	Storage	Ceiling incandescent Fixture	1	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
108	Sister Superior Study	4x4 Magnetic	1	N/A	T12	6	388	Retrofit- 6 T-8s, 2 3l electronic ballasts	1	T8	6	180
109	Bedroom	1x4 Wrap	1	N/A	T12	2	96	Retrofit- 2 T-8s, electronic ballast	1	T8	2	58
110	Bedroom	1x4 Wrap	1	N/A	T12	2	96	Retrofit- 2 T-8s, electronic ballast	1	T8	2	58
111	Bedroom	1x4 Wrap	1	N/A	T12	2	96	Retrofit- 2 T-8s, electronic ballast	1	T8	2	58
112	Bedroom	1x4 Wrap	1	N/A	T12	2	96	Retrofit- 2 T-8s, electronic ballast	1	T8	2	58
113	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
113	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
114	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
114	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
115	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
115	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
116	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
116	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
117	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
117	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
118	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
118	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
119	Bedroom	2x4 Wrap	1	N/A	T12	4	192	Retrofit- 4 T-8s, 1 4l electronic ballast	1	T8	4	110
119	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
119	Bedroom	2x4 Wrap	1	N/A	T12	4	192	Retrofit- 4 T-8s, 1 4l electronic ballast	1	T8	4	110
120	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
119	Bedroom	2x4 Wrap	1	N/A	T12	4	192	Retrofit- 4 T-8s, 1 4l electronic ballast	1	T8	4	110
121	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
119	Bedroom	2x4 Wrap	1	N/A	T12	4	192	Retrofit- 4 T-8s, 1 4l electronic ballast	1	T8	4	110
122	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
119	Bedroom	2x4 Wrap	1	N/A	T12	4	192	Retrofit- 4 T-8s, 1 4l electronic ballast	1	T8	4	110
123	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
119	Bedroom	2x4 Wrap	1	N/A	T12	4	192	Retrofit- 4 T-8s, 1 4l electronic ballast	1	T8	4	110
124	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
119	Bedroom	2x4 Wrap	1	N/A	T12	4	192	Retrofit- 4 T-8s, 1 4l electronic ballast	1	T8	4	110
125	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
126	Bedroom	2x4 Wrap	1	N/A	T12	4	192	Retrofit- 4 T-8s, 1 4l electronic ballast	1	T8	4	110
126	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
127	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30

Room #	Room Type	Fixture Type	Fixture QTY	Lamp Type	Lamp Description	Lamp QTY	Total Fixture Wattage	Replacement Fixture	Replacement Fixture QTY	Replacement Lamp	QTY Replacement Lamp per fixture	Total Replacement Fixture Wattage
127	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
128	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
128	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
129	Toilet	2x4 Wrap	3	N/A	T12	4	192	Retrofit- 4 T-8s, 1 4l electronic ballast	3	T8	4	110
130	Bath	Ceiling incandescent Fixture	3	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
131	Storage	Ceiling incandescent Fixture	1	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
132	Janitor	Ceiling incandescent Fixture	1	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
133	Trunch Storage	Ceiling incandescent Fixture	3	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
134	Corridor	Exit Light	4	N/A	N/A	N/A	40	New LED exit w/ battery backup	4			2
134	Corridor	Ceiling incandescent Fixture	12	R	Hubble	3	150	14" diameter compact fluorescent	1	30W	1	30
140	Stairs - East	Ceiling incandescent Fixture	1	S	Hubble	3	150	Ceiling compact fluorescent	1	30	1	30
136	Storage	Ceiling incandescent Fixture	1	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
137	Storage	Ceiling incandescent Fixture	1	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
138	Work Room	fluorescent Fixture	4	N/A	T17	2		Remove old fixture	4			0
138	Work Room	fluorescent Fixture						New 1x8 wide wrap- 2 T-8s, 2l electronic ballast	2			58
138	Work Room	fluorescent Fixture						New 1x4 wide wrap- 1 T-8, 1l elec ballast	2			30
139	Storage	2x4 Lay-in magnetic ballast	2	N/A	T12	4	192	Retrofit- reflector, 2 T-8s 2l eb	2	T8	2	58
141	Corridor	Ceiling incandescent Fixture	4	R	Hubble	3	150	14" diameter compact fluorescent	1	30W	1	30
142	Community Room	fluorescent Fixture	8	AS	Revere	2	300	No change needed	8	N/A	N/A	N/A
143	Corridor	Ceiling incandescent Fixture	3	R	Hubble	3	150	14" diameter compact fluorescent	1	30W	1	30
144	Corridor	Ceiling incandescent Fixture	4	R	Hubble	3	150	14" diameter compact fluorescent	1	30W	1	30
145	Guest	2x4 Wrap w/ mag ballast	1	N/A	T12	4	192	Retrofit- 4 T-8s, 1 4l electronic ballast	1	T8	4	110
145	Guest Closet	Ceiling incandescent Fixture	1	A	Hubble	1	50	Ceiling compact fluorescent	1	30	1	30
146	Guest Bath	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
146	Guest Bath	Ceiling incandescent Fixture	1	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
147	Guest	Ceiling incandescent Fixture	1	AQ	Revere	2	150	Ceiling compact fluorescent	1	30	1	30
147	Guest Closet	Ceiling incandescent Fixture	1	A	Hubble	1	50	Ceiling compact fluorescent	1	30	1	30
148	Reception	2x2 2UT8 electronic ballast	2	N/A	T8	2	N/A	No change needed	2	N/A	N/A	N/A
149	Parlor Room	2x4 Wrap w/ mag ballast	1	N/A	T12	4	192	Retrofit- 4 T-8s, 1 4l electronic ballast	1	T8	4	110
150	Parlor	Ceiling incandescent Fixture	1	AQ	Revere	2	150	Ceiling compact fluorescent	1	30	1	30
151	Toilet	Ceiling incandescent Fixture	1	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
152	Vestibule	Ceiling incandescent Fixture	1	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
153	Dining Room	2x4 Wrap w/ mag ballast	1	N/A	T12	4	192	Retrofit- 4 T-8s, 1 4l electronic ballast	1	T8	4	110
154	Hallway	Ceiling incandescent Fixture	1	R	Hubble	3	150	14" diameter compact fluorescent	1	30W	1	30
155	Serving Room	Ceiling incandescent Fixture	1	R	Hubble	3	150	14" diameter compact fluorescent	1	30W	1	30
156	Refectory	2x4 lay-in w/ deep cell	9	N/A	T12	3	150	Retrofit- reflector, 2 T-8s 2l eb	2	T8	2	58
157	Kitchen	4-lamp wraps	6	N/A	T12	4	192	Retrofit- 4 T-8s, 1 4l electronic ballast	6	T8	4	110
160	Entryway	1x4 Wrap w/ mag ballast	4	N/A	T12	2	96	Retrofit- 2 T-8s, electronic ballast	4	T8	2	58
160	Bath off Entryway	Ceiling incandescent Fixture	1	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
161	Food Storage	2x4 wraps w/ mag ballast	6	N/A	T12	4	192	Retrofit- 4 T-8s, 1 4l electronic ballast	6	T8	3	110
163	Corridor	Ceiling incandescent Fixture	4	R	Hubble	3	150	14" diameter compact fluorescent	1	30W	1	30
164	Laundry	2x4 wraps w/ mag ballast	6	N/A	T12	4	192	New 2x4 wrap- 3 T-8s	6	T8	3	90
165	Phone	Ceiling incandescent Fixture	1	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
168	Hallway	Ceiling incandescent Fixture	1	R	Hubble	3	150	14" diameter compact fluorescent	1	30W	1	30
140	Stairs - West	Ceiling incandescent Fixture	1	S	Hubble	3	150	Ceiling compact fluorescent	1	30	1	30

Room #	Room Type	Fixture Type	Fixture QTY	Lamp Type	Lamp Description	Lamp QTY	Total Fixture Wattage	Replacement Fixture	Replacement Fixture QTY	Replacement Lamp	QTY Replacement Lamp per fixture	Total Replacement Fixture Wattage
201	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
201	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
202	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
202	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
203	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
203	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
204	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
204	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
205	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
205	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
206	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
206	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
207	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
207	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
208	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
208	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
209	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
209	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
210	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
210	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
211	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
211	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
212	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
212	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
213	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
213	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
214	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
214	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
215	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
215	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
216	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
216	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
217	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
217	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
218	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
218	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
219	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
219	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
220	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
220	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
221	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
221	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
222	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
222	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
223	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
223	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
224	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20

Room #	Room Type	Fixture Type	Fixture QTY	Lamp Type	Lamp Description	Lamp QTY	Total Fixture Wattage	Replacement Fixture	Replacement Fixture QTY	Replacement Lamp	QTY Replacement Lamp per fixture	Total Replacement Fixture Wattage
224	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
225	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
225	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
226	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
226	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
227	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
227	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
228	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
228	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
229	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
229	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
230	Bedroom	Bracket Fixture	1	L	Hubble	2	100	Sink compact fluorescent	1	20	1	20
230	Bedroom	Ceiling incandescent Fixture	1	K	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
231	Toilet	Ceiling incandescent Fixture	3	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
232	Storage	Ceiling incandescent Fixture	1	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
233	Janitor	Ceiling incandescent Fixture	1	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
234	Phone	Ceiling incandescent Fixture	1	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
235	Bath	Ceiling incandescent Fixture	3	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
236	Storage	Ceiling incandescent Fixture	1	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
237	Pres. Room	Ceiling incandescent Fixture	1	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
238	Corridor	Ceiling incandescent Fixture	12	S	Hubble	3	150	Sink compact fluorescent	1	20	1	20
238	Corridor	Exit Light	2	N/A	N/A	N/A	40	New LED exit w/ battery backup	2			2
239	Bath	Ceiling incandescent Fixture	2	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30
240	Toilet	Ceiling incandescent Fixture	2	B	Hubble	2	150	Ceiling compact fluorescent	1	30	1	30

E. Current lighting inventory and replacement suggestions for gymnasium & stage

Room #	Room Type	Fixture Type	Fixture QTY	Lamp Type	Lamp Description	Lamp QTY	Total Fixture Wattage	Replacement Fixture	Replacement Fixture QTY	Replacement Lamp	QTY Replacement Lamp per fixture	Total Replacement Fixture Wattage
129	Stage	Ceiling Incandescent Fixture	2	AF	McPhilben	1	150	1x4 wrap	2	T8	1	30
129	Stage	Ceiling Incandescent Fixture	4	AE	McPhilben	1	300	1x4 wrap	4	T8	2	58
130	Gymnasium	Ceiling Incandescent Fixture	14	N/A	Metal Halide	1	450	2x4 high bay and wire guard + lens	14	T8	6	224
130	Gymnasium	Ceiling Incandescent Fixture	14	N/A	Metal Halide	2	650	2x4 high bay and wire guard + lens + (0-100) dimming ballast	14	T8	6	224

5. Cost versus Benefit Analysis

A. Current wattage usage

Ref #	Fixture Location	Fixture QTY	Fixture Type	Watt/Hr Before	kW Used	Hrs./Yr.	kWh Annually	Hours/year
1	Room 138	4	1x5 old wrap- 2 T-17 lamps	220	0.88	2,000	1,760	211
2	Room 138	0		0	0.00	2,000	0	0
3	Room 138	0		0	0.00	2,000	0	0
4	Various	12	1x4 wrap- 2 T-12s	96	1.15	2,000	2,304	276
5	Various	2	2x4- 4l LI	192	0.38	2,000	768	92
6	Various	9	2x4- 3l deep cell	150	1.35	2,000	2,700	324
7	Various	26	2x4- 4l wrap	192	4.99	2,000	9,984	1,198
8	Various	6	2x4- 4l old wrap	192	1.15	2,000	2,304	276
9	Various	1	4x4- 6l LI	288	0.29	2,000	576	69
10	Various	49	Old sink fixture- 2 50 w	100	4.90	2,000	9,800	1,176
11	Various	30	Old ceiling fixture- 3 50 w	150	4.50	2,000	9,000	1,080
12	Various	97	Old ceiling fixture- 150 w	150	14.55	2,000	29,100	3,492
13	Various	6	Old Incan Exits	40	0.24	8,760	2,102	252
14	Stage	2	Old incan - 150 watts	150	0.30	2,000	600	72
15	Stage	4	Old incan - 150 watts	150	0.60	2,000	1,200	144
16	Gym	14	Old MV fixture- 450 w	450	6.30	4,000	25,200	3,024
17	Gym	14	Old MV fixture- 750 w	750	10.50	4,000	42,000	5,040
		276			**52.09**		**139,398**	**16,728**

TOTAL ANNUAL COST: $17,731

B. Future wattage usage

Ref #	Fixture Location	Fixture QTY	Fixture Type	Watt/Hr Before	kW Used After	Hrs./Yr. Removed	kW Removed	Hours/year	kWh Removed	Energy Savings
1	Room 138	4	Remove	220	0	220	0.88	2000	1760	211
2	Room 138	2	New 1x8 wrap- 2 T-8s	0	58	-58	-0.12	2000	-232	-28
3	Room 138	2	New 1x4 wrap- 1 T-8	0	30	-30	-0.06	2000	-120	-14
4	Various	12	Retrofit- 2 T-8s, eb	96	58	38	0.46	2000	912	109
5	Various	2	Retrofit- reflector, 2 T-8s	192	58	134	0.27	2000	536	64
6	Various	9	Retrofit- reflector, 2 T-8s	150	58	92	0.83	2000	1656	199
7	Various	26	Retrofit- 4 T-8s	192	110	82	2.13	2000	4264	512
8	Various	6	New 2x4 wrap- 3 T-8s	192	90	102	0.61	2000	1224	147
9	Various	1	Retrofit- 6 T-8s, 2 3l ballasts	288	180	108	0.11	2000	216	26
10	Various	49	New cf sink fixture- 20 watts	100	20	80	3.92	2000	7840	941
11	Various	30	New cf fixture- 30 watts	150	30	120	3.60	2000	7200	864
12	Various	97	New cf fixture- 30 watts	150	30	120	11.64	2000	23280	2794
13	Various	6	New LED exits w/ batt backup	40	2	38	0.23	8760	1997	240
14	Stage	2	New 1x4 wrap- 1 T-8	150	30	120	0.24	2000	480	58
15	Stage	4	New 1x4 wrap- 2 T-8s	150	58	92	0.37	2000	736	88
16	Gym	14	New 2x4 high bay- 6 T-8s	450	224	226	3.16	4000	12656	1519
17	Gym	14	New 2x4 high bay- 8 T-8s- dimmable	750	300	450	6.30	4000	25200	3024
		280					**34.57**		**89,605**	**10,753**

TOTAL ANNUAL COST: $6,334

ANNUAL SAVINGS AFTER RETROFIT: $11,398

C. Cost / Savings Summary & Timeline

SUMMARY		
Lighting Cost Per Year Before Retrofit	$17,731.48	
Lighting Cost Per Year After Retrofit	$6,333.68	
Lighting Savings Per Year	**$11,397.79**	
Kilowatt Demand Savings	**35**	**kW**
Kilowatt Hour Usage Before Retrofit	139,398	kWh
Kilowatt Hour Usage After Retrofit	49,793	kWh
Kilowatt Hour Per Year Savings	**89,605**	**kWh**
Number of Fixtures	280	
Estimated Project Cost	**$49,616.40**	
Com Ed Incentive	**$9,147.00**	
Net Project Cost	**$40,469.40**	
Carbon Dioxide Emission Reduction	201,612	lbs./year
SIMPLE PAYBACK	**3.55**	**Years**
Return on Investment- 1 year	28.16%	
Return on Investment- 5 years	140.82%	

D. Pollutant reduction

By reducing 89,605 kilowatt hours per year will reduce the production and emission of the following pollutants (emissions are in pounds per year):

a. Carbon Dioxide Emissions: 201, 612

b. Sulfur Dioxide Emissions: 1,568

c. Nitrogen Oxide Emissions: 735

Windows Replacement Proposal

1. Background
2. Goals
3. Methodology
4. Schematic
5. Cost versus Benefit Analysis
6. Timeline