ON-SITE INSIGHT
A RECAP REAL ESTATE ADVISORS COMPANY

Green Capital Needs Assessment and Replacement Reserve Analysis

Prepared for:

Town of Arlington
869 Massachusetts Avenue
Arlington, MA 02476

Stratton Elementary School

Arlington, MA

January 14, 2014

Final Report

RECAP
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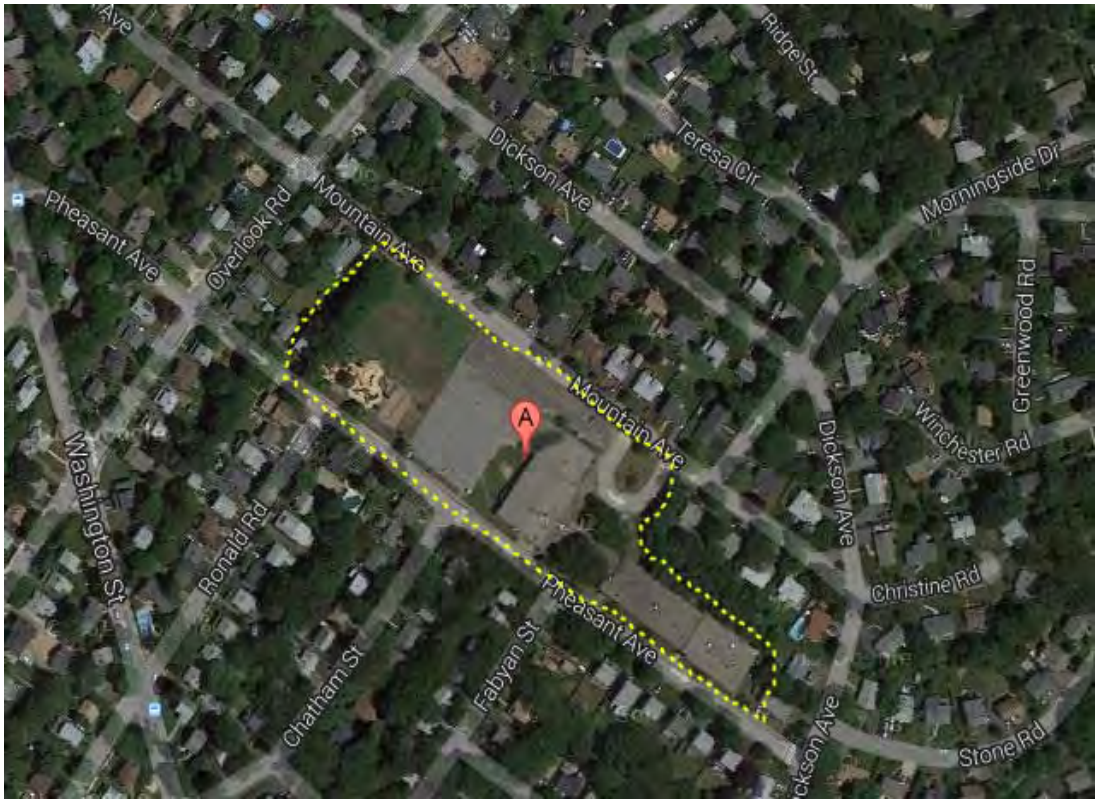
Stratton Elementary School: Property Overview

Total Buildings: 1

	# Bldgs
Elevator	1
Walk-up	-
Townhouse	-
Totals	**1**



Occupancy: Students/Staff

Property/Development Age: 54
Year of Construction: 1960

City & State: Arlington, MA
Address: 180 Mountain Rd

OSI Project Number: 13680

Assessment Date: November 12-13, 2013

Assessment Conditions: Partly sunny, 34°F

Assessor: David Jackson

Property Description:

School with two distinct building wings. Newer wing has a flat roof, metal frame double glazed windows, brick siding, and two levels. Older wing is single level, has both a flat and a pitched roof, and single glazed windows. Hydronic heat serves the New Wing, and steam heat serves the Old Wing.

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FINDINGS AND RECOMMENDATIONS

SUPPORTING DATA

HOW TO READ THIS REPORT

The report is divided into two sections: "Findings and Recommendations" and "Supporting Data".

Findings and Recommendations: The three elements comprising this section constitute the main content of the report. A comprehensive list of the recommended green options and their benefits, and a snapshot of key energy findings, are included in the Executive Summary. Additional detail regarding the property's existing conditions, current and future capital needs, and green recommendations are illustrated in the narrative and photo pages.

Supporting Data: These nine sections contain the support data and calculations used in determining the feasibility of the green recommendations. Hard costs estimates and replacement/repair timing are presented in the capital needs worksheets. The Capital Needs Summaries and Replacement Reserve Analyses highlight the total 20-year capital costs for both the conventional and green scenarios pitted against current funding circumstances. Cost-benefit analyses are included in the Simple Payback and Life Cycle Cost "cut sheets" at the end of the report.

Executive Summary

Overview and Goals

This Green Capital Needs Assessment (GCNA) of the Stratton Elementary School has been undertaken on behalf of the Town of Arlington School Department. It is aimed at determining the development's current and prospective physical circumstances, on both a traditional and green basis. A traditional CNA focuses on those capital activities that reasonably can be expected to ensure that a property is viable and in good condition over a twenty-year horizon. In a traditional CNA, it is common for On-Site Insight (OSI) to informally comment on maintenance practices, or suggest discretionary upgrades that might affect operations, marketability, or occupant well being. This GCNA is aimed at more rigorously and more formally identifying green alternatives to conventional replacement of major components and systems. It offers options aimed at helping:

- improve energy and water efficiency,
- reduce operating and capital costs through the use of durable materials and improved maintenance,
- safeguard indoor environmental quality (IEQ) for residents, and
- reduce the property's environmental impact.

Conventional Summary

Future capital actions are based on useful life expectations and assume continued effective maintenance and physical management. The timing of actions by system (including quantities and costs) is also presented in the Capital Needs Worksheet. Costs for the twenty-year plan total $3,342,484 in current dollars or $4,216,810 in inflated dollars.

Executive Summary

Green Summary

Future capital actions are based on useful life expectations and assume continued effective maintenance and physical management. The timing of actions by system (including quantities and costs) is also presented in the Capital Needs Worksheet. Costs for the twenty-year plan total $4,202,034 in current dollars or $5,065,504 in inflated dollars.

We see a number of sensible green opportunities, now and in the future, to replace existing elements with more durable and/or environmentally friendly materials and technology. In both the narrative and detailed capital needs worksheets that follow, conventional and green capital activities are presented in parallel. Capital needs summaries are presented separately for conventional and green models. The green opportunities described in the plan fall into one of two categories: energy and water conservation measures (EWCMs), or green measures (GMs), expanded in detail below:

Energy and Water Conservation Measures (EWCMs):

In the report, 9 energy and water conservation measures (EWCMs) are identified. Energy and water conservation measures are upgrades and improvements to existing mechanical and electrical systems that have a direct impact on energy consumption, and therefore potential utility (electric, gas, oil, water, sewer) savings if implemented appropriately. As part of the inspection process, the property's utility data was analyzed. This information is then used as part of the EWCM recommendation and calculation process. Of the nine EWCMs, 7 are considered to be cost-effective.

Certain EWCMs are interactive. In order to achieve the projected annual energy savings for an interactive group, the EWCMs must be implemented in concert with one another. If any of the interactive EWCMs are deferred or foregone, there may be a significant impact on the utility savings outlook. For example, replacement of an inefficient boiler system may not achieve projected utility savings associated with that system if inefficient windows remain in place.

Executive Summary

The energy conservation measure specifications (i.e. boiler efficiencies, R-values, U-values) presented in this plan are mostly derived from the International Energy Code and the American Society of Heating, Refrigeration and Air-Conditioning (ASHRAE) Handbook. These measures represent one conceptual option; various alternatives may yield different results. It must be noted that a number of factors may affect the estimated annual energy savings and simple payback periods, and therefore the figures outlined in this report are not guaranteed. Due to the towns practice of combining overall water usage and costs, Stratton School's specific water consumption could not be calculated and therefore water saving options could not be analyzed. It is suggested that wherever low-flow and water saving devices are installed the school and the Town will see significant reductions in water consumption.

Green Measures (GMs):

The report identifies 3 Green Measures (GMs). Green measures are replacements of existing materials and systems that do not have a direct impact on energy consumption; however, they represent opportunities to reduce capital and operational expenditures in the future due to increased durability, enhanced performance, and increased expected useful life (EUL) potential. Additionally, if implemented properly, GMs can improve indoor environmental quality and can benefit resident and staff health, safety, and well-being. Two of the 3 GMs are considered to be cost-effective.

The life cycle costs for the GMs are calculated in the attached worksheets with the comparative life cycle cost for the conventional replacement alternatives. Other GMs included in the plan do not represent enhanced performance or extended expected useful lives, and therefore the life cycle costs for these GMs are not calculated. Many of the projected savings are based on certain performance and EUL criteria for the respective systems and materials. Several factors may impede upon the expected performance and may skew the estimated savings. In this case, the savings presented in the plan are estimated and cannot be guaranteed.

Executive Summary

Building Modeling Methodology

This report uses an energy model created in TREAT to determine the energy loads (electric and fossil fuel uses including heating, domestic hot water, and non-heating systems) for this property. The TREAT model is based on building-specific construction, HVAC systems, and other building systems (i.e. lighting, appliances, etc.) as identified by the inspection team. The energy model also incorporates 12 months of utility bills, and matches weather data to the utility billing period.

Using the SUNREL™ energy simulation software developed by the National Renewable Energy Laboratory (NREL), TREAT calculates energy uses on an hourly basis (again factoring in weather/climate, existing HVAC systems, and internal gains) for an entire year. The result produces calculated energy use for the property, and proposed energy savings for identified measures. The energy savings are shown both independently and with full interaction of all measures. Also, since TREAT evaluates the building as a whole, it is possible that measures reduce electric consumption, could also show an increase in heating requirements (i.e. lighting reduction reduces heat typically produced by the original lighting system and in turn would require an increase to the heating load). The calculated loads (electricity, natural gas) are reconciled against billed utility loads within a 10% margin.

A Note on NPV

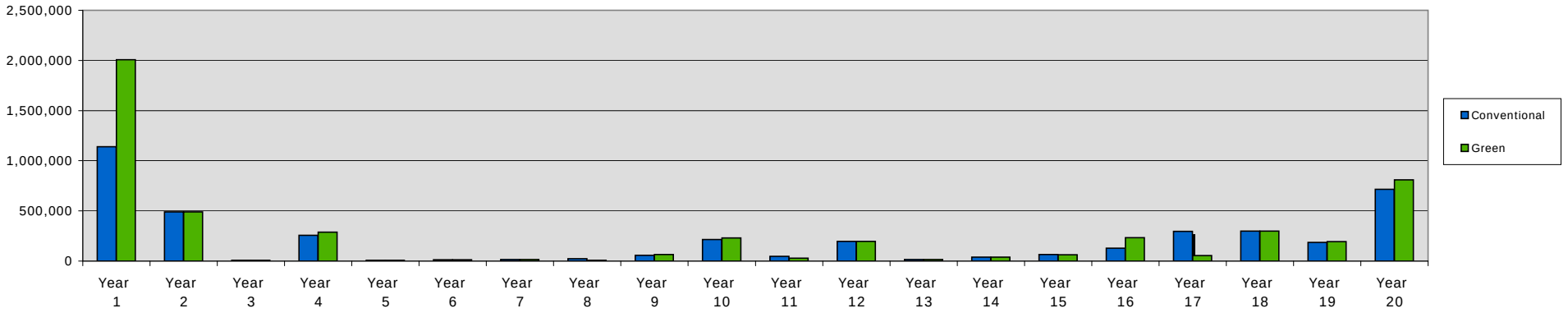
Net present value (NPV) is the difference in total life cycle costs between the conventional recommendation and the green recommendation. The EWCMs and GMs that carry a negative NPV are viewed as cost-prohibitive, despite potential environmental benefits or additional energy savings. In this report, OSI does not recommend measures that carry a negative NPV.

Executive Summary
Dashboard

Property Data

Location:	Arlington, MA
Year Built:	1960
Number of Units:	
Number of Buildings:	1

Comparison of Capital Needs - Conventional vs. Green



Environmental Impact

(Total Carbon Release Based on Current Annual Energy Usage)

Building Square Footage: **60,763**

Student/Staff Population *(est.)*: **600**

	BTUs / yr	Conversion	lbs CO_2	lbs CO_2 / Res
Gas	3,426,200,000	x 11.023100	377,673	629
Oil	0	x 11.023100	0	0
Electricity	707,990,000	x 1.582917	328,359	547
Total	**4,134,190,000**		**706,033**	**1,177**

Replacement Reserve Analysis

Conventional

Total capital cost is $4,216,810 (inflated)

Green

Total green capital cost is $5,065,504 (inflated)

Health and Safety

Hazardous Materials

	Identified	Location / Notes
Lead Based Paint (LBP):	No suspect areas	
Asbestos Containing Materials (ACMs):	Suspected VAT	Class/staff/mech rms
Mold:	No suspect areas	

Indoor Ventilation

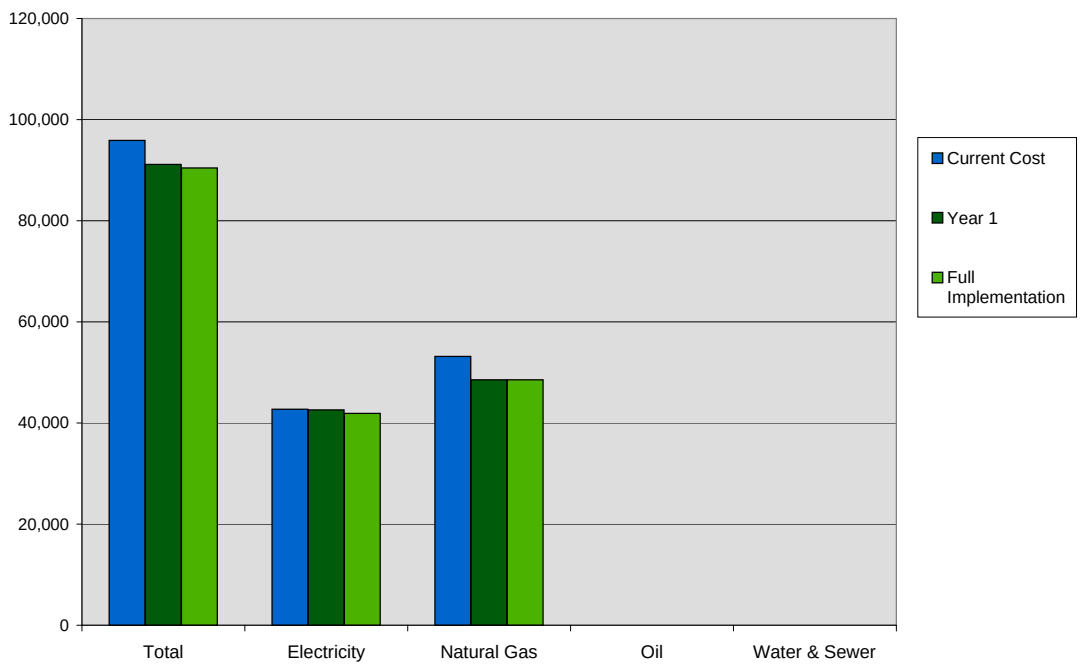
Indoor Air Quality (IAQ)

	Design Specification	Actual Read	Notes
Relative Humidity	20-40%	22	Average humidity
Thermal Comfort	68-78°F	71	Average temp
Carbon Monoxide	<9 ppm	0	Boiler room
Carbon Dioxide	<1000 ppm	1021, 1350	New wing, Old wing

Executive Summary

Energy Savings

Current and Projected Energy Cost



Energy Intensity / Benchmarking Data

TREAT Modeled Data

Building Square Footage:	**60,763**
Heating Degree Days:	5,839

TREAT Model

	Amount	Units	BTUs/yr	Energy Intensity (BTUs/(HDDs x SF)
Heating	27,596	therms	2,759,568,536	8
Cooling	0	kWh	0	0
DHW	17,323	therms	1,732,319,421	5
Electricity	207,500	kWh	707,990,000	2
Total			**5,199,877,957**	**15**

	Gallons/yr	Gallons/sf/yr
Water	0	0

Energy Usage Summary

Billing Data

Utility	Current Usage		Current Cost	Projected Usage		Projected Cost	% Savings
Electricity	207,500	kWh	$42,711	203,704	kWh	$41,930	1.8%
Natural Gas	34,262	therms	$53,165	31,275	therms	$48,529	8.7%
Oil	0	gallons	$0	0	gallons	$0	n/a
Water & Sewer	0	gallons	$0	0	gallons	$0	n/a
Total			**$95,876**			**$90,459**	**5.6%**

Executive Summary

Green Improvement Plan

Measure	Upfront Cost	EUL	Simple SIR [1]	Incremental Cost [2]	Green NPV [4]	Annual Utility Savings								Total $	Recommended Timing
						Electric		Gas		Oil		Water & Sewer			
						KWh	$	Therms	$	Gallons	$	Gallons	$		
Recommended EWCMs (Based on Financial Analysis)															
Interactive Group															
EWCM 2 Replace Steam Boilers	214,500	22	0.51	35,802	4,423			3,197	4,961					4,961	Immediate
EWCM 4 Exhaust Fans VFDs	11,250	20	1.17	1,950	6,738	3,190	657							657	Year 12
EWCM 6 Low-E Windows	173,320	40	7.49	37,140	247,721			20,911	32,448					32,448	Immediate
EWCM 9 LED Exit Signs	260	30	1.42	130	409	105	22	(6)	(9)					12	Immediate
Interactive Group Total [5]	**399,330**			**75,022**										**0**	
EWCM 1 Site Lighting	2,575	30	9.10	975	14,087	3,796	781							781	Immediate
EWCM 3 Condensing DHW Tank	6,975	15	9.97	5,625	45,327			2,987	4,636					4,636	Immediate
EWCM Subtotal	**408,880**			**81,622**		**3,796**	**781**	**2,987**	**4,636**	**0**	**0**	**0**	**0**	**5,417**	
Recommended GMs (Based on Financial Analysis)															
GM 2 Replace Vinyl w/Linoleum	329,610	25		31,534	7,179	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Immediate
GM 3 Replace Carept w/Linoleum	20,213	25		10,573	926	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Year 4
GM Subtotal	**349,823**			**42,107**		**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	
Total	**758,703**			**123,729**		**3,796**	**781**	**2,987**	**4,636**	**0**	**0**	**0**	**0**	**5,417**	
Optional Actions															
EWCM 5 Fiberglass Doors	18,250	35	0.20	1,975	(184)			66	102					102	Immediate
EWCM 7 Green Roof	1,060,424	30	0.10	599,496	(532,730)			2,360	3,662					3,662	Immediate
EWCM 8 Interior LED Lighting	199,375	35	0.62	123,250	(46,861)	25,436	5,236	(1,081)	(1,677)					3,558	Immediate
GM 1 Cement Board Siding	4,614	50		3,657	(863)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Immediate

Notes:

*1. Simple SIR is calculated as (Total Annual Savings * Estimated Useful Life) / Upfront Cost.*

2. Incremental Cost is the difference in cost between the green and conventional alternatives.

3. Green SIR (Savings to Investment Ratio) is a relative measure that reflects the ratio of total savings to total investment of Green vs. Conventional. Unlike Simple SIR, this calculation takes into account maintenance costs, inflation, discounting, and differences in expected useful life.

4. Green NPV is the net present value of installing a green vs. conventional product.

5. Interactive group total recognizes full interaction of all measures based on the TREAT model.

Narrative

Stratton Elementary School consists of a single building with two distinct sections, an original section referred to as the Old Wing, and a recently upgraded section referred to as the New Wing. The Old Wing has only one level and contains the three kindergarten classrooms, cafetorium, main gymnasium, food service, central mechanical room, library, and the administration and support offices. The New Wing has two levels and contains the bulk of the classrooms, staff support areas, and the playrooms. Common hallways and stairways provide access throughout the facility and there is a single hydraulic elevator located in the New Wing that accesses both levels.

Site & Handicap Accessibility

Stratton Elementary School is located on a large, gently sloped parcel of land in a residential neighborhood of Arlington, MA. The site is attractively landscaped with mature lawn areas, plantings, and trees. The site includes a large asphalt-paved playground that is adjacent to an even larger open field that has a tot lot in one section. There is also an asphalt-paved parking lot, walkways, along with a circular driveway for student drop-off and pickup.

Roadways and Parking Areas

Existing conditions	Capital needs	Green alternative
Most of the asphalt surfaces (driveway, parking lot, walkways, and play area) have been recently repaved and presently are in good condition. No appreciable cracks, trip hazards, or other surface damage was observed.	The plan includes the cost for surface repairs (crackfilling, sealcoating, and parking lot re-striping) in Years 4, 9, and 14. Future resurfacing costs are shown at the end of the plan in Year 20.	For future repaving, consider a lighter porous (permeable) colored asphalt material. The lighter asphalt material decreases heat retention associated with darker asphalt materials and therefore reduces the heat island effect and allows for a cooler, more comfortable site for the residents and visitors alike. Typically, lighter-colored asphalt paving is not more expensive than dark asphalt materials, and

Narrative

Existing conditions	Capital needs	Green alternative
		therefore, no premium is carried in the plan for this work. The porous aspect will help reduce stormwater runoff redirecting it to the adjacent soil as opposed to the storm drain system.

Retaining Walls

Existing conditions	Capital needs	Green alternative
The stone perimeter wall that runs along a portion of rear of the school building has sections of missing mortar and loose stones.	The plan includes an allowance to repair the retaining wall in Year 1.	No green option shown.

Exterior Lighting

Existing conditions	Capital needs	Green alternative
There is a pair of pole-mounted high intensity discharge (HID) double head fixtures that provide lighting at the paved play area.	The lamps and ballasts are to be replaced every eight years beginning in Year 7.	The green alternative to help achieve energy savings is to retrofit the existing lighting with comparable LED fixtures. LED lighting has a significantly longer useful life and lower energy usage than HIDs. (See EWCM 1)

Narrative

Landscaping and Play Equipment		
Existing conditions	**Capital needs**	**Green alternative**
The site features a well-maintained lawn and garden beds. The tot lot has been recently upgraded with newer play equipment featuring high impact plastic and metal elements. The base is a combination of rubber mats and mulch.	The plan includes an allowance for replanting and pruning in Year 12. The plan also anticipates replacement of the play equipment in Year 16.	The green alternative would be to replace the existing landscaping with a Xeriscape in Yr 12, which employs native and adaptive plantings that require significantly less water and fertilizers than traditional lawns and garden beds.

Handicap Accessibility / Section 504 Analysis

As part of this assessment, the common areas and dwelling units at the development were examined for compliance with the requirements of the Uniform Federal Accessibility Standards (UFAS). The development is partially compliant with UFAS, however, deficiencies were noted at several locations. Costs for handicap accessibility modifications and/or improvements at these locations are shown in Year 1 unless otherwise noted.

Circulation		
Existing conditions	**Capital needs**	**Green alternative**
The gymnasium, cafetorium stage, and the kindergarten playground egress (Old Wing), and the play rooms (New Wing) are directly accessible by stairs.	Adding chair lift stations at each of these sets of stairs could help improve access to these key program areas.	No green option shown.

Narrative

Mechanical Room

The central mechanical room contains the natural gas-fired heating and domestic hot water (DHW) systems. A recently installed Hydrotherm condensing boiler produces hydronic heat exclusively for the New Wing (approximately 60% of the total building load). This boiler also features a stainless steel flue to vent flue gases out of the building. Condensing boilers produce low temperature flue gases (under 100°F) resulting in a corrosive vapor, which requires the use of a corrosive-resistant flue such as stainless steel. A pair of 5 horsepower hydronic pumps, each governed by a variable frequency drive (VFD) is used to distribute the heat throughout the New Wing. This equipment, along with classroom and program area thermostats in the New Wing is controlled by an energy management system (EMS).

The pair of original low pressure steam boilers is used to provide steam heat throughout the Old Wing. The condensed (cooled) steam returns to the boiler plant via the condensate system for reheating. Based on the age of the boilers, the insulating jackets are suspected to be asbestos contaminated material (ACM). This system features steam traps to allow only condensate to be returned which greatly improves the steam heat system efficiency. An original pneumatic (compressed air) system is used to control the boiler, and pneumatic-controlled devices including the thermostats throughout the Old Wing. An atmospheric DHW tank serves the entire campus; the DHW needs are limited to bathroom and food preparation use.

Boilers

Existing conditions	Capital needs	Green alternative
The hydronic boiler and one of the steam boilers were operating at the time of the assessment (the remaining steam boiler was in standby mode). The hydronic heat supply was observed at 140F and 130F, supply and return respectively.	The steam boilers are shown to be replaced in the first year of the plan. The heat load should also be re-evaluated to ensure that the replacement boiler plant is sized to meet the load of the Old Wing exclusively.	The green option is to replace the steam boiler plant with a hydronic boiler plant, which would serve the Old Wing and augment the existing hydronic boiler plant currently serving the New Wing.

Narrative

Existing conditions	Capital needs	Green alternative
Also, there was no indication of live steam being returned to the condensate receiver (main collection tank) in the mechanical room, indicating that the steam traps were performing adequately. The compressed air system was being serviced during the site visit.		The proposed hydronic plant should utilize condensing boilers and includes a premium for anticipated ACM abatement. The plan also includes the cost for a design professional to design the hydronic boiler plant and to supervise its installation and commissioning. See EWCM 2. The existing hydronic condensing boiler is to be replaced at the end of the plan.

Controls

Existing conditions	Capital needs	Green alternative
The EMS uses outside air (OA) return water and interior space temperature inputs to govern the boiler plant and hydronic pump performance. The pneumatic system is original with various aspects updated to replace failed components.	The cost to replace the pneumatic system (in-kind) is shown in Year 1. The plan also shows the cost for anticipated upgrades in Year 16.	The green option is to expand the existing EMS to govern the proposed hydronic heat system (boilers and peripherals) that would serve the Old Wing in place of the existing steam heat with pneumatic control. The EMS would improve control function response time and reliability and would also produce comparable performance that exists in the New Wing.

Narrative

Condensate Receiver, Hydronic Circulating Pumps and VFDs		
Existing conditions	**Capital needs**	**Green alternative**
Infra-red imaging indicated that the condensate system was performing reliably; no condensate leaks or live steam loss was observed.	This system is to be replaced at the midpoint of the plan in Year 11.	The green option, based on the proposed steam plant replacement with hydronic boilers is to replace the condensate equipment with hydronic heat circulating pumps and piping. This cost includes VFDs for the proposed hydronic pumps. The existing hydronic pumps are expected to perform reliably throughout the plan.
The existing hydronic pumps have high efficiency pump motors and each is controlled by a VFD.	The VFDs are to be replaced in Year 16. The secondary hydronic pump (1.5 hp used to assist return water to the condensing boiler) is to be replaced in Year 20.	The green options are in place.

Narrative

Mechanical Room Piping		
Existing conditions	**Capital needs**	**Green alternative**
The mechanical room which originally had steam and condensate piping has been recently upgraded to include hydronic piping as part of the newer system that provides hydronic heat to the New Wing.	The cost to replace the steam traps (assuming that the steam system will continue to be in use) is shown every four years starting in Year 4.	The green alternative is to replace the steam and condensate systems with a hydronic system similar to the system serving the New Wing. A design professional (shown as a separate capital item) will determine if the proposed hydronic system can cost-effectively be the result of expanding the existing hydronic system.

Domestic Hot Water		
Existing conditions	**Capital needs**	**Green alternative**
A 40-gallon natural gas-fired DHW tank provides DHW for the entire campus. A fractional horsepower pump is used for DHW distribution.	The DHW tank is to be replaced in Year 9 after approximately 15 years of use. The pump is to be replaced in Year 14.	A condensing DHW tank, which offers greater energy efficiency (higher combustion efficiency), is shown as the green option. See EWCM 3.

Narrative

Building Mechanical and Electrical Systems

The major building systems include distribution piping systems for steam and hydronic heat, domestic hot and cold water, sanitary wastewater, and natural gas services, as well as heating ventilation and air conditioning (HVAC), electrical, fire detection, and security and elevators.

Fire Suppression

Existing conditions	Capital needs	Green alternative
The building construction pre-dates the current building practice of including a fire suppression system (i.e. fire sprinklers) in the building. The school has a series of wall-hung fire extinguishers.	The cost to add a fire sprinkler system is shown in Year 2 of the plan.	No green option shown.

Distribution Systems

Existing conditions	Capital needs	Green alternative
The distribution systems appear to be in good condition. The steam system did not have any apparent leaks or steam trap problems at the time of the assessment.	Assuming that the steam system will remain in use throughout the plan, the cost to replace the steam traps is shown every four years beginning in Year 4.	The green option is to replace the steam heat system with hydronic heat in Year 1. See discussion in the Mechanical Room report section pertaining to the steam boilers, condensate system and piping.

Narrative

HVAC Systems

Existing conditions	Capital needs	Green alternative
The classrooms and most of the program spaces in the Old Wing have through-wall steam-heated convectors governed by pneumatically-controlled thermostats. The larger areas in the Old Wing have ceiling mounted steam-heated convectors. There are also several window air conditioners serving the administration offices in the Old Wing. Hydronic convectors with digital thermostat controls are used throughout the New Wing.	The steam heated convectors, which appear to be original, are to be upgraded in the first year of the plan. This cost also includes replacing the window air conditioners (in-kind). The existing hydronic convectors are to be repaired in Year 15 of the plan.	The green option is to replace the steam equipment with proposed hydronic equipment in Year 1. The thermostats are to also be replaced with digital thermostats similar to those used throughout the New Wing. This option also includes adding several split direct expansion (DX) air conditioning units to cost-effectively serve the administration offices.

Exhaust Fans

Existing conditions	Capital needs	Green alternative
A series of exhaust fans (rooftop and sidewall) vent stale air from this building.	These fans are to be replaced in Year 12.	These fans are to be replaced with fans that have variable speed motors and each will include a micro VFD, which will respond to variations of carbon dioxide (CO_2 levels) to adjust the exhaust and ventilation rates. See EWCM 4.

Narrative

Electrical

Existing conditions	Capital needs	Green alternative
The main electric service has been recently upgraded with a surge protector. There is also a natural gas powered emergency generator that produces 50 kW of electrical power during a power outage. The fire alarm system features a new Fire Lite fire alarm control panel (FACP) that governs hardwired detection and alarm devices. There is also a central public address (PA) and time clock system in place.	The plan includes the cost to overhaul the generator in Year 7, to ensure reliable performance. There are also upgrade allowances for the PA and time clock systems, and the fire alarm systems in Years 10 and 19, respectively.	No green option shown.

Electrical and Elevators

Existing conditions	Capital needs	Green alternative
There is a single hydraulic-type elevator located in the New Wing to provide access to both levels of that building wing. The elevator is maintained by a full service contract and has restricted use (by staff only).	The cost to refurbish the elevator cab interior and door operators, items normally excluded from the service contract is shown in Year 10.	No green option shown.

Narrative

Building Architectural Systems

Building Exterior

Stratton Elementary School is of a single walk-up building; the Old Wing is one level and the New Wing has two levels. The building is constructed on a poured concrete foundation. No issues were observed or reported with regard to the building framing and it should be monitored going forward. Exterior walls are primarily brick; the window assemblies have been updated with decorative concrete panels and portions of the Old Wing also has wood siding. The Old Wing also has single glazed metal framed windows and two roof lines: flat roofing over the administration section and pitched roofing over remaining portion of this wing and these roof sections have a tar and gravel roof covering. The New Wing has been updated recently with metal framed double glazed windows. It has a flat roof that is covered with an insulated rubber membrane.

Doors

Existing conditions	Capital needs	Green alternative
The building has a series of solid core metal and wood doors (common and service) that were found to be in varying conditions, including several wood doors that were delaminating.	The doors are believed to have exceeded their 35-year useful life are to be replaced in the first year of the plan.	The doors are shown being replaced with fiberglass framed insulated glass doors. Fiberglass doors are more durable to metal or wood doors since they are resistant to rusting, impact-related damage, and deterioration associated with wood or metal options. Not only are they more durable, but they also lower operations costs since they don't require periodic painting. These doors however were not shown to be a cost-effective option; see EWCM 5.

Narrative

Siding

Existing conditions	Capital needs	Green alternative
The brickwork appears to be in good condition, with no signs of mortar loss or deterioration observed on the brick sections. The wood section on the Old Wing appears to be in fair condition; the paint will require attention in the near-term but the wood itself appears to be in good condition.	The cost to repaint the wood sections is shown every five years starting in Year 3. The plan also includes the cost for limited repointing of the brickwork in Year 12.	Replacing the wood section with an alternative product such as cement fiberboard could provide a longer lasting building component that also requires less repainting. This option however did not appear to be cost-effective; see GM 1.

Windows / Curtain Walls

Existing conditions	Capital needs	Green alternative
Infra-red imaging of the metal framed single glazed windows on the Old Wing indicated significant heat loss coupled with possible higher than expected air infiltration. The metal framed double-glazed windows on the New Wing appear to be in good condition. None of these windows had signs of fogging (an indication of failed window glazing seals allowing moisture to get trapped in between the glazing layers).	The plan shows the cost to replace the single glazed windows with double glazed windows in Year 1. Based on the age of the double glazed windows, an allowance for anticipated glazing replacement (for possible window seal failure) is shown in the second half of the plan starting in Year 17.	Replacement of the single glazed windows with fiberglass-framed, double-glazed models with a low-E (low emissivity) coating, and a gas fill between the glazing layers (EWCM #5). The low-e coating will reflect heat from entering the building during the summer, and can reflect radiant infrared energy from escaping the building during the heating months. A gas fill (such as argon) between the glazing layers will reduce heat transfer through the glass similar to the low-e coating.

Narrative

Existing conditions	Capital needs	Green alternative
		It is recommended that the windows be monitored and appropriately caulked going forward to keep air infiltration to a minimum. See EWCM 6.

Roof

Existing conditions	Capital needs	Green alternative
The existing roof covering on the Old Wing (pitched and flat sections) has exceeded its 20-year useful life. Presently, there were no observed or reported active leaks, however ponding was observed on the flat roof section (an indication of inadequate drainage). There are also several skylights that have also exceeded their useful life. The roof covering on the New Wing appears to be in good condition.	The plan shows cost to replace the Old Wing's roof covering with an insulated rubber membrane in Year 1; this cost includes any necessary repairs to the drainage system. The skylights are to be replaced in the first year of the plan. The rubber membrane on the New Wing is expected to perform reliably throughout most of the plan and is shown being replaced in Year 17.	A green roof (vegetated roof covering) was considered for this facility. The green roof features vegetation, a growing medium, a root inhibitor, and a waterproof membrane. These roofs provide increased roof insulation, absorb solar heat gain (helping to keep the interior spaces cooler during the warmer months, and utilize rainwater limiting stormwater runoff. Green roofs typically require annual maintenance to ensure that the vegetation is controlled and active. The structural integrity of the roof also has to be confirmed by a design professional prior to installing a green roof. This option was not determined to be cost-effective; see EWCM 7.

Narrative

Building Interior Common Areas

The building interior includes classrooms and related program areas, common hallways and stairwells, staff support areas, restrooms, cafetorium, food preparation area, and gymnasium. Wall are primarily painted with some accented with wood paneling; most ceiling surfaces are covered with ceiling tiles. Allowances are shown throughout the plan for as-needed repairs and painting. As a green measure, the plan specifies low-VOC or recycled-content paint for painting cycles at no additional premium. Most of the common areas with the exception of the stairways have carpeting or a mixture of vinyl tile floor covering: vinyl composite tiles (VCT) and vinyl asbestos tile (VAT as reported). The stairways have concrete treads and landings, considered to be the green alternative.

Flooring

Existing conditions	Capital needs	Green alternative
The hallways VCT throughout the building is in varying conditions, most of the damaged and recently repaired sections are in the classrooms; the hallway flooring was found to be in good condition. Maintenance staff reported that several areas have VAT (identified by the smaller square profile) and possible ACM tile adhesive, but there are no areas that have any ACM that appear to be in a deteriorating condition (the VAT is stable and in some areas encapsulated with another floor covering).	The replacement of the floor coverings are shown throughout the plan based on the ages and conditions of the flooring in the various areas: classrooms, food prep area, and the cafetorium are to be updated in Year 1 with a future cycle in Year 17. Floor coverings in the common hallways and support administration areas are shown in Years 4 and 20. The plan also includes the cost to refinish the gymnasium floor (hardwood) in Years 1 and 11.	Replacement of the VCT and carpeting with a linoleum product is considered to be the green alternative. Linoleum is a natural product (containing linseed oil, powdered wood or cork, ground limestone, resin binders, natural jute backing), which has been found to be more durable than its vinyl tile and carpet counterpart. Linoleum tile hardens over time, and therefore becomes less susceptible to scratching and cracking. Installation of linoleum has a lower annual life cycle cost than existing flooring. (See GMs 2 and 3).

Narrative

Interior lighting		
Existing conditions	**Capital needs**	**Green alternative**
Fluorescent lighting fixtures are used primarily throughout the common areas, with most being energy efficient fluorescent fixtures (T8 lamps with energy efficient electronic ballasts). Most of the exit signs LED light source; there are a pair of compact fluorescent exit signs in the gymnasium and there are also two areas that require an illuminated exit sign (to replace the paper signage).	Most of the lighting fixtures, including the classroom lighting consist of single lamp suspended aluminum reflectors that project a downward light. While this is an efficient lighting system, it also results in shadow effect on the ceiling. Additionally, some of the lighting has demonstrated a subtle flickering, which reportedly has impacted a small group of the students. The plan includes the cost to replace these fixtures with indirect reflectors, designed to illuminate the ceilings initially resulting in a "bounced" light source into the room, providing an even light distribution with virtually no flickering. LED exit signs are to be installed to replace the paper exit signs.	The fluorescent fixtures can be replaced with comparable LED fixtures that would also be arranged as indirect reflectors. This green option requires less electricity with out reducing light output and provides a significantly longer useful life. Despite these benefits, this option was not determined to be cost-effective. (See EWCM 8). LED exit signs, which will provide significant energy savings and providing a long-lasting lighting source are to be used to replace the existing paper and compact fluorescent signs. (See EWCM 9).

Narrative

Finishes, Furnishings, and Appliances		
Existing conditions	**Capital needs**	**Green alternative**
Hallways have solid core doors (fire doors and classroom doors) currently in good condition. Classroom and program area furnishings include desks, tables, chairs, shelving, whiteboards, computers, and open storage (cubbies) all found to be in good condition. The food prep area is undersized and it presently utilizes a renovated program area for food preparation (and includes ovens and dishwashing); the reach-in refrigerators and serving tables (electric-heated steam tables) are located in a section of the common hallway near the entrance of the cafetorium.	The furnishing in the administration area is to be replaced initially in Year 4 with a future cycle shown in Year 19. The hallway doors are to be replaced starting in Year 10. The classroom furnishings are to be replaced in Years 10 and 20.	The green options for furnishings include using green-rated furniture, wood products that have been certified by FSC (Forest Stewardship Council), and materials that have a rapid renewal (i.e. bamboo, etc.) as well as materials and components within close proximity (500 miles or less) of the facility. The uniqueness of an educational facility dictates that the furnishings must first meet the needs and standards of the educational environment which may impact the type of materials and components that could be used for replacement furnishings.

Narrative

Health and Safety

Resident and Staff Concerns:

As part of the assessment, the property was examined for potential resident and staff health and safety concerns.

Lead-Based Paint and Asbestos:

- OSI did not conduct any testing for asbestos containing material (ACMs) or for lead-based paint (LBP). Therefore, this section should not be interpreted as a comprehensive or conclusive identification of ACMs or LBP. School maintenance staff did report that ACM flooring exists in various areas; this flooring in some cases has been encapsulated and none of the ACM is in a deteriorating condition that would result in a hazardous and unacceptable condition. School officials continue to prepare for a forthcoming abatement of ACM as part of proposed facility modernization.

Other Health and Safety Issues:

- Domestic hot water temperatures were recorded ranging 125°F. DHW temperatures should be in the range of 110°F to 130°F; at temperatures of 140°F, burns (scalding) can occur.

Indoor Air Quality

Ventilation (Classrooms and Common Areas):

This building has mechanically supplied fresh air via through-wall convectors (steam and hydronic heated) and operable windows to provide fresh air. There is a series of rooftop exhaust fans used to remove stale air the building. The exhaust fans appear to be in continuous operation.

Temperature, Humidity, Carbon Dioxide (CO_2)

Narrative

Space temperature and humidity are the key components for comfort level. Temperature and relative humidity was measured throughout the entire facility. The average temperature of the conditioned spaces was 71°F db, and the relative humidity average was 22% rH. It should be noted that there was very little variation in space temperature and relative humidity between the Old Wing and the New Wing.

Carbon dioxide ($C0_2$) levels were measured during the assessment, with all of the classrooms and most of the program areas measured. There is a distinct difference between the CO_2 levels in the two building wings, in part due to level of activity and status of heating and ventilation systems, but mostly to the significant difference in the building systems and construction between these building wings. The average CO_2 levels are as follows: New Wing: 1,021 ppm and Old Wing: 1,350 ppm. Carbon dioxide levels helps to determine the level of fresh air within a space. Ambient conditions are typically below 500 ppm. General levels of CO_2 for interior spaces are identified by the following ranges:

- Acceptable air quality: 1,000 ppm or below
- Fair air quality: 1,001 ppm to 2,500 ppm (occupants can feel drowsy or the air seems stuffy or stagnant)
- Poor air quality: 2,501 ppm or greater (stagnant conditions which could become unhealthy over prolong periods)

Introducing fresh air by opening windows or using ventilation systems can quickly restore air quality to healthy levels. The point to underscore is that there were no immediate air quality concerns at the Stratton School, but there is a notable difference in the air quality readings between the two building wings, with the lower readings clearly registered throughout the New Wing.

Mold and airborne concerns:

No mold was observed on the interior of the apartments, nor in any common spaces at the property. The average relative humidity readings that were recorded during the assessment are below the humidity level to support the growth of mold. Further detail environmental examination would be required to investigate any areas of concern (i.e. carpeting, restrooms, etc.) but the humidity readings indicate that the general air quality is acceptable.

Narrative

Capital Needs Summary, Replacement Reserve Analysis - *Conventional*

Future capital actions are based on useful life expectations and assume continued effective maintenance and physical management. The timing of actions by system (including quantities and costs) is also presented in the Capital Needs Worksheet. Costs for the twenty-year plan total $3,342,484 in current dollars or $4,216,810 in inflated dollars.

Narrative

Capital Needs Summary, Replacement Reserve Analysis - *Green*

Future capital actions are based on useful life expectations and assume continued effective maintenance and physical management. The timing of actions by system (including quantities and costs) is also presented in the Capital Needs Worksheet. Costs for the twenty-year plan total $4,202,034 in current dollars or $5,065,504 in inflated dollars.

Narrative

Additional Notes:

1. The Physical Assessment of the property was conducted on November 12-13, 2013. Members of the Town of Arlington and the Stratton school staff provided information on the property's current condition, recent repairs, and near-term needs. Additional information was provided by informal interviews with residents during the dwelling unit evaluation portion of the assessment. We would like to thank site staff for their assistance.

2. OSI was represented on this assignment by David Jackson. Mr. Jackson is a Building Performance Institute (BPI)-certified energy auditor, and LEED Green Associate accredited and has complied with the applicable professional standards for ethics as defined by the BPI Code of Ethics during the assessment process.

3. Regular updates of this plan are recommended to ensure careful monitoring of major building systems and to adjust the program to accommodate unanticipated circumstances surrounding the buildings, operations, and/or occupants.

The hardtop section of the playground has been recently repaved.

The playground also includes this tot lot.

This ramp provides access to the playground and tot lot.

The parking lot has also been repaved and is in good condition.

A view of the driveway to the school's main entrance.

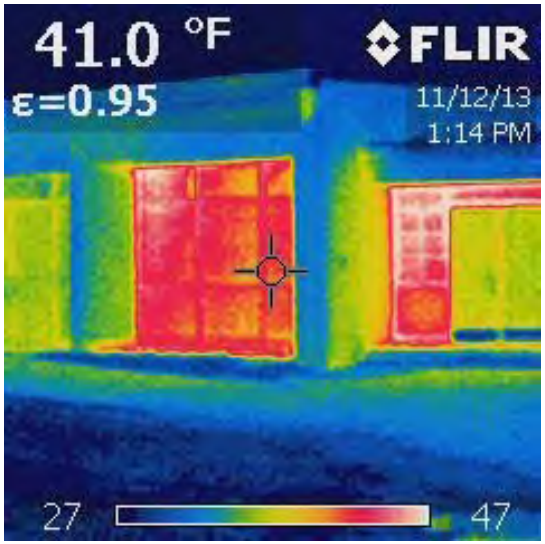
This retaining wall (adjacent to Pleasant Street) has sections of mortar loss

These concrete steps (near the main gym) have spalled treads.

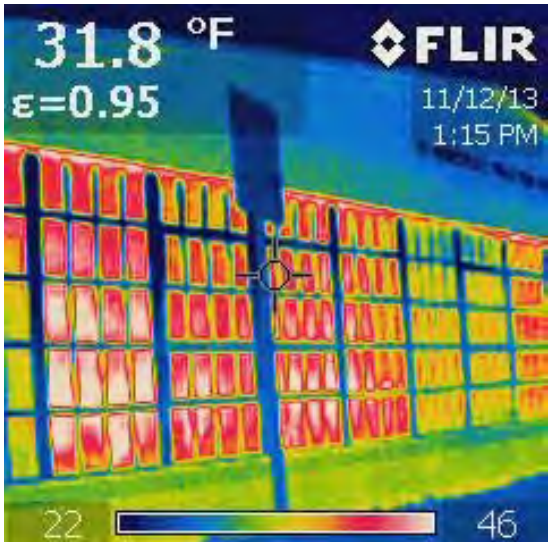
This is the school's main entrance.

A portion of the original building.
This is the administration section.

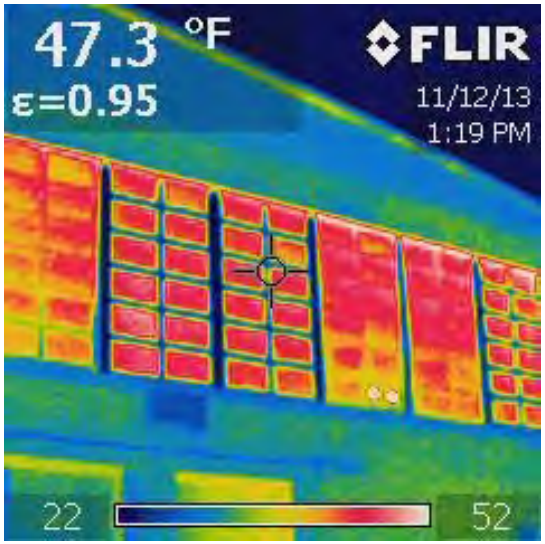
Three kindergarten classes are also located in the original building. Note the large windows are all metal framed single glazed.



This infra-red image of the original building at the entrance (from the driveway) to the cafetorium and kindergarten classes. The red indicates heat losses through the single glazed windows.

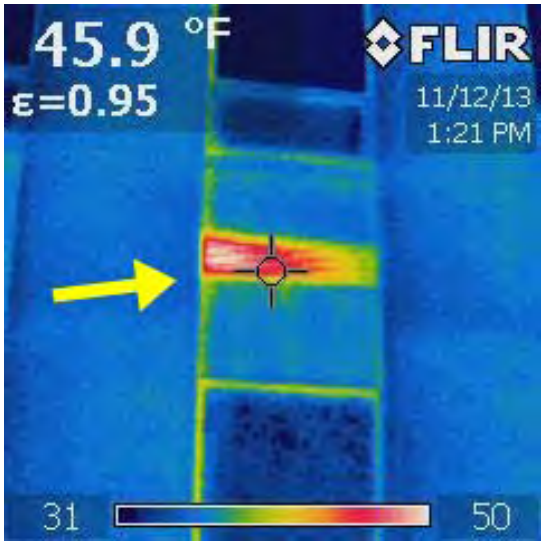


Heat loss can also be seen in this infra-red image of some of the windows in the kindergarten wing.



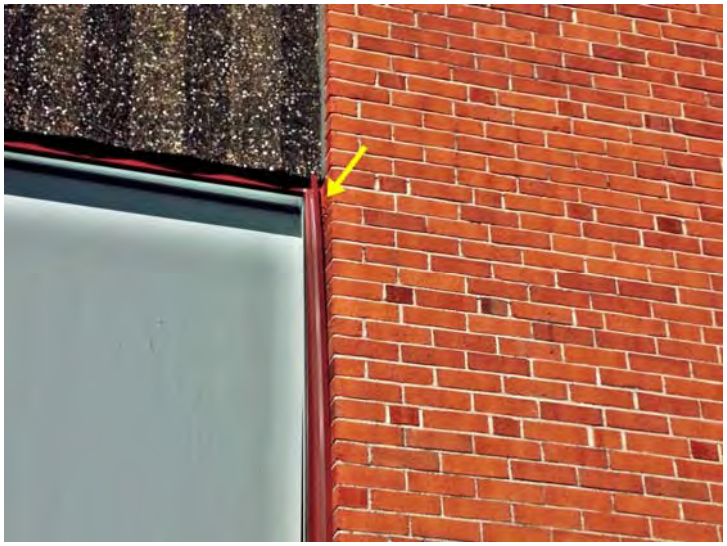
This infra-red image also shows heat loss at the main gym. The walls (blue-green) are close to the outside air temperature (34°F); the window surface is 47°F.

The new (renovated) wing has two levels, brick exterior walls and metal-framed double glazed insulated windows.



This infra-red image of a window assembly on the new wing shows very little heat loss. The arrow is pointing to the fresh air intake of one of the wall convectors (used to heat and ventilate the classrooms).

This concrete wall section has spalled and exposed the steel reinforcement (rebar) at this window assembly.



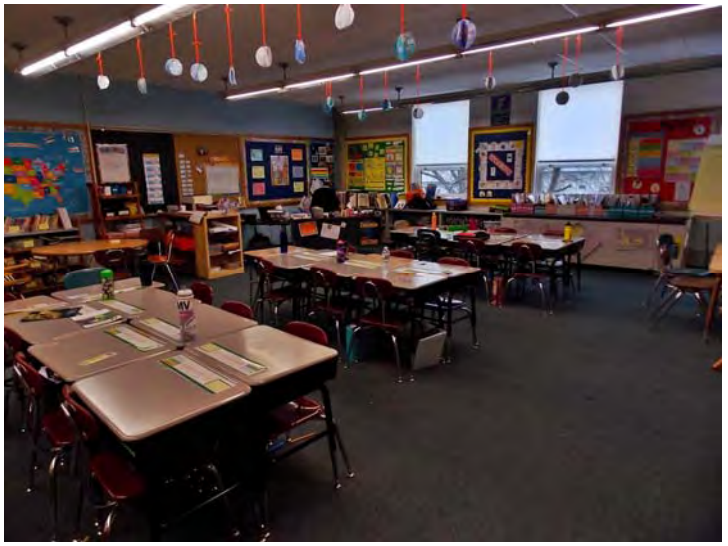
A portion of the metal trim at this window has come loose.

The original building has an older tar and gravel roof covering (over both the flat and pitch sections). Despite the amount of standing water (ponding) no active leaks were reported.

The new wing has a rubber membrane roof covering and internal drains.

A pair of skylights over the administration section of the original building.

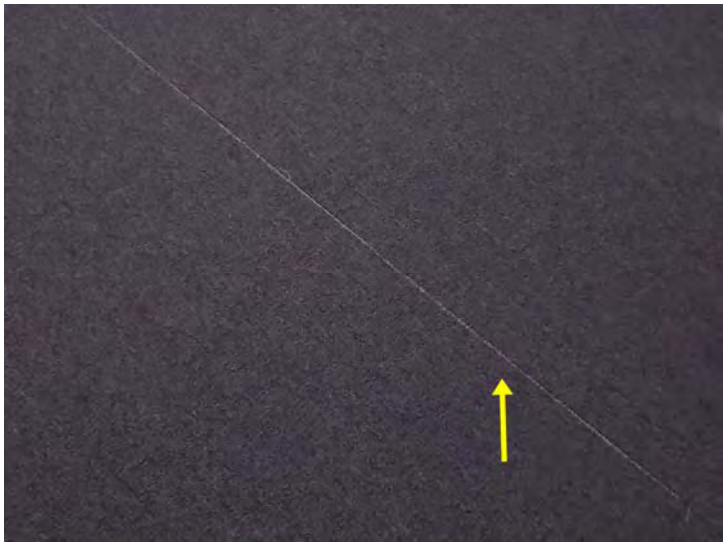
This is one of the kindergarten classes in the original building. Note the high ceilings and significant window space.



A classroom in the new wing. This one has carpeted flooring; some of the other classrooms in this wing have vinyl tile flooring.

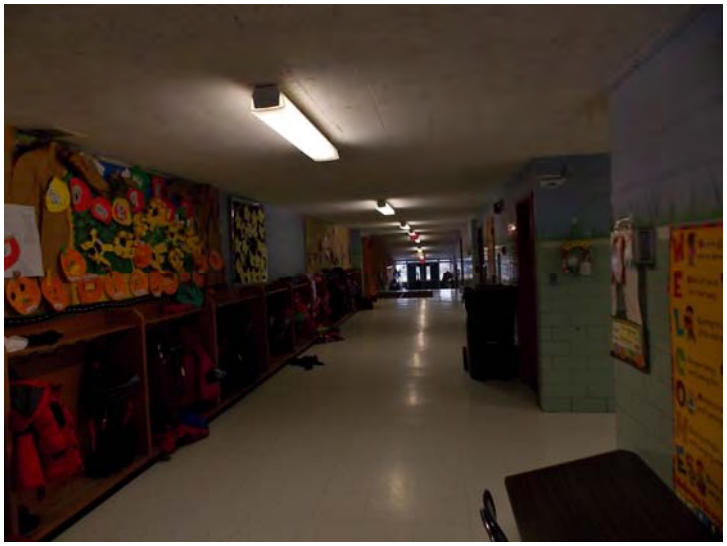
A view of the playroom located in the new wing. This space has hardwood flooring. The partition is used to create two areas.

A view of the cafetorium.



A close-up view of a damaged carpet section.

A repaired flooring section in a classroom in the wing. The lighter colored tiles are vinyl composite tiles (VCT) used to replace damaged sections of the original smaller vinyl asbestos tiles (VAT).

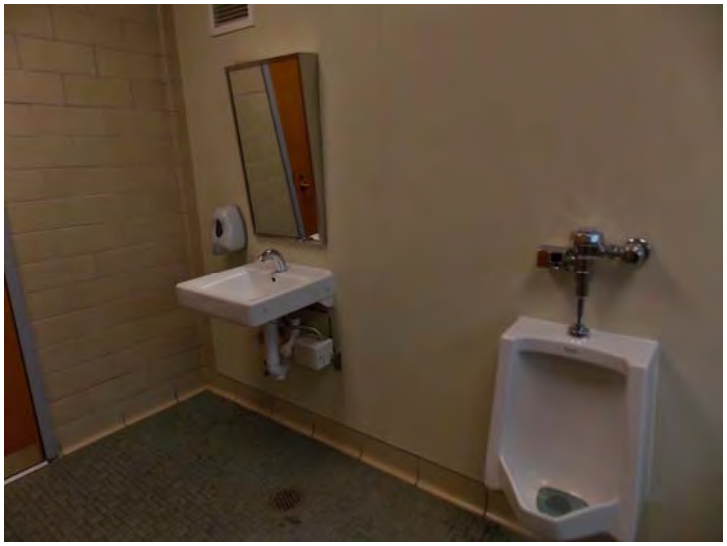


One of the common hallways.

The main gym is accessed either by coming down these stairs or by going outside of the original building and coming in through the playground.

The food preparation area is undersized;
it is currently located in a renovated office.

The food serving table (steam table) is located in a portion of the common hallway (across from the cafetorium) due to limited space.



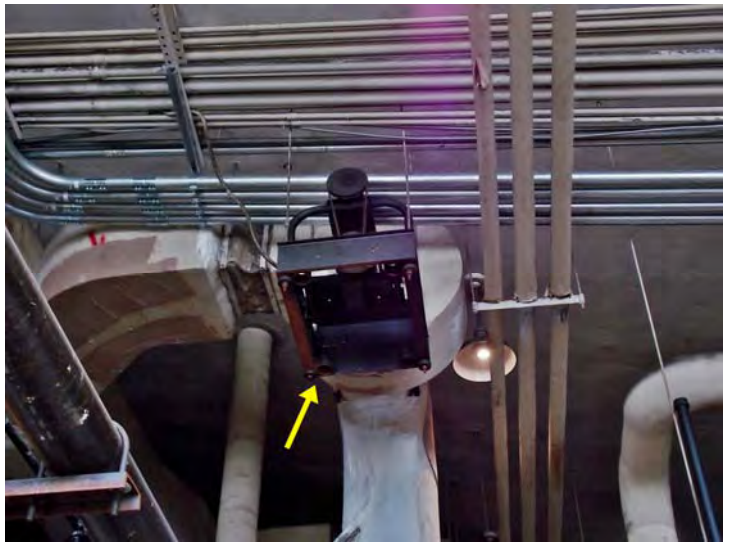
One of the staff restrooms;
this space is handicap accessible.

This natural gas-fired condensing boiler produces hydronic heat for the new wing.

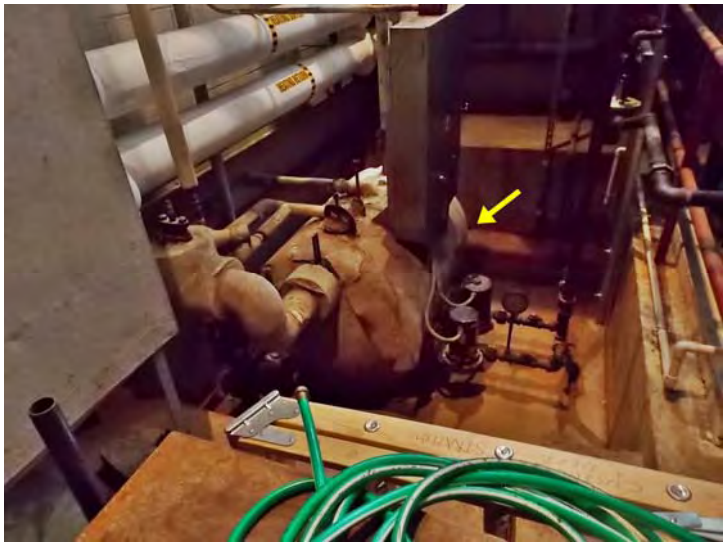
These are the variable speed 5 hp pumps used in a lead/standby manner to distribute hydronic heat throughout the new wing.

These are the variable frequency drives (VFDs) that control the hydronic pumps. Note the communication modules (arrows) that enable the school's energy management system to control the VFDs remotely.

This pair of original natural gas-fired low pressure steam boilers serves the original building. The boilers have been upgraded with new forced draft burners.

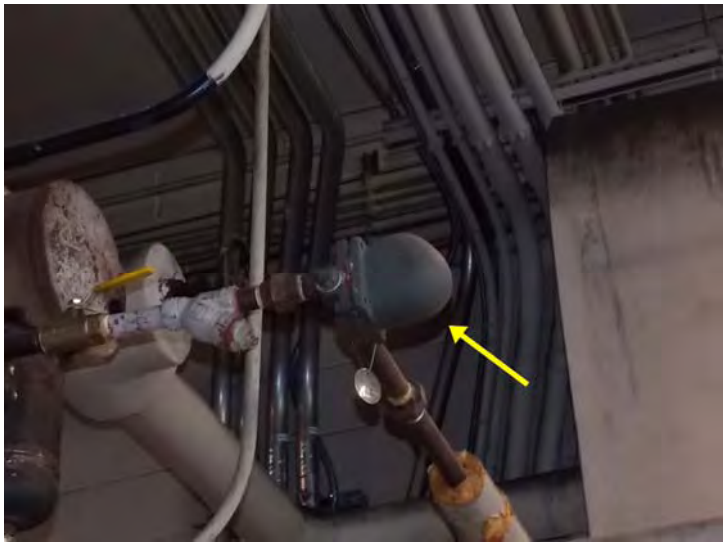


An induced draft fans on one of steam boilers, to assist in venting of flue gases.

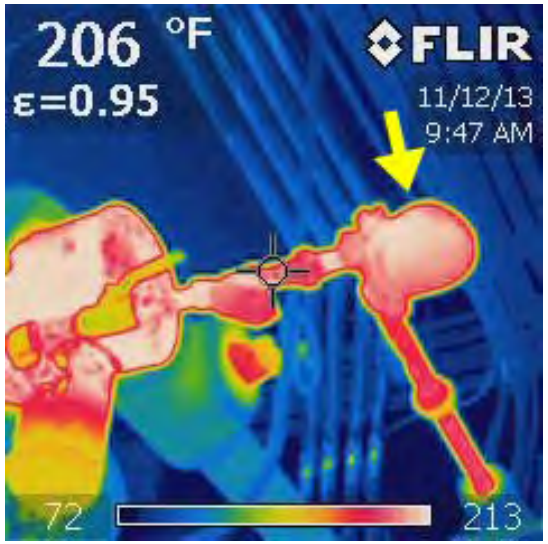


This is the main condensate receiver; condensed (cooled steam is collected in this vessel for re-use).

This original pneumatic (compressed air) system is used to control thermostats and motorized valves throughout the original building.



This is one of the float and thermostatic (F&T) steam traps.



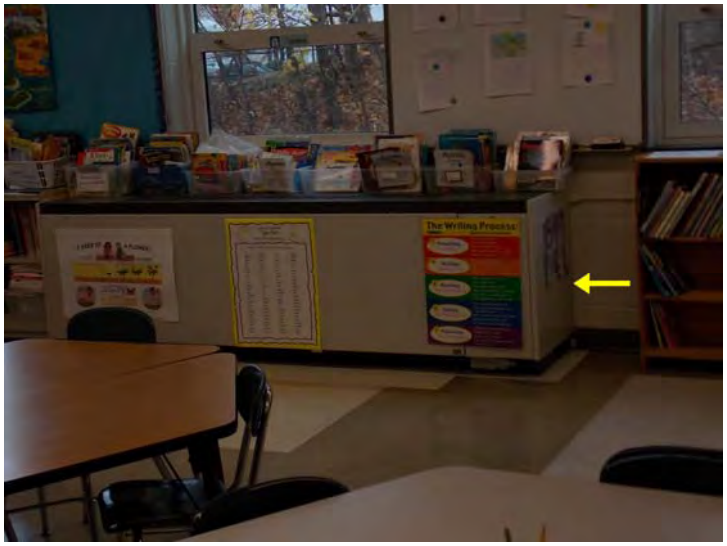
An infra-red image of the same steam trap shows that it is working properly. Steam (shown by the white color) enters the trap, and condensate (red color) flows from the trap (lower right pipeline).

An air handler in the main gym;
this unit has a steam coil to provide warm air.

One of the pneumatically-controlled thermostats.

One of the steam-heated through-wall convectors.

An electronic thermostatic (lower arrow) and a carbon monoxide (CO) detector in a new wing classroom.



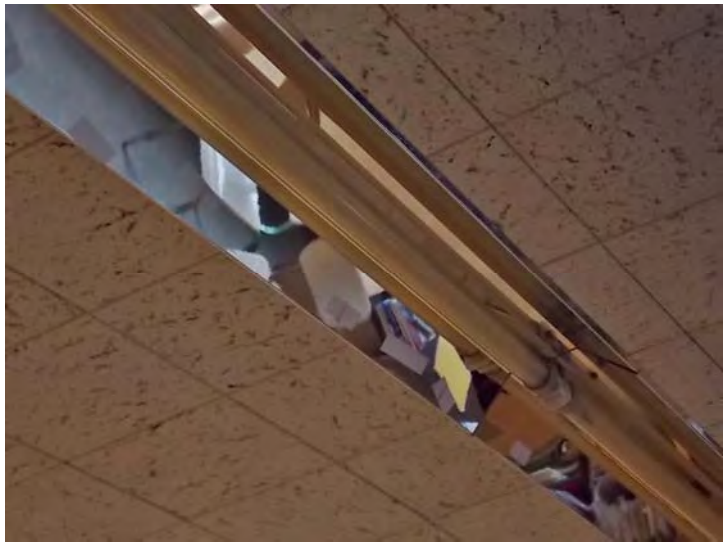
A typical through-wall convector in the new wing; each has a hydronic heat coil to produce warm air.

This is the elevator's hydraulic pump station.

Emergency power is provided by this natural gas powered generator (49 kW).

A view of the main fire alarm control panel.

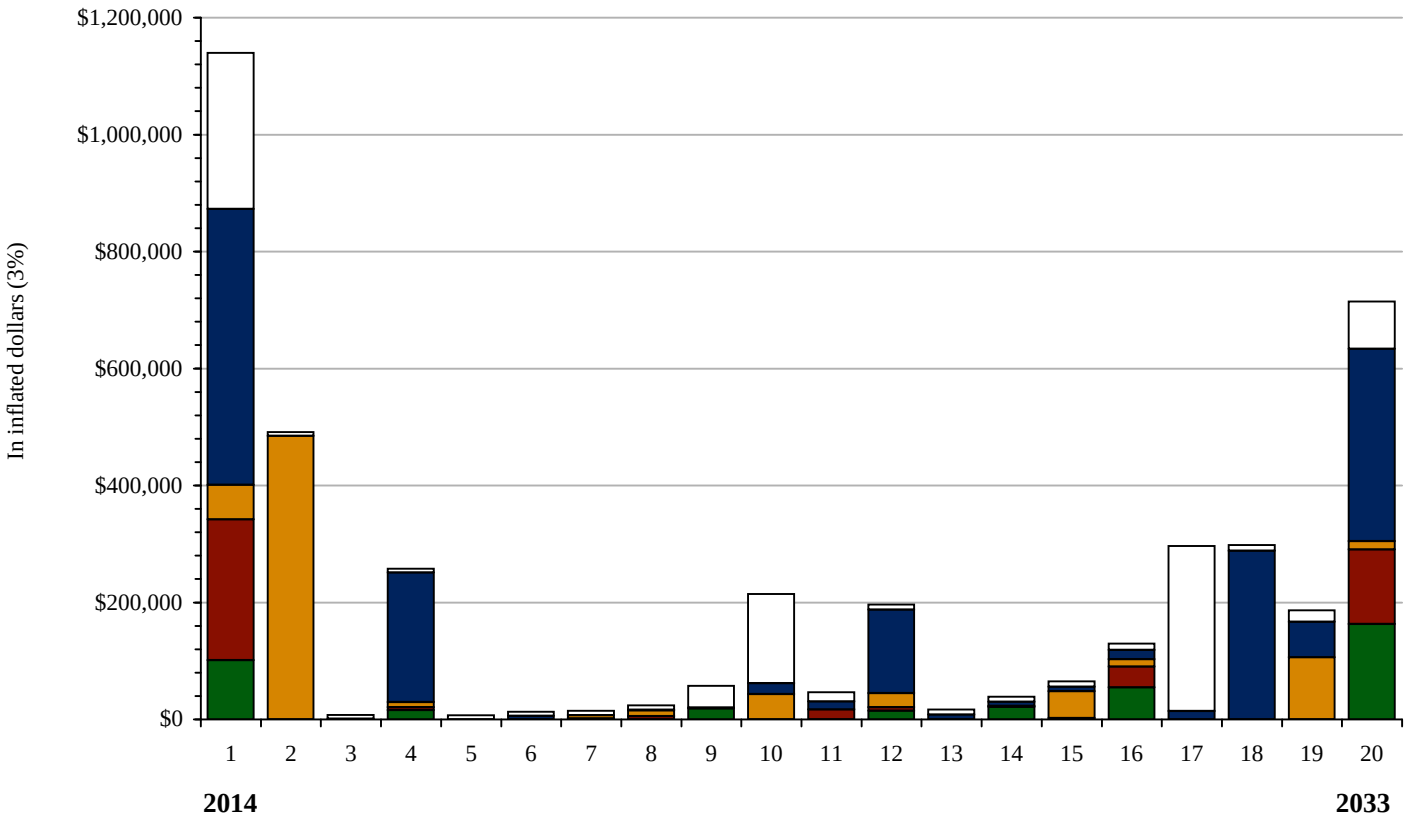
Domestic hot water for the school is produced by this natural gas-fired DHW tank (arrow). The tank in the background was a storage tank and appears to be offline.

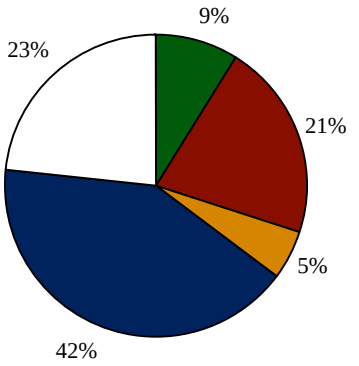


This is typical most of the lighting fixtures throughout the school: high efficient fluorescent lamps (T8s with electronic ballasts). Fixtures have a reflector surface to improve light output.

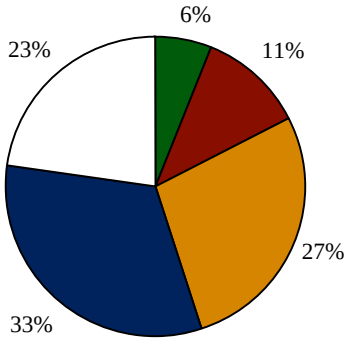
This egress should be upgraded with an illuminated exit sign.

This is LED light fixture should provide a long-lasting and energy efficient lighting source.

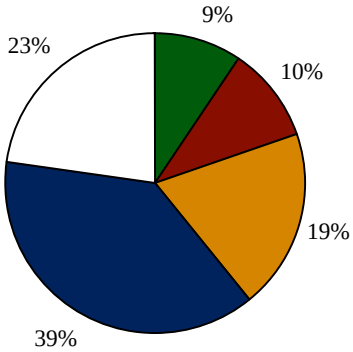




Year One Distribution



Ten Year Distribution



Twenty Year Distribution

Total Costs by Building System (inflated dollars)

	Year 1	Years 1-10	Years 1-20
Site Systems & Accessibility	$101,350	$137,442	$393,513
Mechanical Room	$240,798	$252,728	$440,734
Building Mech. & Elec.	$58,975	$611,431	$814,282
Building Architectural	$471,387	$719,809	$1,606,662
Dwelling Units	$267,560	$505,649	$961,619
In inflated dollars:	$1,140,070	$2,227,059	**$4,216,810**
In current dollars:	$1,140,070	$2,118,838	$3,342,484

Capital Needs Summary - *Conventional*

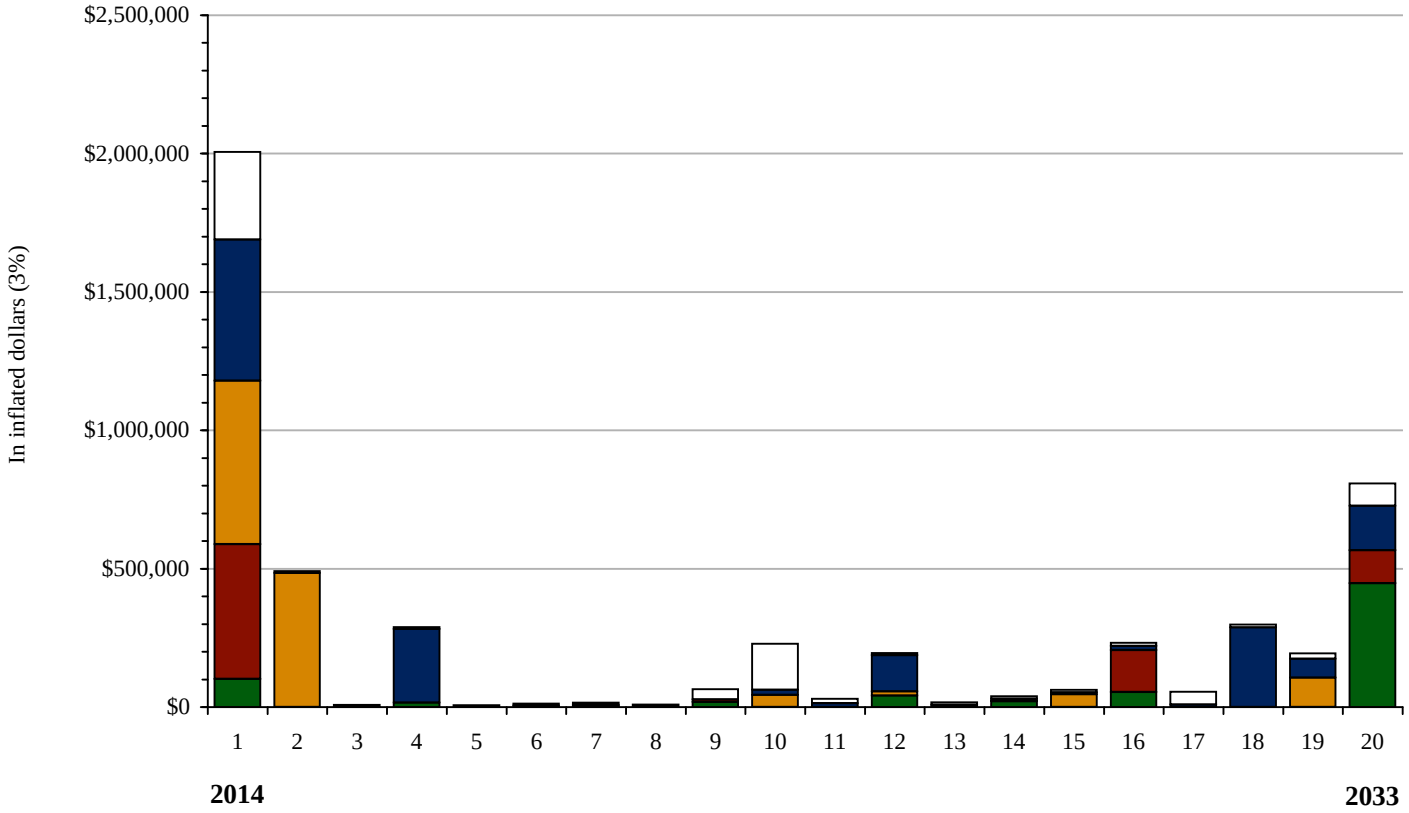
				OSI Ref:	**13680**		Residential Buildings:	**1**		
				Property Age:	**54 Years**		Total Number of Units:	**0**		
				Financing:	**0**		Occupancy:	**Students/Staff**		
	2014 Year 1	**2015** Year 2	**2016** Year 3	**2017** Year 4	**2018** Year 5	**2019** Year 6	**2020** Year 7	**2021** Year 8	**2022** Year 9	**2023** Year 10
Site Systems & Accessibility										
Surface	$101,350	$0	$0	$15,830	$0	$0	$1,910	$0	$18,352	$0
Accessibility	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Site Sub-Total	**$101,350**	**$0**	**$0**	**$15,830**	**$0**	**$0**	**$1,910**	**$0**	**$18,352**	**$0**
Mechanical Room										
Boilers	$240,798	$0	$0	$0	$0	$0	$0	$0	$0	$0
Boiler Room Systems	$0	$0	$0	$4,808	$0	$0	$0	$5,411	$1,710	$0
Mechanical Sub-Total	**$240,798**	**$0**	**$0**	**$4,808**	**$0**	**$0**	**$0**	**$5,411**	**$1,710**	**$0**
Building Mech. & Electrical										
Mechanical	$58,975	$484,937	$0	$8,796	$0	$0	$0	$9,900	$0	$0
Electrical	$0	$0	$0	$0	$0	$0	$5,373	$0	$0	$34,055
Elevators	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,394
Mechanical & Electrical Sub-Total	**$58,975**	**$484,937**	**$0**	**$8,796**	**$0**	**$0**	**$5,373**	**$9,900**	**$0**	**$43,449**
Building Architectural										
Structural and Exterior	$152,455	$0	$1,015	$0	$0	$0	$0	$1,177	$0	$0
Roof Systems	$300,428	$0	$0	$0	$0	$0	$0	$0	$0	$0
Halls, Stairs, Lobbies	$9,160	$0	$0	$162,500	$0	$0	$0	$0	$0	$6,234
Community Spaces	$9,344	$0	$0	$58,994	$0	$6,172	$0	$0	$0	$12,330
Building Architectural Sub-Total	**$471,387**	**$0**	**$1,015**	**$221,495**	**$0**	**$6,172**	**$0**	**$1,177**	**$0**	**$18,564**
Dwelling Units										
Living Areas	$155,568	$6,320	$6,509	$6,704	$6,906	$7,113	$7,326	$7,546	$7,772	$60,196
Bathrooms	$43,067	$0	$0	$0	$0	$0	$0	$0	$29,449	$41,100
Kitchens	$1,831	$0	$0	$0	$0	$0	$0	$0	$0	$51,147
Mechanical & Electrical	$67,095	$0	$0	$0	$0	$0	$0	$0	$0	$0
Dwelling Units Sub-Total	**$267,560**	**$6,320**	**$6,509**	**$6,704**	**$6,906**	**$7,113**	**$7,326**	**$7,546**	**$37,222**	**$152,444**
Total Capital Costs	**$1,140,070**	**$491,256**	**$7,524**	**$257,634**	**$6,906**	**$13,285**	**$14,610**	**$24,035**	**$57,283**	**$214,457**

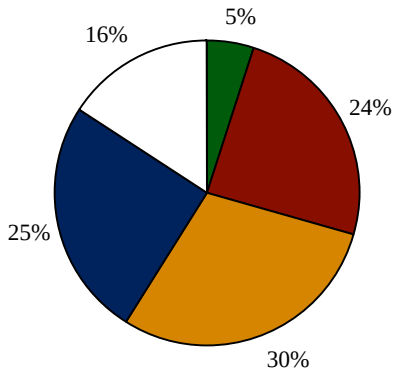
Costs on these pages are aggregated by category from the Capital Needs worksheets which follow. Total capital costs on these pages are carried forward to line F of the Replacement Reserve Analysis(es) that follow.

2024 Year 11	2025 Year 12	2026 Year 13	2027 Year 14	2028 Year 15	2029 Year 16	2030 Year 17	2031 Year 18	2032 Year 19	2033 Year 20	
										Site Systems & Accessibility
$0	$14,534	$0	$21,274	$2,420	$54,529	$0	$0	$0	$163,313	Surface
$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	Accessibility
$0	**$14,534**	**$0**	**$21,274**	**$2,420**	**$54,529**	**$0**	**$0**	**$0**	**$163,313**	Site Sub-Total
										Mechanical Room
$16,925	$0	$0	$0	$0	$29,165	$0	$0	$0	$119,677	Boilers
$0	$6,091	$0	$1,579	$0	$6,855	$0	$0	$0	$7,715	Boiler Room Systems
$16,925	**$6,091**	**$0**	**$1,579**	**$0**	**$36,020**	**$0**	**$0**	**$0**	**$127,392**	Mechanical Sub-Total
										Building Mech. & Electrical
$0	$24,016	$0	$0	$45,945	$12,542	$0	$0	$0	$14,116	Mechanical
$0	$0	$0	$0	$0	$0	$0	$0	$106,232	$0	Electrical
$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	Elevators
$0	**$24,016**	**$0**	**$0**	**$45,945**	**$12,542**	**$0**	**$0**	**$106,232**	**$14,116**	Mechanical & Electrical Sub-Total
										Building Architectural
$0	$16,834	$1,364	$0	$0	$0	$1,143	$2,759	$1,213	$1,249	Structural and Exterior
$0	$0	$0	$0	$0	$0	$0	$277,678	$0	$0	Roof Systems
$6,421	$93,116	$6,812	$7,016	$7,226	$7,443	$7,666	$7,896	$8,133	$269,143	Halls, Stairs, Lobbies
$7,155	$33,205	$0	$0	$0	$8,295	$5,376	$0	$51,073	$58,634	Community Spaces
$13,576	**$143,156**	**$8,176**	**$7,016**	**$7,226**	**$15,738**	**$14,186**	**$288,334**	**$60,419**	**$329,026**	Building Architectural Sub-Total
										Dwelling Units
$8,246	$8,493	$8,748	$9,010	$9,281	$9,559	$221,113	$10,141	$10,445	$80,899	Living Areas
$7,988	$0	$0	$0	$0	$0	$59,571	$0	$0	$0	Bathrooms
$0	$0	$0	$0	$0	$1,295	$1,605	$0	$0	$0	Kitchens
$0	$0	$0	$0	$0	$0	$0	$0	$9,576	$0	Mechanical & Electrical
$16,234	**$8,493**	**$8,748**	**$9,010**	**$9,281**	**$10,854**	**$282,289**	**$10,141**	**$20,022**	**$80,899**	Dwelling Units Sub-Total
$46,734	**$196,290**	**$16,924**	**$38,879**	**$64,872**	**$129,682**	**$296,474**	**$298,475**	**$186,673**	**$714,746**	**Total Capital Costs**

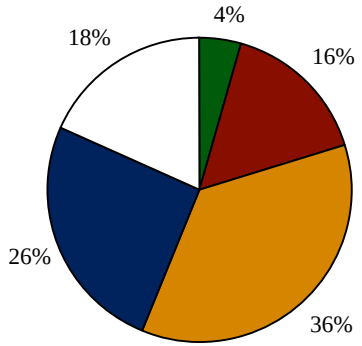
Capital Needs Summary - *Green*

Stratton Elementary School





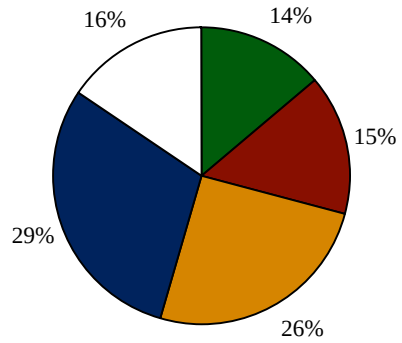
Year One Distribution



Ten Year Distribution

Total Costs by Building System (inflated dollars)

	Year 1	Years 1-10	Years 1-20
Site Systems & Accessibility	$101,350	$138,606	$703,103
Mechanical Room	$487,101	$495,936	$768,159
Building Mech. & Elec.	$591,232	$1,124,991	$1,292,740
Building Architectural	$509,863	$803,020	$1,510,724
Dwelling Units	$316,852	$569,946	$790,778
In inflated dollars:	$2,006,398	$3,132,500	**$5,065,504**
In current dollars:	$2,006,398	$3,019,304	$4,202,034



Twenty Year Distribution

Capital Needs Summary - *Green*

OSI Ref:	**13680**	Residential Buildings:	**1**
Property Age:	**54 Years**	Total Number of Units:	**0**
Financing:	**0**	Occupancy:	**Students/Staff**

	2014 Year 1	**2015** Year 2	**2016** Year 3	**2017** Year 4	**2018** Year 5	**2019** Year 6	**2020** Year 7	**2021** Year 8	**2022** Year 9	**2023** Year 10
Site Systems & Accessibility										
Surface	$101,350	$0	$0	$15,830	$0	$0	$3,075	$0	$18,352	$0
Accessibility	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Site Sub-Total	**$101,350**	**$0**	**$0**	**$15,830**	**$0**	**$0**	**$3,075**	**$0**	**$18,352**	**$0**
Mechanical Room										
Boilers	$370,193	$0	$0	$0	$0	$0	$0	$0	$0	$0
Boiler Room Systems	$116,908	$0	$0	$0	$0	$0	$0	$0	$8,836	$0
Mechanical Sub-Total	**$487,101**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$8,836**	**$0**
Building Mech. & Electrical										
Mechanical	$591,232	$484,937	$0	$0	$0	$0	$0	$0	$0	$0
Electrical	$0	$0	$0	$0	$0	$0	$5,373	$0	$0	$34,055
Elevators	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,394
Mechanical & Electrical Sub-Total	**$591,232**	**$484,937**	**$0**	**$0**	**$0**	**$0**	**$5,373**	**$0**	**$0**	**$43,449**
Building Architectural										
Structural and Exterior	$189,595	$0	$1,015	$0	$0	$0	$0	$1,177	$0	$0
Roof Systems	$300,428	$0	$0	$0	$0	$0	$0	$0	$0	$0
Halls, Stairs, Lobbies	$9,290	$0	$0	$190,765	$0	$0	$0	$0	$0	$6,234
Community Spaces	$10,550	$0	$0	$75,465	$0	$6,172	$0	$0	$0	$12,330
Building Architectural Sub-Total	**$509,863**	**$0**	**$1,015**	**$266,230**	**$0**	**$6,172**	**$0**	**$1,177**	**$0**	**$18,564**
Dwelling Units										
Living Areas	$200,397	$6,320	$6,509	$6,704	$6,906	$7,113	$7,326	$7,546	$7,772	$60,196
Bathrooms	$47,229	$0	$0	$0	$0	$0	$0	$0	$29,449	$56,105
Kitchens	$2,131	$0	$0	$0	$0	$0	$0	$0	$0	$51,147
Mechanical & Electrical	$67,095	$0	$0	$0	$0	$0	$0	$0	$0	$0
Dwelling Units Sub-Total	**$316,852**	**$6,320**	**$6,509**	**$6,704**	**$6,906**	**$7,113**	**$7,326**	**$7,546**	**$37,222**	**$167,449**
Total Capital Costs	**$2,006,398**	**$491,256**	**$7,524**	**$288,764**	**$6,906**	**$13,285**	**$15,774**	**$8,723**	**$64,409**	**$229,461**

Costs on these pages are aggregated by category from the Capital Needs worksheets which follow. Total capital costs on these pages are carried forward to line F of the Replacement Reserve Analysis(es) that follow.

2024 Year 11	2025 Year 12	2026 Year 13	2027 Year 14	2028 Year 15	2029 Year 16	2030 Year 17	2031 Year 18	2032 Year 19	2033 Year 20	
										Site Systems & Accessibility
$0	$41,527	$0	$21,274	$0	$54,529	$0	$0	$0	$447,166	Surface
$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	Accessibility
$0	**$41,527**	**$0**	**$21,274**	**$0**	**$54,529**	**$0**	**$0**	**$0**	**$447,166**	Site Sub-Total
										Mechanical Room
$0	$0	$0	$0	$0	$150,967	$0	$0	$0	$119,677	Boilers
$0	$0	$0	$1,579	$0	$0	$0	$0	$0	$0	Boiler Room Systems
$0	**$0**	**$0**	**$1,579**	**$0**	**$150,967**	**$0**	**$0**	**$0**	**$119,677**	Mechanical Sub-Total
										Building Mech. & Electrical
$0	$15,573	$0	$0	$45,945	$0	$0	$0	$0	$0	Mechanical
$0	$0	$0	$0	$0	$0	$0	$0	$106,232	$0	Electrical
$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	Elevators
$0	**$15,573**	**$0**	**$0**	**$45,945**	**$0**	**$0**	**$0**	**$106,232**	**$0**	Mechanical & Electrical Sub-Total
										Building Architectural
$0	$16,834	$1,364	$0	$0	$0	$1,143	$2,759	$1,213	$1,249	Structural and Exterior
$0	$0	$0	$0	$0	$0	$0	$277,678	$0	$0	Roof Systems
$6,421	$93,116	$6,812	$7,016	$7,226	$7,443	$7,666	$7,896	$8,133	$117,957	Halls, Stairs, Lobbies
$7,155	$19,861	$0	$0	$0	$8,295	$0	$0	$58,734	$41,730	Community Spaces
$13,576	**$129,812**	**$8,176**	**$7,016**	**$7,226**	**$15,738**	**$8,810**	**$288,334**	**$68,080**	**$160,936**	Building Architectural Sub-Total
										Dwelling Units
$8,246	$8,493	$8,748	$9,010	$9,281	$9,559	$9,846	$10,141	$10,445	$80,899	Living Areas
$7,988	$0	$0	$0	$0	$0	$37,305	$0	$0	$0	Bathrooms
$0	$0	$0	$0	$0	$1,295	$0	$0	$0	$0	Kitchens
$0	$0	$0	$0	$0	$0	$0	$0	$9,576	$0	Mechanical & Electrical
$16,234	**$8,493**	**$8,748**	**$9,010**	**$9,281**	**$10,854**	**$47,151**	**$10,141**	**$20,022**	**$80,899**	Dwelling Units Sub-Total
$29,809	**$195,404**	**$16,924**	**$38,879**	**$62,452**	**$232,087**	**$55,961**	**$298,475**	**$194,334**	**$808,678**	**Total Capital Costs**

Projected Capital Needs Over Twenty Years

SITE SYSTEMS

Replacement Items	Quantity	Cost / Unit in 2014 $	Total Cost in 2014 $	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)	Notes
SURFACE								
Parking/Driveway	19,941 sf	2.10	$41,876		≈2	20	20 in 1 Year	Asphalt, recently repaved, in good condition. Repairs shown in "Crackfill/Sealcoat/Restripe. Resurface in Yr 20
Parking/Driveway (Green)	19,941 sf	5.75	$114,661	$72,785	≈2	20	20 in 1 Year	Resurface using pourous asphalt
Hardtop/Basketball Court	21,450 sf	2.10	$45,045		≈2	20	20 in 1 Year	Asphalt, recently repaved & striped, in good condition. Repairs Repairs in "Crackfill/Sealcoat/Restripe. Resurface in Yr 20
Hardtop/Basketball Court (Green)	21,450 sf	5.75	$123,338	$78,293	≈2	20	20 in 1 Year	Resurface using pourous asphalt
Crack-Fill/Sealcoat/Re-stripe	41,391 sf	0.35	$14,487		≈2	5	4 /9 /14 in 1 Year	Driveway/ parking lot, walkways, & hardtop in good condition Future repairs in Yrs 4, 9, 14, and 19
Pedestrian Paving	2,959 sf	2.10	$6,214		≈2	20	20 in 1 Year	Asphalt, recently repaved, in good condition. Repairs shown in "Crackfill/Sealcoat/Restripe. Resurface in Yr 20
Pedestrian Paving (Green)	2,959 sf	5.75	$17,014	$10,800	≈2	20	20 in 1 Year	Resurface using pourous asphalt
Fencing	lf							
Fencing (Green)	lf							
Site Lighting	2 ea	800.00	$1,600		Varies	8	7 /15 in 1 Year	Pole-mounted HID double fixtures at hardtop play area Allowance to replace lamps and ballasts
Site Lighting (Green)	2 ea	1287.50	$2,575	$975	Varies	30	7 E1 in 1 Year	Consider replacement/retrofit with LED fixtures Longevity, energy savings. **Discuss**
Retaining Walls	230 lf	37.00	$8,510		54	20	1 in 1 Year	Stone perimeter wall, in fair condition. Repair allowance to repoint (replace damaged mortar, re-seat stones)
	1 ls	10500.00	$10,500		54	20	12 in 1 Year	Developed greenspace; allowance to prune/replant in Yr 12
Landscaping/Play Equipment	1 ls	35000.00	$35,000		Varies	20	16 in 1 Year	High impact plastic/metal play equip. Replace in Yr 16
Landscaping/Play Equipment (Green)	1 ls	35000.00	$35,000		54	20	16 in 1 Year	Consider replacing existing landscape with low maintenance
	1 ls	30000.00	$30,000	$19,500	Varies	20	12 in 1 Year	plantings (xeriscape) in Yr 12.
ACCESSIBILITY								
Circulation	1 ls	92840.00	$92,840		54	25	1 in 1 Year	Stairs to gym, stage, and playroom. Stairs at kindergarten egress. Modify w/chair lift stations.
Circulation (Green)	ls							
Common Areas	ls							
Common Areas (Green)	ls							
Classrooms/Program Areas	ls							
Classrooms/Program Areas (Green)	ls							
Miscellaneous	ls							

Replacement Items	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021	Year 9 2022	Year 10 2023	Year 11 2024	Year 12 2025	Year 13 2026	Year 14 2027	Year 15 2028	Year 16 2029	Year 17 2030	Year 18 2031	Year 19 2032	Year 20 2033
SURFACE																				
Parking/Driveway	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$73,430
Parking/Driveway (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$201,058
Hardtop/Basketball Court	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$78,987
Hardtop/Basketball Court (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$216,273
Crack-Fill/Sealcoat/Re-stripe	$0	$0	$0	$15,830	$0	$0	$0	$0	$18,352	$0	$0	$0	$0	$21,274	$0	$0	$0	$0	$0	$0
Pedestrian Paving	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10,896
Pedestrian Paving (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$29,835
Fencing	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Fencing (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Site Lighting	$0	$0	$0	$0	$0	$0	$1,910	$0	$0	$0	$0	$0	$0	$0	$2,420	$0	$0	$0	$0	$0
Site Lighting (Green)	$0	$0	$0	$0	$0	$0	$3,075	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Retaining Walls	$8,510	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Landscaping/Play Equipment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$14,534	$0	$0	$0	$54,529	$0	$0	$0	$0
Landscaping/Play Equipment (Gree	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$41,527	$0	$0	$0	$54,529	$0	$0	$0	$0
ACCESSIBILITY																				
Circulation	$92,840	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Circulation (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Common Areas	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Common Areas (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Classrooms/Program Areas	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Classrooms/Program Areas (Green	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Projected Capital Needs Over Twenty Years

MECHANICAL ROOM

Replacement Items	Quantity	Cost / Unit in 2014 $	Total Cost in 2014 $	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)	Notes
BOILERS								
Boilers - Steam	2 ea	89,349	$178,698		54	30+	1 in 1 Year	Gas-fired HB Smith, 2900 MBH ea (lead/backup) Replace in Yr 1; only meeting 40% of bldg load -oversized?
Boilers - Steam (Green)	1 ls	214,500	$214,500	$35,802	NEW	22	1 E2 in 1 Year	Replace steam boilers w/hydronic condensing boiler plant Includes ACM abatement, flues, and combustion air
Boilers - Condensing	1 ea	66,000	$66,000		≈1	20	20 in 1 Year	Gas-fired Hydrotherm 1,999 MBH in good condition Replace in Yr 20
Boilers - Condensing (Green)	1 ea				≈1	22		Green option in place
Controls - Pneumatic	1 ls	12,420	$12,420		54	15	16 in 1 Year	Pneumatics for steam sys (compressor, air dryer, tank
	1 ls	62,100	$62,100		54	15	1 in 1 Year	control panel, etc.). Replace in Yr 1; upgrade in Yr 16
Controls - EMS/DDC	1 ls	22,100	$22,100		≈1	15	16 in 1 Year	Bldg EMS in place for new wing & hydronic. Add org bldg
	1 ls	73,575	$73,575	$11,475	≈1	15	1 in 1 Year	(DDC points, devices, etc.) in Yr 1; upgrade in Yr 16
Steam Valves, Condensate Receiver	1 ls	12,594	$12,594		Varies	20	11 in 1 Year	Receiver w/pumps, manual main steam valve. Replace pumps, service valve and receiver tank, etc.
Hydronic Pumps	1 ls	13,618	$13,618	$1,024	≈1	20	1 in 1 Year	Remove condensate receiver & pumps. Upgrade hydronic pumps to serve original bldg section in Yr 1
Variable Frequency Drives	2 ea	3,150	$6,300		≈1	15	16 in 1 Year	VFDs control hydronic pumps (one per pump) Replace in Year 16
Variable Frequency Drives (Green)	ea				≈1			Green option in place
Boiler Secondary Pumps	1 ea	2,250	$2,250		≈1	20	20 in 1 Year	In-line high eff 1.5 hp pump on consdensing boiler's return Replace in Year 20.
Boiler Secondary Pumps (Green)	1 ea				≈1	20		Green option in place
Engineering Fee	ls							Fee pertains only for proposed hydronic upgrade
Engineering Fee (Green)	1 ls	68,500	$68,500		54	15	1 16 in 1 Year	Contract design professional to design hyrdronic system to replace steam heat.
Combustion Air	1 ls				54	20		
Combustion Air (Green)	1 ls				54	20		
Miscellaneous	1 ea				54	20		
Flue Exhaust - Steam Boilers	1 ls				54	30		Insulated metal flues each with induced draft fan Maintain out of Operating
Flue Exhaust - Steam Boilers (Green)	1 ls				54	30		Replace w/stainless steel if condensing boilers are used. Replace w/stainless steel if condensing boilers are used.
Flue Exhaust - Condensing Boiler	1 ls				≈1	30		Stainless steel flue with induced draft fan Maintain out of Operating
Flue Exhaust - Condensing Boiler (Gree	1 ls				≈1	30		Green option in place

Costs projected at 3%

Replacement Items	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021	Year 9 2022	Year 10 2023	Year 11 2024	Year 12 2025	Year 13 2026	Year 14 2027	Year 15 2028	Year 16 2029	Year 17 2030	Year 18 2031	Year 19 2032	Year 20 2033
BOILERS																				
Boilers - Steam	$178,698	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Boilers - Steam (Green)	$214,500	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Boilers - Condensing	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$115,731
Boilers - Condensing (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Controls - Pneumatic	$62,100	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$19,350	$0	$0	$0	$0
Controls - EMS/DDC	$73,575	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$34,431	$0	$0	$0	$0
Steam Valves, Condensate Receive	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$16,925	$0	$0	$0	$0	$0	$0	$0	$0	$0
Hydronic Pumps	$13,618	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Variable Frequency Drives	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,815	$0	$0	$0	$0
Variable Frequency Drives (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Boiler Secondary Pumps	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,945
Boiler Secondary Pumps (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Engineering Fee	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Engineering Fee (Green)	$68,500	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$106,721	$0	$0	$0	$0
Combustion Air	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Combustion Air (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Flue Exhaust - Steam Boilers	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Flue Exhaust - Steam Boilers (Gre	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Flue Exhaust - Condensing Boiler	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Flue Exhaust - Condensing Boiler (	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Projected Capital Needs Over Twenty Years

MECHANICAL ROOM--*continued*

Replacement Items	Quantity	Cost / Unit in 2014 $	Total Cost in 2014 $	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)	Notes
BOILER ROOM SYSTEMS								
Boiler Room Piping/Valves	1 ls	4,400	$4,400		Varies	25	4 8 12 16 20 in 1 Year	Mix of hydronic heat, low pressure steam, & DHW lines Replace steam traps
Boiler Room Piping/Valves (Green)	1 ls	116,908	$116,908	$112,508	54	25	1 in 1 Year	Replace steam lines w/hydronic heat, connect to existing hydronic (header, etc.)
3-Way Valve & Controller	ea							
3-Way Valve & Controller (Green)	ea							
Heat Exchanger	ea							
Heat Exchanger (Green)	ea							
DHW Generation - 1	1 ea	1,350	$1,350		≈6	15	9 in 1 Year	Natural gas fired 40 gallon tank Replace
DHW Generation - 1 (Green)	1 ea	6,975	$6,975	$5,625	≈6	15	9 E3 in 1 Year	Replace existing w/natural gas-fired condensing DHW tank Higher efficiency, energy savings
DHW Pumps	1 ea	1,075	$1,075		≈6	20	14 in 1 Year	Fractional hp in-line pump (high eff motor) Replace in Year 14
DHW Pumps (Green)	ea							Green option in place
DHW Storage	ea							
DHW Storage (Green)	ea							
DHW Storage - 2	ea							
DHW Storage - 2 (Green)	ea							
DHW Pumps - 1	ea							
DHW Pumps - 1 (Green)	ea							
DHW Pumps - 2	ea							
DHW Pumps - 2 (Green)	ea							
Miscellaneous	ea							
Miscellaneous (Green)	ea							
Miscellaneous	ea							

Costs projected at 3%

Replacement Items	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021	Year 9 2022	Year 10 2023	Year 11 2024	Year 12 2025	Year 13 2026	Year 14 2027	Year 15 2028	Year 16 2029	Year 17 2030	Year 18 2031	Year 19 2032	Year 20 2033
BOILER ROOM SYSTEMS																				
Boiler Room Piping/Valves	$0	$0	$0	$4,808	$0	$0	$0	$5,411	$0	$0	$0	$6,091	$0	$0	$0	$6,855	$0	$0	$0	$7,715
Boiler Room Piping/Valves (Green)	$116,908	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3-Way Valve & Controller	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3-Way Valve & Controller (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Heat Exchanger	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Heat Exchanger (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DHW Generation - 1	$0	$0	$0	$0	$0	$0	$0	$0	$1,710	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DHW Generation - 1 (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$8,836	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DHW Pumps	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,579	$0	$0	$0	$0	$0	$0
DHW Pumps (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DHW Storage	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DHW Storage (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DHW Storage - 2	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DHW Storage - 2 (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DHW Pumps - 1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DHW Pumps - 1 (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DHW Pumps - 2	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DHW Pumps - 2 (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Projected Capital Needs Over Twenty Years

BUILDING MECHANICAL AND ELECTRICAL

Replacement Items	Quantity	Cost / Unit in 2014 $	Total Cost in 2014 $	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)	Notes
BUILDING MECHANICAL								
Compactors	ea							
Building Fire Suppression	1 ls	470,813	$470,813		ADD	35	2 in 1 Year	No existing fire sprinklers. Budget price to add sprinklers in Year 2.
Building Distribution Systems	1 ls				Varies	50		DHW, hydronic heat, natural gas, sanitary wastewater No observed systemic problems; maintain out of Operating
Steam/Condensate Distribution	1 ls	8,050	$8,050		54	50	4 8 12 16 20 in 1 Year	Existing low pressure steam serves original bldg section Replace steam traps in Years 4, 8, 12, 16, and 20
Hydronic Distribution (Green)"	1 ea	467,632	$467,632	$459,582	54	50	1 in 1 Year	Replace steam system with hydronic heat, similar to new wing in Yr 1
Building HVAC Systems - 2	4 ea	7,500	$30,000		54	25	1 in 1 Year	Ceiling mounted air handlers Upgrade allowance (blowers, steam coils)
Building HVAC Systems - 2 (Green)	4 ea	11,400	$45,600	$15,600	NEW	25	1 in 1 Year	Replace existing with hydronic heated air handlers in Year 1
Building HVAC Systems - Old Bldg	1 ls	28,975	$28,975		54	25	1 in 1 Year	Steam-heated convectors in old building section. Upgrade allowance (blowers, steam coils) & replace a/c units in Yr 1
Building HVAC Systems - Old Bldg (Gre	1 ls	78,000	$78,000	$49,025	54	25	1 in 1 Year	Replace existing w/ hydronic heated convectors in Yr 1 as part of the hydronic upgrade plus split DX a/c.
Bldg HVAC - New Wing	1 ls	30,375	$30,375		≈1	25	15 in 1 Year	Existing hydronic convectors Repair allowance (blowers and coils)
Bldg HVAC - New Wing (Green)	1 ls				≈1	25		Green option in place
Exhaust Fans	11 ea	845	$9,300		8	20	12 in 1 Year	Rooftop and several sidewall fans Replace
Exhaust Fans (Green)	11 ea	1,023	$11,250	$1,950	8	20	12 E4 in 1 Year	Replace existing and govern with VFDs (CO2 input) to maintain good air quality.
BUILDING ELECTRICAL								
Building Power Wiring	1 ls				Varies	99		Cutler-Hammer equipment (main, panels), LEA surge protector recently added. Maintain out of Operating
Emergency Generator	1 ea	4,500	$4,500		12	35	7 in 1 Year	Natural gas powered Katolight generator (50 kW) with new transfer switch. Overhaul generator in Year 7
Emergency Lights	1 ea				54	10		Powered by generator Maintain out of Operating
Smoke / Fire Detection	1 ls	62,400	$62,400		≈1	20	19 in 1 Year	Fire Lite FACP controls hardwired alarm & detection devices Upgrade in Year 19
Signaling / Communication	1 ls	26,100	$26,100		Varies	20	10 in 1 Year	PA system, central time clocks Upgrade allowance
BUILDING ELEVATORS								
Shafts and Doorways	1 ea				15	30		Stanley hydraulic-type elevator Maintained by full service contract
Cabs	1 ea	7,200	$7,200		15	15	10 in 1 Year	Cab interior and door operators not included in service contract. Refurbish in Year 10
Controller/Dispatcher	1 ea				15	20		Maintained by full service contract
Machine Room Equipment	1 ea				15	30		Maintained by full service contract

Costs projected at 3%

Replacement Items	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021	Year 9 2022	Year 10 2023	Year 11 2024	Year 12 2025	Year 13 2026	Year 14 2027	Year 15 2028	Year 16 2029	Year 17 2030	Year 18 2031	Year 19 2032	Year 20 2033
BUILDING MECHANICAL																				
Compactors	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Building Fire Suppression	$0	$484,937	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Building Distribution Systems	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Steam/Condensate Distribution	$0	$0	$0	$8,796	$0	$0	$0	$9,900	$0	$0	$0	$11,143	$0	$0	$0	$12,542	$0	$0	$0	$14,116
Hydronic Distribution (Green)"	$467,632	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Building HVAC Systems - 2	$30,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Bldb HVAC Systems - 2 (Green)	$45,600	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Building HVAC Systems - Old Bldg	$28,975	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Bldg HVAC Sys - Old Bldg (Green)	$78,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Bldg HVAC - New Wing	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$45,945	$0	$0	$0	$0	$0
Bldg HVAC - New Wing (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Exhaust Fans	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$12,873	$0	$0	$0	$0	$0	$0	$0	$0
Exhaust Fans (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$15,573	$0	$0	$0	$0	$0	$0	$0	$0
BUILDING ELECTRICAL																				
Building Power Wiring	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Emergency Generator	$0	$0	$0	$0	$0	$0	$5,373	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Emergency Lights	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Smoke / Fire Detection	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$106,232	$0
Signaling / Communication	$0	$0	$0	$0	$0	$0	$0	$0	$0	$34,055	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Shafts and Doorways	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cabs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,394	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Controller/Dispatcher	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Machine Room Equipment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Projected Capital Needs Over Twenty Years

BUILDING ARCHITECTURE

Replacement Items	Quantity	Cost / Unit in 2014 $	Total Cost in 2014 $	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)	Notes
STRUCTURE								
Foundation	1,394 lf				54	50		Poured concrete foundation, no indication (reported or observed) of foundation issues. Monitor
Framing	ls							
Slab	sf							
Miscellaneous	ea							
BUILDING EXTERIOR								
	6 ea				54			Metal frame glass doors in good condition; replace solid
Common Doors -Double Leaf	3 ea	1650.00	$4,950		54	35	1 in 1 Year	core metal doors (include glass inserts)
Common Doors -Double Leaf (Green)	3 ea	1825.00	$5,475	$525	54	35	E5 Years	Replace existing solid metal doors w/fiberglass doors (energy savings, lower maintenance), not cost-effective
Common Doors - Single Leaf	3 ea	1175.00	$3,525		54	35	1 in 1 Year	Solid core metal doors Replace in Year 1
Common Doors - Single Leaf (Green)	3 ea	1325.00	$3,975	$450	54	35	E5 Years	Replace existing with fiberglass doors (energy savings, lower maintenance); not cost-effective
Service Doors	8 ea	975.00	$7,800		54	35	1 in 1 Year	Solid core metal and wood doors Replace in Year 1
Service Doors (Green)	8 ea	1100.00	$8,800	$1,000	54	35	E5 Years	Replace existing with fiberglass doors (energy savings, lower maintenance); not cost-effective
Garage Doors	ea							
Storm Doors	ea							
Exterior Walls - Wood	684 sf	1.40	$957		54	40+	3 8 13 18 in 1 Year	Painted, various locations on original building Allowance to repair and repaint
	684 sf	0.90	$615		54	50		Replace existing w/cementious fiberboard (longevity,
Exterior Walls - Wood (Green)	684 sf	6.75	$4,614	$3,657	54	50	G1 Years	nominal maintenance); repaint in Yr 18; not cost-effective
Exterior Walls - Concrete	2,203 sf				54	50		Concrete window panels, concrete wall sections Isolated spalled section; repair out of Operating
Exterior Walls - Concrete (Green)	2,203 sf				54	50		No green option
	18,532				54			Brickwork in good condition, no signs of mortar loss or
Exterior Walls - Brick	1,390 sf	8.75	$12,161		54	50	12 in 1 Year	shaling. Allowance for future repointing
Trim, Soffit, Fascia	490 lf				54	20		Metal trim and fascia board, wood soffits Maintain out of Operating
Trim, Soffit, Fascia (Green)	lf							
Exterior Ceilings/Canopies	6 sf				54	50		Recently rebuilt, in good condition Maintain out of Operating
Miscellaneous	ea							
Miscellaneous (Green)	ea							

Costs projected at 3%

Replacement Items	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021	Year 9 2022	Year 10 2023	Year 11 2024	Year 12 2025	Year 13 2026	Year 14 2027	Year 15 2028	Year 16 2029	Year 17 2030	Year 18 2031	Year 19 2032	Year 20 2033
STRUCTURE																				
Foundation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Framing	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Slab	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
BUILDING EXTERIOR																				
Common Doors -Double Leaf	$4,950	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cmmn Doors -Double Leaf (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Common Doors - Single Leaf	$3,525	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cmmn Doors - Single Leaf (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Service Doors	$7,800	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Service Doors (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Garage Doors	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Storm Doors	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Exterior Walls - Wood	$0	$0	$1,015	$0	$0	$0	$0	$1,177	$0	$0	$0	$0	$1,364	$0	$0	$0	$0	$1,582	$0	$0
Exterior Walls - Wood (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Exterior Walls - Concrete	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Ext Walls - Concrete (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Exterior Walls - Brick	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$16,834	$0	$0	$0	$0	$0	$0	$0	$0
Trim, Soffit, Fascia	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Trim, Soffit, Fascia (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Exterior Ceilings/Canopies	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Projected Capital Needs Over Twenty Years

BUILDING ARCHITECTURE--*continued*

Replacement Items	Quantity	Cost / Unit in 2014 $	Total Cost in 2014 $	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)				Notes
BUILDING EXTERIORS (cont.)											
Windows - Large & Original	22 ea	6190.00	$136,180		54	35	1		in	1 Year	Metal framed single glazed, some with lexan glazing Replace w/double glazed windows
Windows - Large & Original (Green)	22 ea	7878.18	$173,320	$37,140	54	40	1	E6	in	1 Year	Replace existing w/double glazed windows include low-E glazing and fiberglass frames
Windows - New	114 ea				≈2	35					Metal framed double glazed energy efficient windows Maintain out of Operating
Windows - New (Green)	114 ea				≈2	40					Green option in place
Window Glazing	114 ea	125.00	$14,250		≈2	20	17		over	20 Years	Glazing replacement allowance starts in Year 17
Window Glazing (Green)	ea										
Window Lintels	ea										
Balconies	ea										
Balconies (Green)	ea										
Patios	ea										
Patios (Green)	ea										
Building Mounted Lighting	1 ls				54	10					LED fixtures Maintain out of Operating
Building Mounted Lighting (Green)	ea										Green option in place
ROOF SYSTEMS											
Structure	46,093 sf				54	50					Flat and shallow pitched sections Monitor
Roof Covering - Older	29,293 sf	10.00	$292,928		54	20	1		in	1 Year	Tar and gravel: original, no leaks but ponding on flat section Replace in Yr 1 w/ rubber membrane
	29,293 sf	0.45	$13,182		NEW	5				Years	Replace w/green roof; longevity, temp control
Roof Covering - Older (Green)	29,293 sf	23.00	$673,734	$380,806	NEW	30		E7		Years	Not cost-effective
Roof Covering - Newer	16,800 sf	10.00	$168,000		≈2	20	18		in	1 Year	Rubber membrane over new wing w/internal drains; insulation added
	16,800	0.45	$7,560		≈2	5				Year	Replace w/green roof; longevity, temp control
Roof Covering - Newer (Green)	16,800 sf	23.00	$386,400	$218,400	≈2	30		E7		Years	Not cost-effective
Roof Drainage	1 ls				54	20					Mix of internal drains and gutters and downspouts. Repair costs included with respective roof covering replacement.
Skylights	3 ea	2500.00	$7,500		≈25	20	1		in	1 Year	Older skylights repaired and rebuilt, in fair condition Replace in Year 1
Penthouses	ea										

Costs projected at 3%

Replacement Items	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021	Year 9 2022	Year 10 2023	Year 11 2024	Year 12 2025	Year 13 2026	Year 14 2027	Year 15 2028	Year 16 2029	Year 17 2030	Year 18 2031	Year 19 2032	Year 20 2033
BUILDING EXTERIORS (cont.)																				
Windows - Large & Original	$136,180	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Windows - Lrg & Orig (Green)	$173,320	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Windows - New	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Windows - New (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Window Glazing	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,143	$1,178	$1,213	$1,249
Window Glazing (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Window Lintels	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Balconies	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Balconies (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Patios	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Patios (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Building Mounted Lighting	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Bld Mounted Lighting (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
ROOF SYSTEMS																				
Structure	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Roof Covering - Older	$292,928	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Roof Covering - Older (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Roof Covering - Newer	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$277,678	$0	$0
Roof Covering - Newer (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Roof Drainage	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Skylights	$7,500	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Penthouses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Projected Capital Needs Over Twenty Years

BUILDING ARCHITECTURE--*continued*

Replacement Items	Quantity	Cost / Unit in 2014 $	Total Cost in 2014 $	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)	Notes
HALLS								
Hallway Walls and Ceilings	42,204 sf	1.39	$58,452		Varies	8	4 12 20 in 1 Year	Ceiling tiles, ceramic tile and painted walls. Allowance to replace ceiling and repaint/reglaze walls
Hallway Walls and Ceilings (Green)	42,204 sf	1.39	$58,452	$0	Varies	8	4 12 20 in 1 Year	Replace ceiliing tiles and repaint/reglaze walls using low VOC products.
Hallway Floors	17,244 sf	5.00	$86,219		Varies	16	4 20 in 1 Year	VCT flooring, in good condition Replace in Year 4
Hallway Floors (Green)	17,244 sf	6.50	$112,085	$25,866	Varies	25	4 G2 in 1 Year	Replace existing with linoleum tile Longevity, resilient
Hallway Lighting	71 ea	105.00	$7,455		17	25	1 in 1 Year	T8 fluorescent w/reflectors, mostly 1L w/several U-lamps, 2 & 3 light fixtues. Replace reflectors w/wrap fixtures
Hallway Lighting (Green)	71 ea	275.00	$19,525	$12,070	17	35	E8 Years	Replace existing with LED fixtures, Longevity, energy savings; not cost-effective
Hallway/Stairway Exit Lighting	19 ea 2 ea	65.00	$130		54 ADD	30	1 in 1 Year	Mostly LED fixtures: pair of older PL exits at main gym. Add LED exits to replace outdated exit signs.
Hallway/Stairway Exit Lighting (Green)	4 ea	65.00	$260	$130	ADD	30	1 E9 in 1 Year	Replace outdated signs and the PL exit signs with LED exits.
Hallway Heating	1 ls				54	20		Steam and hydronic convectors. See BME report section for discussion
Hallway Heating (Green)	ea							
Hallway Doors	98 ea	975.00	$95,550		Varies	30	10 over 20 Years	Solid core doors w/glass insert in good condition Replacement allowance
Furnishing	ea							
Furnishing (Green)	ea							
STAIRS								
Stair Walls and Ceilings	8,694 sf 2,376 sf	1.70	$4,039		54 Varies	8	4 12 20 in 1 Year	Ceiling tiles and ceramic tile walls, in good condition Replace ceiling tiles; maintain ceramic tiles out of Operating
Stair Walls and Ceilings (Green)	2,376 sf	1.70	$4,039	$0	Varies	8	4 12 20 in 1 Year	Replace ceiliing tiles with low VOC product
Stair Floors	2,376 sf				54	30		Quarry tile flooring, in good condition Maintain out of Operating
Stair Floors (Green)	2,376 sf				54	30		Green option in place
Stair Interior Lighting	15 ea	105.00	$1,575		54	25	1 in 1 Year	T8 fluorescent w/reflectors, mostly 1L w/2L fixtures Replace reflectors w/wrap fixtures
Stair Interior Lighting (Green)	15 ea	275.00	$4,125	$2,550	54	35	E8 Years	Replace existing with LED fixtures, Longevity, energy savings; not cost-effective
Stair Doors	ea							
Stair Railings	ea							

Costs projected at 3%

Replacement Items	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021	Year 9 2022	Year 10 2023	Year 11 2024	Year 12 2025	Year 13 2026	Year 14 2027	Year 15 2028	Year 16 2029	Year 17 2030	Year 18 2031	Year 19 2032	Year 20 2033
HALLS																				
Hallway Walls and Ceilings	$0	$0	$0	$63,872	$0	$0	$0	$0	$0	$0	$0	$80,912	$0	$0	$0	$0	$0	$0	$0	$102,497
Hall Walls and Ceilings (Green)	$0	$0	$0	$63,872	$0	$0	$0	$0	$0	$0	$0	$80,912	$0	$0	$0	$0	$0	$0	$0	$102,497
Hallway Floors	$0	$0	$0	$94,214	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$151,186
Hallway Floors (Green)	$0	$0	$0	$122,478	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Hallway Lighting	$7,455	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Hallway Lighting (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Hallway/Stairway Exit Lighting	$130	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Hall/Stair Exit Lighting (Green)	$260	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Hallway Heating	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Hallway Heating (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Hallway Doors	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,234	$6,421	$6,613	$6,812	$7,016	$7,226	$7,443	$7,666	$7,896	$8,133	$8,377
Furnishing	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Furnishing (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
STAIRS																				
Stair Walls and Ceilings	$0	$0	$0	$4,414	$0	$0	$0	$0	$0	$0	$0	$5,591	$0	$0	$0	$0	$0	$0	$0	$7,083
Stair Walls and Ceilings (Green)	$0	$0	$0	$4,414	$0	$0	$0	$0	$0	$0	$0	$5,591	$0	$0	$0	$0	$0	$0	$0	$7,083
Stair Floors	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Stair Floors (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Stair Interior Lighting	$1,575	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Stair Interior Lighting (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Stair Doors	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Stair Railings	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Projected Capital Needs Over Twenty Years

BUILDING ARCHITECTURE--*continued*

Replacement Items	Quantity	Cost / Unit in 2014 $	Total Cost in 2014 $	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)	Notes
LOBBIES / MAIL FACILITIES								
Lobby Walls & Ceilings	sf							Included in "Hallways"
Lobby Walls & Ceilings (Green)	sf							
Lobby Floors	sf							
Lobby Floors (Green)	sf							
ADMINISTRATION/MAIN OFFICE/LIBRARY								
Walls and Ceilings	10,360 sf	1.39	$14,348		Varies	8	4 12 20 in 1 Year	Mix of painted walls & wood paneling, ceiling tiles. Allowance Allowance to replace ceiling tiles & repaint walls
Walls and Ceilings (Green)	10,360 sf	1.39	$14,348	$0	Varies	8	4 12 20 in 1 Year	Replace ceiliing tiles and repaint walls using low VOC products.
Floor Covering - Carpeting	3,110 sf	3.10	$9,640		Varies	8	4 12 20 in 1 Year	Carpet tiles (squares) Replace
Floor Covering - Carpeting (Green)	3,110 sf	6.50	$20,213	$10,573	Varies	25	4 G3 in 1 Year	Replace existing with linoleum tile Longevity, resilient
	670 sf	5.00	$3,350		Varies	16	17 in 1 Year	Mostly VCT, possible VAT in limited areas. Replace in
Floor Covering - VCT	670 sf	6.00	$4,020		Varies	16	1 in 1 Year	Yr 1 (includes abatement premium); future cycle in Yr 17
Floor Covering - VCT (Green)	670 sf	7.80	$5,226	$1,206	Varies	25	1 G2 in 1 Year	Replace existing with linoleum tile Longevity, resilient (includes abatement premium)
Furnishing	1 ls	30000.00	$30,000		Varies	15	4 19 in 1 Year	Desks, chairs, tables, staff kitchen finishes, cabinets, etc. Replacement allowance
Furnishing (Green)	1 ls	34500.00	$34,500	$4,500	Varies	15	4 19 in 1 Year	Replace existing w/green-rated furnishings: FSC wood, Green Label, low VOC, etc.
RESTROOMS								
Walls and Ceilings	6,655 sf	0.80	$5,324		54	5	1 6 11 16 in 1 Year	Ceramic tiles and CMU walls, painted ceilings Repaint
Walls and Ceilings (Green)	6,655 sf	0.80	$5,324	$0	54	5	1 6 11 16 in 1 Year	Repaint using low VOC paint
Floor Covering	2,205 sf				54	30		Ceramic tile floors, in good condition Maintain out of Operating
Floor Covering (Green)	2,205 sf				54	30		Green option in place
Toilets	42 ea	225.00	$9,450		≈3	15	10 20 in 1 Year	Flushometers, dual flush toilets, auto-flush sensors Replace in Years 10 and 20
Toilets (Green)	42 ea				54	10		Green option in place
Restroom Sinks	26 ea				54	20		
Urinals	14 ea				54	20		
Urinals (Green)	14 ea				54	20		

Costs projected at 3%

Replacement Items	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021	Year 9 2022	Year 10 2023	Year 11 2024	Year 12 2025	Year 13 2026	Year 14 2027	Year 15 2028	Year 16 2029	Year 17 2030	Year 18 2031	Year 19 2032	Year 20 2033
LOBBIES / MAIL FACILITIES																				
Lobby Walls & Ceilings	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Lobby Walls & Ceilings (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Lobby Floors	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Lobby Floors (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
ADMINISTRATION/MAIN OFFICE/LIBRARY																				
Walls and Ceilings	$0	$0	$0	$15,679	$0	$0	$0	$0	$0	$0	$0	$19,861	$0	$0	$0	$0	$0	$0	$0	$25,160
Walls and Ceilings (Green)	$0	$0	$0	$15,679	$0	$0	$0	$0	$0	$0	$0	$19,861	$0	$0	$0	$0	$0	$0	$0	$25,160
Floor Covering - Carpeting	$0	$0	$0	$10,534	$0	$0	$0	$0	$0	$0	$0	$13,344	$0	$0	$0	$0	$0	$0	$0	$16,904
Floor Covering - Carpeting (Green)	$0	$0	$0	$22,087	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Floor Covering - VCT	$4,020	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,376	$0	$0	$0
Floor Covering - VCT (Green)	$5,226	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Furnishing	$0	$0	$0	$32,782	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$51,073	$0
Furnishing (Green)	$0	$0	$0	$37,699	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$58,734	$0
RESTROOMS																				
Walls and Ceilings	$5,324	$0	$0	$0	$0	$6,172	$0	$0	$0	$0	$7,155	$0	$0	$0	$0	$8,295	$0	$0	$0	$0
Walls and Ceilings (Green)	$5,324	$0	$0	$0	$0	$6,172	$0	$0	$0	$0	$7,155	$0	$0	$0	$0	$8,295	$0	$0	$0	$0
Floor Covering	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Floor Covering (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Toilets	$0	$0	$0	$0	$0	$0	$0	$0	$0	$12,330	$0	$0	$0	$0	$0	$0	$0	$0	$0	$16,571
Toilets (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Restroom Sinks	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Urinals	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Urinals (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Projected Capital Needs Over Twenty Years

BUILDING ARCHITECTURE--*continued*

Replacement Items	Quantity	Cost / Unit 2014.00	Total Cost in 2014 $	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)	Notes
CLASSROOMS - FINISHES								
Unit Hallway Doors	ea							
Closet Doors	27 ea				54	25		Wood doors Maintain out of Operating
Furnishings	1 ea	40000.00	$40,000		Varies	20	10 20 in 1 Year	Desks, chairs, computers, shelving, whiteboards, A/V systs Replacement allowance
Walls and Ceilings	35,440 sf	1.39	$49,084		54	8	1 9 17 over 8 Years	Wood panels, painted CMU, and acoustic ceiling tiles Allowance to replace ceiling tiles & repaint walls
Walls and Ceilings (Green)	35,440 sf	1.39	$49,084	$0	54	8	1 9 17 over 8 Years	Replace ceiliing tiles and repaint walls using low VOC products.
Floors - VCT	8,554 sf	5.00	$42,770		54	16	1 17 in 1 Year	Vinyl composite tiles, in varying conditions Replace in Years 1 and 17
Floors - VCT (Green)	8,554 sf	6.50	$55,601	$12,831	54	25	1 G2 in 1 Year	Replace existing w/linoleum tile flooring Longevity
	17,777	5.00	$88,885		1	16	17 in 1 Year	Suspected asbestos contaminated, currently intact. Replace
Floors - VAT	17,777 sf	6.00	$106,662		54	16	1 in 1 Year	in Yr 1, includes abatement cost; future cycle in Yr 17
Floors - VAT (Green)	17,777 sf	7.80	$138,661	$31,999	54	25	1 G2 in 1 Year	Replace existing w/linoleum tile flooring, includes abatement cost and encapsulated floors
CAFETORIUM and GYMNASIUM								
Walls and Ceilings	16,785 sf	1.39	$23,248		54	8	1 9 17 in 1 Year	Ceiling tiles and painted CMU Repaint and replace ceiling tiles
Walls and Ceilings (Green)	16,785 sf	1.39	$23,248	$0	54	8	1 9 17 in 1 Year	Replace ceiliing tiles and repaint walls using low VOC products.
Gymnasium Floor	4,755 ea	1.25	$5,944		54	20	1 11 in 1 Year	Hardwood (main and playspace gyms), in good condition Refinish
Gymnasium Floor (Green)	4,755 ea	1.25	$5,944	$0	54	20	1 11 in 1 Year	Refinish using low VOC product
Cafeteria Floor	2,775 ea	5.00	$13,875		54	16	1 17 in 1 Year	VCT Replace in Years 1 and 17
Cafeteria Floor (Green)	2,775 ea	6.50	$18,038	$4,163	54	25	1 G2 in 1 Year	Replace existing w/linoleum tile flooring Longevity
Stage Floor	698 ea				54	20		Wood strip flooring. Refinishing cost included with gym flooring.
Cafeteria Furnishings	1 ls	31500.00	$31,500		Varies	25	10 in 1 Year	Tables, benches, etc Replace in Year 10
Cafeteria Furnishings (Green)	1 ls	43000.00	$43,000	$11,500	Varies	30	10 in 1 Year	Consider green-rated furnishings
Miscellaneous	ea							
Miscellaneous (Green)	ea							
Miscellaneous	ea							

Costs projected at 3%

Replacement Items	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021	Year 9 2022	Year 10 2023	Year 11 2024	Year 12 2025	Year 13 2026	Year 14 2027	Year 15 2028	Year 16 2029	Year 17 2030	Year 18 2031	Year 19 2032	Year 20 2033
CLASSROOMS - FINISHES																				
Unit Hallway Doors	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Closet Doors	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Furnishings	$0	$0	$0	$0	$0	$0	$0	$0	$0	$52,191	$0	$0	$0	$0	$0	$0	$0	$0	$0	$70,140
Walls and Ceilings	$6,136	$6,320	$6,509	$6,704	$6,906	$7,113	$7,326	$7,546	$7,772	$8,006	$8,246	$8,493	$8,748	$9,010	$9,281	$9,559	$9,846	$10,141	$10,445	$10,759
Walls and Ceilings (Green)	$6,136	$6,320	$6,509	$6,704	$6,906	$7,113	$7,326	$7,546	$7,772	$8,006	$8,246	$8,493	$8,748	$9,010	$9,281	$9,559	$9,846	$10,141	$10,445	$10,759
Floors - VCT	$42,770	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$68,633	$0	$0	$0
Floors - VCT (Green)	$55,601	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Floors - VAT	$106,662	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$142,634	$0	$0	$0
Floors - VAT (Green)	$138,661	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
CAFETORIUM and GYMNASIUM																				
Walls and Ceilings	$23,248	$0	$0	$0	$0	$0	$0	$0	$29,449	$0	$0	$0	$0	$0	$0	$0	$37,305	$0	$0	$0
Walls and Ceilings (Green)	$23,248	$0	$0	$0	$0	$0	$0	$0	$29,449	$0	$0	$0	$0	$0	$0	$0	$37,305	$0	$0	$0
Gymnasium Floor	$5,944	$0	$0	$0	$0	$0	$0	$0	$0	$0	$7,988	$0	$0	$0	$0	$0	$0	$0	$0	$0
Gymnasium Floor (Green)	$5,944	$0	$0	$0	$0	$0	$0	$0	$0	$0	$7,988	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cafeteria Floor	$13,875	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$22,265	$0	$0	$0
Cafeteria Floor (Green)	$18,038	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Stage Floor	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cafeteria Furnishings	$0	$0	$0	$0	$0	$0	$0	$0	$0	$41,100	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cafeteria Furnishings (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$56,105	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Projected Capital Needs Over Twenty Years

DWELLING UNITS--*continued*

Replacement Items	Quantity	Cost / Unit in 2014 $	Total Cost in 2014 $	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)	Notes
FOOD SERVICE-FOOD PREP								
Kitchen Walls and Ceilings	600 sf	1.39	831		54	15	1 16 in 1 Year	Ceiling tiles and painted CMU Repaint and replace ceiling tiles
Kitchen Walls and Ceilings (Green)	600 sf	1.39	831	$0	54	15	1 16 in 1 Year	Replace ceiliing tiles and repaint walls using low VOC products.
Kitchen Floors	200 ea	5.00	1,000		54	16	1 17 in 1 Year	VCT Replace in Years 1 and 17
Kitchen Floors (Green)	200 ea	6.50	1,300	$300	54	20	1 G2 in 1 Year	Replace existing w/linoleum tile flooring Longevity
Countertops / Worksurfaces	1 ls				54	20		Stainless steel Maintain out of Operating
Countertops / Worksurfaces (Green)	1 ls				54	20		No green option
Commercial Oven	2 ea	7300.00	14,600		10	20	10 in 1 Year	Electric ovens Replace
Commercial Oven (Green)	2 ea				54	20		No green option
Refrigerator	1 ea	5500.00	5,500		10	20	10 in 1 Year	Reach-in commercial unit Replace
Refrigerator (Green)	1 ea				54	20		No green option
Freezer	1 ea	5500.00	5,500		10	20	10 in 1 Year	Reach-in commercial unit Replace
Freezer (Green)	1 ea				54	20		No green option
Steam Tables	2 ea	6800.00	13,600		10	20	10 in 1 Year	Electric-heated steam tables Replace
Steam Tables (Green)	2 ea				54	20		No green option
Miscellaneous	ea							
Miscellaneous (Green)	ea							
Miscellaneous	ea							
Miscellaneous (Green)	ea							
Miscellaneous	0 ea							
Miscellaneous	ea							
Miscellaneous	ea							
Miscellaneous (Green)	ea							

Costs projected at 3%

Replacement Items	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021	Year 9 2022	Year 10 2023	Year 11 2024	Year 12 2025	Year 13 2026	Year 14 2027	Year 15 2028	Year 16 2029	Year 17 2030	Year 18 2031	Year 19 2032	Year 20 2033
FOOD SERVICE-FOOD PREP																				
Kitchen Walls and Ceilings	$831	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,295	$0	$0	$0	$0
Kitchen Walls and Ceilings (Green)	$831	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,295	$0	$0	$0	$0
Kitchen Floors	$1,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,605	$0	$0	$0
Kitchen Floors (Green)	$1,300	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Countertops / Worksurfaces	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cntrtops / Worksurfaces (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Commercial Oven	$0	$0	$0	$0	$0	$0	$0	$0	$0	$19,050	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Commercial Oven (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Refrigerator	$0	$0	$0	$0	$0	$0	$0	$0	$0	$7,176	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Refrigerator (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Freezer	$0	$0	$0	$0	$0	$0	$0	$0	$0	$7,176	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Freezer (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Steam Tables	$0	$0	$0	$0	$0	$0	$0	$0	$0	$17,745	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Steam Tables (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Projected Capital Needs Over Twenty Years

BUILDING ARCHITECTURE--*continued*

Replacement Items	Quantity	Cost / Unit in 2014 $	Total Cost in 2014 $	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)		Notes
CLASSROOM - MECHANICAL AND ELECTRICAL									
Thermostats-Pneumatic	20 ea				54	20			Original thermostats in classrooms and program ares served with steam. Replace from Operating
Thermostats-Pneumatic (Green)	20 ea				54	20			Replace existing w/electronic thermostats that include EMS interface; included in proposed hydronic heating system.
Thermostats - Electronic DDC	45 ea	125.00	$5,625		≈1	20	19	in 1 Year	Thermostats on hydronic system w/EMS interface Replacement allowance
Thermostats - Electronic DDC (Green)	45 ea				≈1	20			Green option in place
Classroom Lighting	639 ea	105.00	$67,095		17	25	1	in 1 Year	T8 fluorescent lamps w/reflectors. Replace with indiect T8 fluorescent fixtures or wraps, based on mounting
Classroom Lighting (Green)	639 ea	275.00	$175,725	$108,630	17	35	E8	Years	Replace existing with LED fixtures, Longevity, energy savings; not cost-effective
Convectors	ea								See discussion in BME report section
Convectors (Green)	ea								
Unit Domestic Hot Water	ea								
Unit Domestic Hot Water (Green)	ea								
Miscellaneous	ea								
Miscellaneous (Green)	ea								
IN-UNIT ELECTRICAL									
Unit Electrical Panel	0 ea								
Unit Wiring	ea								
Unit Security Call System	ea								
Unit Smoke/Fire Detection	ea								
Unit Lighting	lf								
Unit Lighting (Green)	lf								
Unit Lighting	ea								
Unit Lighting (Green)	ea								
Miscellaneous	ea								

Costs projected at 3%

Replacement Items	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021	Year 9 2022	Year 10 2023	Year 11 2024	Year 12 2025	Year 13 2026	Year 14 2027	Year 15 2028	Year 16 2029	Year 17 2030	Year 18 2031	Year 19 2032	Year 20 2033
CLASSROOM - MECHANICAL AND ELECTRICAL																				
Thermostats-Pneumatic	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Thermostats-Pneumatic (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Thermostats - Electronic DDC	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,576	$0
Therms - Electronic DDC (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Classroom Lighting	$67,095	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Classroom Lighting (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Convectors	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Convectors (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Unit Domestic Hot Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Unit Domestic Hot Water (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IN-UNIT ELECTRICAL																				
Unit Electrical Panel	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Unit Wiring	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Unit Security Call System	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Unit Smoke/Fire Detection	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Unit Lighting	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Unit Lighting (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Unit Lighting	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Unit Lighting (Green)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

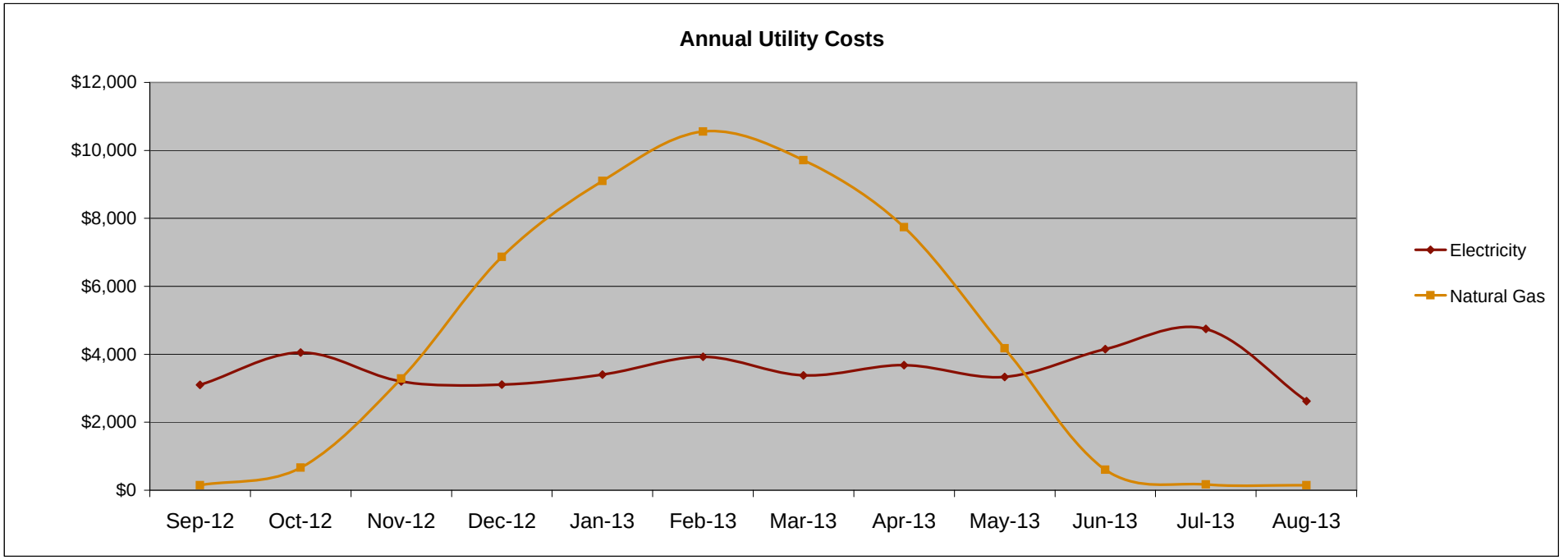
Energy Analysis

Utility Usage

Stratton Elementary School

The energy analysis portion of this GCNA examines utility bills for the most recent 12 months to summarize at electricity and natural gas; water/sewer usage information was not available for this analysis. The following table and charts show the utility information by utility source, and by month (summer month usage estimated).

	ELECTRICITY		NATURAL GAS		WATER / SEWER				OIL		TOTAL
	kWh	$	Therms	$	Gallons	Water $	Sewer $	Total $	Gallons	$	
Aug-13	11,000	$2,625	30	$145							**$2,770**
Jul-13	17,000	$4,750	500	$171							**$4,921**
Jun-13	18,500	$4,150	1,100	$606							**$4,756**
May-13	18,300	$3,335	4,000	$4,178							**$7,513**
Apr-13	21,000	$3,682	5,500	$7,737							**$11,419**
Mar-13	17,500	$3,380	6,400	$9,713							**$13,093**
Feb-13	21,200	$3,930	6,900	$10,555							**$14,485**
Jan-13	18,850	$3,400	5,200	$9,104							**$12,504**
Dec-12	17,250	$3,110	3,152	$6,863							**$9,973**
Nov-12	17,500	$3,200	1,300	$3,282							**$6,482**
Oct-12	17,300	$4,049	135	$664							**$4,713**
Sep-12	12,100	$3,100	45	$146							**$3,246**
Total	**207,500**	**$42,711**	**34,262**	**$53,165**							**$95,876**
Unit Cost		*$0.206*		*$1.5517*							

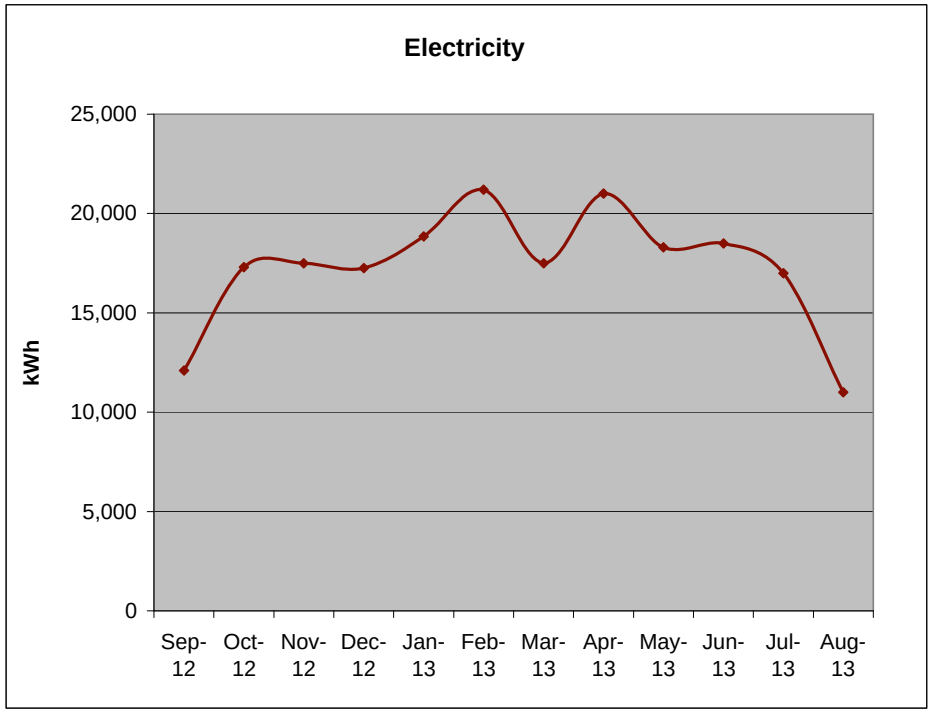


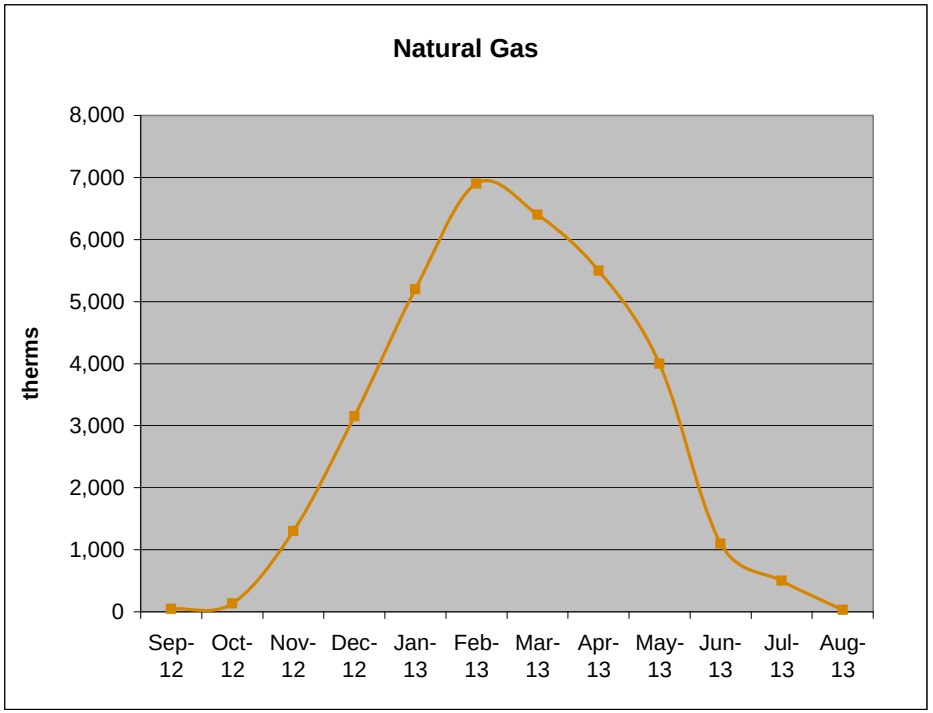
Energy Analysis

Utility Usage, By Type

Stratton Elementary School

Below are graphic presentations of annual usage by utility type for the property.



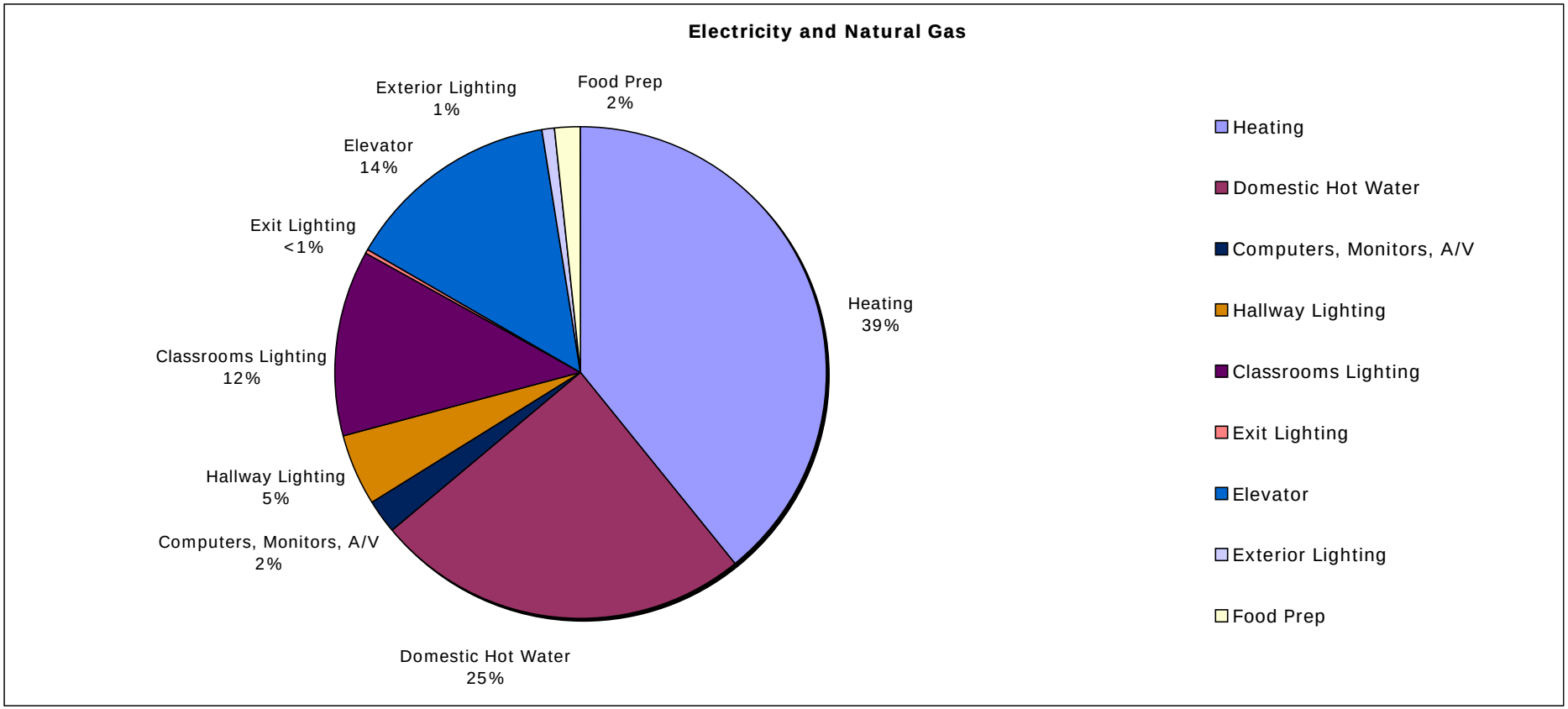


Energy Analysis

Disaggregated End Uses

Stratton Elementary School

Natural gas is used for space heating and domestic hot water generation. Electricity is used for all other services and appliances. The following chart illustrates the disaggregated costs based on the end uses. Please note: the estimated end uses are base



End Use	Utility	Annual Cost	Annual Usage (kWh)	Annual Usage (therms)	Annual Usage (btu)
Heating	Natural Gas	$42,820		27,596	2,759,568,536
Domestic Hot Water	Natural Gas	$26,881		17,323	1,732,319,421
Computers, Monitors, A/V	Natural Gas	$2,600	12,631	1,676	167,557,391
Hallway Lighting	Electricity	$5,013	24,354		83,096,951
Classrooms Lighting	Electricity	$13,450	65,343		222,951,125
Exit Lighting	Electricity	$173	840		2,867,698
Elevator	Electricity	$15,666	76,109		259,684,188
Exterior Lighting	Electricity	$722	3,508		11,968,083
Food Prep	Electricity	$1,860	9,036		30,831,903

Energy Analysis

Notes

Stratton Elementary School

Below are notes regarding the property metering schedule, general billing information, and specific usage details by utility type.

General

The property is master metered for natural gas, water and sewer, and common area electricity (hallways, office, community spaces).

Natural Gas

Natural gas shows a normal consumption pattern, with spikes during the heating season since the property utilizes natural gas for heating purposes. The lower usage during the summer corresponds to the limited building use during this period.

Electricity

Electricity is generally higher in the winter months, presumably to a higher demand for lighting caused by daylight savings time. The lower usage during the summer corresponds to the limited building use during this period.

Water and Sewer

Water and sewer is billed every other month. Generally, water and sewer usage remains steady for the 12-month period, since the property does not have any water consuming systems that may cause seasonal shifts in usage, such as a swimming pool or site irr

Energy Assumptions Table

Below are the energy assumptions by category that were used as inputs for the TREAT model for the property.

These energy assumptions are based on the following:

1. The physical inspection of the property
2. Diagnostic testing conducted during the inspection
3. The historic utility billing information
4. The building blueprints/plans
5. Information provided by site management and maintenance staff

General

Property Type (Family, Elderly, Commercial):	**School**	
Resident Population Persons:	**600**	

Space Types

Classrooms, Common Areas	Square Footage:	**60,760**	Conditioned:	**Yes**
Basement	Square Footage:	**n/a**	Conditioned:	

Utility Metering

Whole Building	Utility Type:	**Electricity**	Individual, Master:	**Master**
Whole Building	Utility Type:	**Natural Gas**	Individual, Master:	**Master**
Whole Building	Utility Type:	**Water/Sewer**	Individual, Master:	**Master**

Infiltration

Infiltration Condition	Tight, Leaky:	**Leaky**
Infiltration Rate	ACH:	**0.9**

Architectural

Wall Insulation	Type:	**None**	R-Value:	**R-4**
Roof Insulation	Type:	**Cellulose**	R-Value:	**R-15 (Old), R30 (New)**
Exterior Doors 1	Type:	**Flush Metal**	R-Value:	**< R-5**
Exterior Doors 2	Type:	**Wood/Glass**	R-Value:	**< R-5**
Windows Old Wing	Type:	**Aluminum**	U-Factor:	**1**
Windows New Wing	Type:	**Aluminum**	U-Factor:	**0.38**

Heating and Cooling

Temperature Control:

Occupied Heating Temp	Degrees F:	**72**
Occupied Cooling Temp	Degrees F:	**N/A**
Unoccupied[1] Heating Temp	Degrees F:	**68**
Unoccupied[1] Heating Time	Hours / Day:	**12**

Boilers / DHW Generation:

Boiler 1	Type:	**Gas, Steam**	Capacity:	**2900 MBH**	Efficiency:	**83%**
Boiler 2	Type:	**Gas, Steam**	Capacity:	**2900 MBH**	Efficiency:	**83%**
Boiler 3	Type:	**Gas, Hydronic**	Capacity:	**2000**	Efficiency:	**93%**
Domestic Hot Water 1	Type:	**Gas-Fired**	Capacity:	**40 MBH**	Efficiency:	**81%**

[1]Unoccupied temps/times based on opportunity for savings based on programmable thermostats

Water & Sewer

Domestic Hot Water:

DHW Daily Usage	Gallons/Resident:	**7**
DHW Delivery Temp	Degrees F:	**125**

Domestic Cold Water:

Showerheads	Gallons / Minute:	**n/a**
Toilets	Gallons / Flush:	**1.28**
Irrigation	Gallons / Year:	**None**

Lighting Loads

Hallway	Type:	**Fluorescent**	Wattage:	**26-56**	Hours per Day:	**24**
Storage	Type:	**T8**	Wattage:	**32**	Hours per Day:	**10**
Common Kitchen	Type:	**T8**	Wattage:	**60**	Hours per Day:	**1**
Exit Lighting	Type:	**LED**	Wattage:	**4**	Hours per Day:	**24**
Community / Office	Type:	**Fluorescent**	Wattage:	**32-61**	Hours per Day:	**4-8**
Exterior	Type:	**Metal Halide**	Wattage:	**400**	Hours per Day:	**12**

Appliances, Miscellaneous Loads

Range	Energy Star (Y/N):	**No**	Usage per Year:	**1500 kWh**
Refrigerator	Energy Star (Y/N):	**No**	Usage per Year:	**944 kWh**
Laundry	Energy Star (Y/N):	**No**	Usage per Year:	**450 kWh**
Miscellaneous Load			Usage per Year:	**6920 kWh**

Simple Payback Analysis

EWCM #1 Replace Site Lighting

Replacement Costs

A. Total cost to replace HID lighting with LED fixtures: $2,575.00

Utility Cost

Electricity: $0.21
Natural Gas: $1.55

Existing Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage $/Year
Type 1:	HID Fixtures	400	4	8	365	4,672	$961.67
Type 2:						0	$0.00
Type 3:						0	$0.00
Type 4:						0	$0.00
Type 5:						0	$0.00
					Total:	4,672	$961.67

Proposed Green Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage $/Year
Type 1:	LED Fixtures	75	4	8	365	876	$180.31
Type 2:						0	$0.00
Type 3:						0	$0.00
Type 4:						0	$0.00
Type 5:						0	$0.00
					Total:	876	$180.31

Annual Electric Savings

12,951,952 BTUs

3796.00 kWh

Savings = 3,796.00 x $0.21 = $781.35 /yr

Annual Natural Gas Savings[1]

0 BTUs

0.00 therms

Savings = 0.00 x $1.55 = $0.00 /yr

Annual Net Cost Savings

$781.35 + $0.00 = $781.35

5. Simple Payback

$2,575.00 / $781.35 = 3.30 yrs

Additional Notes/Comments:

Average daily usage (dusk to dawn)

Exterior lighting has no natural gas saving.

Simple Payback Analysis

EWCM #2 Replace Steam Boiler

Description
Evaluate the cost-effectiveness of replacing the low pressure steam boiler plant with a comparably-sized hydronic boiler plant.

Replacement Costs

	Type	Cost
A. Proposed Conventional:	Replace with low pressure steam boilers	$178,698
B. Proposed Green:	Replace with hydronic heat boilers	$214,500
C. Incremental Cost Between Proposed Conventional and Proposed Green:		$35,802.00

Boiler Efficiencies

A. Existing Efficiency:	83%
B. Conventional Efficiency:	83%
C. Green Efficiency:	93%

Annual Utility Cost

	Existing		Conventional		Green	
	2,759,568,536	btus	2,759,568,536	btus	2,439,888,501	btus
	27,596	therms	27,596	therms	24,399	therms
Utility Cost	$1.55	/therm	$1.55	/therm	$1.55	/therm
Heating Cost	$42,820.42		$42,820.42		$37,859.92	

Annual Savings: Existing to Conventional

Savings =	$42,820.42	-	$42,820.42	=	$0.00	/yr

Annual Savings: Conventional to Green

Savings =	$42,820.42	-	$37,859.92	=	$4,960.50	/yr

Annual Savings: Existing to Green

Savings =	$0.00	+	$4,960.50	=	$4,960.50	/yr

Simple Payback: Conventional

$178,698.00	/	$0.00	=	n/a yrs

Simple Payback: Green

$214,500.00	/	$4,960.50	=	43.2 yrs

Incremental Payback: Conventional to Green

$35,802.00	/	$4,960.50	=	7.2 yrs

Simple Payback Analysis

EWCM #3 Condensing DHW Tank

Description
Replace existing atmospheric DHW tank with a comparably-sized condensing DHW tank

Replacement Costs

	Type	Cost
A. Proposed Conventional:	Atmospheric DHW Tank	$1,350.00
B. Proposed Green:	Condensing DHW Tank	$6,975.00
C. Incremental Cost Between Proposed Conventional and Proposed Green:		$5,625.00

Boiler Efficiencies

A. Existing Efficiency:	81%
B. Conventional Efficiency:	81%
C. Green Efficiency:	93%

Annual Utility Cost

	Existing		Conventional		Green	
	1,732,319,421	btus	1,732,319,421	btus	1,433,576,178	btus
	17323.19	therms	17323.19	therms	14335.76	therms
Utility Cost	$1.55	/therm	$1.55	/therm	$1.55	/therm
Heating Cost	$26,880.52		$26,880.52		$22,244.90	

Annual Savings: Existing to Conventional

Savings =	$26,880.52	-	$26,880.52	=	$0.00	/yr

Annual Savings: Conventional to Green

Savings =	$26,880.52	-	$22,244.90	=	$4,635.62	/yr

Annual Savings: Existing to Green

Savings =	$0.00	+	$4,635.62	=	$4,635.62	/yr

Simple Payback: Conventional

$1,350.00	/	$0.00	=	n/a yrs

Simple Payback: Green

$6,975.00	/	$4,635.62	=	1.5 yrs

Incremental Payback: Conventional to Green

$5,625.00	/	$4,635.62	=	1.2 yrs

Simple Payback Analysis

EWCM #4 Install Variable Frequency Drives (VFDs)

Description: This worksheet calculates the annual savings and simple payback for upgrading the existing air handlers with comparable air handlers (supply and exhaust) and the central exhaust fan governed with variable frequency drives.

Installation Costs

	Type	Cost
A. Proposed Conventional:	Standard Drive Exhaust Fans	$9,300
B. Proposed Green:	Exhaust Fans w/VFD control	$11,250
C. Incremental Cost Between Proposed Conventional and Proposed Green:		$1,950.00

Utility Cost

Electricity: $0.21

Step 1: Convert Motor Horsepower to Kilowatts

Horsepower		Conversion Factor		kW_A
2.75	x	0.746	=	2.05

Step 2: Multiply Adjustable Frequency Drive Power Ratio (from Table 1 below) by kW_A

Power Ratio A		kW_A		kW_B
0.28	x	2.05	=	0.57

Step 3: Multiply Power Ratio of Current Control (from Table 2 below) by kW_A

(n/a: no pumps are being evaluated)

Power Ratio B		kW_A		kW_C
0.00	x	2.05	=	0.00

Step 4: Calculate kW Savings

kW_C		kW_B		kW_D
2.05	-	0.57	=	1.48

Step 5: Calculate Cost Savings

kW_D		Annual Hours of Use		Electricity Cost		Savings	
1.48	x	2,160	x	$0.21	=	$656.72	$ / yr

Simple Payback: Conventional to Proposed Green

$1,950.00	/	$656.72	=	3.0	yrs

Tables and Additional Notes

Table 1: Power Ratio A

Ratio	Flow Control Method
0.28	Variable Frequency Drive
0.62	Inlet Guide Vane
0.88	Outlet Damper
0.88	Fan Curve
1.00	Bypass Damper

Fans at 60% of max flow

Table 2: Power Ratio B

Ratio	Flow Control Method
0.40	Variable Frequency Drive
0.94	Discharge Valve
1.00	Bypass Valve
1.00	No Control

Pumps at 70% of max flow

VFD savings are based on fan affinity laws, where the change in power (electricity) is equal to cube of motor speed reduction $(P_2 / P_1) = (S_2/S_1)^3$. This calculation assumes that the exhaust fans will run at 70% of normal speed for most of the school year, 7300 hours, and increase speed during periods of high carbon dioxide levels (when the occupied space starts to get stuffy).

Simple Payback Analysis

EWCM #5 Replace Exterior Doors

Replacement Costs

	Type	Cost
A. Proposed Conventional	Solid Core Doors (Metal and Wood)	$16,275.00
B. Proposed Green	Fiberglass Doors	$18,250.00
C. Incremental Cost Between Proposed Conventional and Proposed Green		$1,975.00

Existing Conditions

General: Existing doors are flush metal models. Insulating quality of existing doors estimated at no greater than R-5.

A. Door Type:		Solide Core	
B. Total Area of Doors:			sf
C. Utility Cost:	Gas	$1.55	/therm

U-Value

A. Existing:	0.39
B. Conventional:	0.39
C. Green:	0.20

Annual Savings: Existing to Conventional

					0	BTUs
					0.00	therms
Savings =	$1.55	x	0.00	=	$0.00	/yr

Annual Savings: Conventional to Green

					6,600,000	BTUs
					66.00	therms
Savings =	$1.55	x	66.00	=	$102.41	/yr

Annual Savings: Existing to Green

					6,600,000	BTUs
					66.00	therms
Savings =	$0.00	+	$102.41	=	$102.41	/yr

Simple Payback: Conventional

$16,275.00	/	$0.00	=	n/a	yrs

Simple Payback: Green

$18,250.00	/	$102.41	=	178.2	yrs

Incremental Payback: Conventional to Green

$1,975.00	/	$102.41	=	19.3	yrs

Additional Notes:

Simple Payback Analysis

EWCM #6 Replace Single Glazed Windows

Replacement Costs

	Type	Cost
A. Proposed Conventional:	Double Glazed Windows	$136,180
B. Proposed Green:	Dbl Glazed Low-E Fiberglass Frame Windows	$173,320
C. Incremental Cost Between Proposed Conventional and Proposed Green:		$37,140.00

Existing Conditions

General: Slider models have poor fit and allow for appreciable air infiltration. Remaining models in fair condition with limited air infiltration.

A. Window Type:		Single glazed	
B. Total Area of Windows:			sf
C. Utility Cost:	Gas	$1.55	/therm

U-Factor[1]

A. Existing:	1.00
B. Conventional:	0.55
C. Green:	0.32

Annual Savings: Existing to Conventional

1,117,500,000 BTUs

11175.00 therms

Savings = $1.55 x 11175.00 = $17,340.33 /yr

Annual Savings: Conventional to Green

973,600,000 BTUs

9736.00 therms

Savings = $1.55 x 9736.00 = $15,107.42 /yr

Annual Savings: Existing to Green

2,091,100,000 BTUs

20911.00 therms

Savings = $17,340.33 + $15,107.42 = $32,447.75 /yr

Simple Payback: Conventional

$136,180.00 / $17,340.33 = 7.9 yrs

Simple Payback: Green

$173,320.00 / $32,447.75 = 5.3 yrs

Incremental Payback: Conventional to Green

$37,140.00 / $15,107.42 = 2.5 yrs

Additional Notes:

1 The U-factors were derived from the 2001 ASHRAE Fundamentals Handbook, based on the specifications in the plan

Simple Payback Analysis

EWCM #7 Green Roof

Replacement Costs

	Type	Cost
A. Proposed Conventional:	Rubber Membrane w/Insulation	$ 460,928.00
B. Proposed Green:	Green (Vegetated) Roof w/Insulation	$1,060,424.00
C. Incremental Cost Between Proposed Conventional and Proposed Green:		$ 599,496.00

Existing Conditions

A. Roof area:		46,093	sf
B. Type of existing roof structure:			
C. Utility Cost:	Gas	$1.55	/therm
D. Existing Heating Efficiency:			

R-Value

A. Existing:	15.00
B. Conventional:	31
C. Proposed Green:	42

Annual Savings: Existing to Conventional

					73,300,000	BTUs
					733.00	therms
Savings =	$1.55	x	733.00	=	$1,137.40	/yr

Annual Savings: Conventional to Green

					162,700,000	BTUs
					1627.00	therms
Savings =	$1.55	x	1627.00	=	$2,524.63	/yr

Annual Savings: Existing to Green

					236,000,000	BTUs
					2360.00	therms
Savings =	$1,137.40	x	$2,524.63	=	$3,662.03	/yr

Simple Payback: Conventional

$460,928.00	/	$1,137.40	=	405.2	yrs

Simple Payback: Green

$1,060,424.00	/	$3,662.03	=	289.6	yrs

Incremental Payback: Conventional to Green

$599,496.00	/	$2,524.63	=	237.5	yrs

Additional Notes:

Simple Payback Analysis

EWCM #8 Replace Fluorescent Lighting w/LED

Replacement Costs

A. Total cost to upgrade to LED lighting (classrooms and common areas): $123,250.00

Utility Cost

Electricity:	$0.21
Natural Gas:	$1.55

Existing Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage $/Year
Type 1:	Common Areas	60	86	8	225	9,288	$1,911.81
Type 2:	Classrooms	32	639	8	225	36,806	$7,576.09
Type 3:						0	$0.00
Type 4:						0	$0.00
Type 5:						0	$0.00
					Total:	46,094	$9,487.89

Proposed Green Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage $/Year
Type 1:	Common Areas	22	86	8	225	3,406	$701.00
Type 2:	Classrooms	15	639	8	225	17,253	$3,551.29
Type 3:						0	$0.00
Type 4:						0	$0.00
Type 5:						0	$0.00
					Total:	20,659	$4,252.29

Annual Electric Savings

					86,786,950	BTUs
					25,435.80	kWh
Savings =	25,435.80	x	$0.21	=	$5,235.61	/yr

Annual Natural Gas Savings[1]

					-108,100,000	BTUs
					-1,081.00	therms
Savings =	-1,081.00	x	$1.55	=	-$1,677.40	/yr

Annual Net Cost Savings

$5,235.61	+	-$1,677.40	=	$3,558.21	

5. Simple Payback

$123,250.00	/	$3,558.21	=	34.64	yrs

Additional Notes/Comments:

[1]Negative natural gas savings attributed to decrease in heating gain from the reduced lighting load (wattage); therefore, additional natural gas required for space heating in these areas.

Total cost is the incremental difference between LED and fluorescent lighting.

Simple Payback Analysis

EWCM #9 Convert Exit Lighting and Add Missing Exit Signs

Replacement Costs

A. Total cost to install LED Exit signs replacing PL exits and adding two signs: $260.00

Utility Cost

Electricity:	$0.21
Natural Gas:	$1.55

Existing Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage $/Year
Type 1:	PL Exit Signs	14	2	24	365	245	$50.49
Type 2:						0	$0.00
					Total:	245	$50.49

Proposed Green Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage $/Year
Type 1:	LED Exit Signs	4	2	24	365	70	$14.42
Type 2:	New LED Exit Signs	4	2	24	365	70	$14.42
					Total:	140	$28.85

Annual Electric Savings

					358,669	BTUs
					105.12	kWh
Savings =	105.12	x	$0.21	=	$21.64	/yr

Annual Natural Gas Savings[1]

					-600,000	BTUs
					-6.00	therms
Savings =	-6.00	x	$1.55	=	-$9.31	/yr

Annual Net Cost Savings

$21.64	+	-$9.31	=	$12.33	

5. Simple Payback

$260.00	/	$12.33	=	21.09	yrs

Additional Notes/Comments:

[1]Negative natural gas savings attributed to decrease in heating gain from the reduced lighting load (wattage); therefore, additional natural gas required for space heating in these areas.

Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 1 Replace HID Exterior Lighting

HID Lighting	vs.	LED Lighting
(Conventional Product)		*(Green Product)*

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term: 30

Conventional Product: HID Lighting

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	HID Fixtures (doubles)	2	ea	$800.00	$1,600	8	1	3.8	$8,504	$3,856
Utility Cost	Electric Usage	4,672	kWh	$0.21	$962	1	1	30.0	$45,752	$15,761
								Total Life Cycle Cost	**$54,256**	**$19,618**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$54,256**	**$19,618**

Green Product: LED Lighting

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	LED Fixtures (doubles)	2	ea	$1,287.50	$2,575	30	1	1.0	$2,575	$2,575
Utility Cost	Electric Usage	876	kWh	$0.21	$180	1	1	30.0	$8,578	$2,955
								Total Life Cycle Cost	**$11,153**	**$5,530**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$11,153**	**$5,530**

ECONOMIC RETURN ANALYSIS

Green NPV	**$14,087**
Green IRR	**418.6%**

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: LED Lighting

Override with Green Product? No

Final Product Choice

Green Product: LED Lighting

Notes:

1. *Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.*
2. *Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.*

Energy and Water Conservation Measure (EWCM): # 1 Replace HID Exterior Lighting

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product	**6**
Replacement Year	**7**

Final Product Choice

Green Product:	**LED Lighting**

Immediate Replacement **Year** **1**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Discounted
Install/Replace	LED Fixtures (doubles)	2	ea	$1,287.50	$2,575	30	1	1.0	$2,575	$2,575
Utility Cost	Electric Usage	876	kWh	$0.21	$180	1	1	30.0	$8,578	$2,955
								Total Life Cycle Cost	**$11,153**	**$5,530**

Energy Savings

								Net Life Cycle Cost after Energy Savings	**$11,153**	**$5,530**

Replacement at End of Remaining Useful Life **Year** **7**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	LED Fixtures (doubles)	2	ea	$1,287.50	$2,575	30	7	0.8	$1,861	$1,807
Utility Cost	Electric Usage	876	kWh	$0.21	$180	1	7	24.0	$7,412	$1,991

Expenses for Current Product Through Useful Life

Utility Cost	Current Electric Usage	4,672	kWh	$0.21	$962	1	1	6.0	$6,220	$5,142
								Total Life Cycle Cost	**$15,494**	**$8,940**

Energy Savings

								Net Life Cycle Cost after Energy Savings	**$15,494**	**$8,940**

ECONOMIC RETURN ANALYSIS

Timing NPV	**$3,410**
Timing IRR	**47.87%**

TIMING RECOMMENDATION

Replacement Year:	**1**

Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.

2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 2 **Replace Steam Boilers w/Hydronic Boilers**

Steam Boiler Plant	vs.	Hydronic Boiler Plant
(Conventional Product)		*(Green Product)*

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term 30

Conventional Product: **Steam Boiler Plant**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	Steam Boiler Plant	1	ls	$178,698	$178,698	30	1	1.0	$178,698	$178,698
Utility Cost	Natural Gas Usage	27,596	therms	$1.55	$42,820	1	1	30.0	$2,037,199	$701,816
								Total Life Cycle Cost	**$2,215,897**	**$880,514**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$2,215,897**	**$880,514**

Green Product: **Hydronic Boiler Plant**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	Hydronic Boiler Plant	1	ls	$214,500	$214,500	22	1	1.4	$303,833	$255,576
Utility Cost	Natural Gas Usage	24,399	therms	$1.55	$37,860	1	1	30.0	$1,801,202	$620,515
								Total Life Cycle Cost	**$2,105,035**	**$876,091**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$2,105,035**	**$876,091**

ECONOMIC RETURN ANALYSIS

Green NPV	**$4,423**
Green IRR	**11.0%**

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product:	**Hydronic Boiler Plant**

Override with Green Product? **No**

Final Product Choice

Green Product:	**Hydronic Boiler Plant**

Notes:

1. *Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.*
2. *Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.*

Energy and Water Conservation Measure (EWCM): # 2 **Replace Steam Boilers w/Hydronic Boilers**

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product 0

Final Product Choice

Green Product:	Hydronic Boiler Plant

Immediate Replacement

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Install/Replace	Hydronic Boiler Plant	1	ls	$214,500.00	$214,500	22	1	1.4	$303,833	$255,576
Utility Cost	Natural Gas Usage	24,399	therms	$1.55	$37,860	1	1	30.0	$1,801,202	$620,515
								Total Life Cycle Cost	$2,105,035	$876,091

Energy Savings

								Net Life Cycle Cost after Energy Savings	$2,105,035	$876,091

ECONOMIC RETURN ANALYSIS

Timing NPV	n/a
Timing IRR	n/a

TIMING RECOMMENDATION

Replacement Year:	1

Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.

2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 3 Condensing DHW Tank

Atmospheric DHW Tank	vs.	Condensing DHW Tank
(Conventional Product)		*(Green Product)*

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term 15

Conventional Product: Atmospheric DHW Tank

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	Atmospheric DHW Tank	1	ea	$1,350.00	$1,350	15	1	1.0	$1,350	$1,350
Utility Cost	Natural Gas Usage	17,323	therms	$1.55	$26,881	1	1	15.0	$499,949	$295,456
								Total Life Cycle Cost	**$501,299**	**$296,806**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$501,299**	**$296,806**

Green Product: Condensing DHW Tank

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	Condensing DHW Tank	1	ea	$6,975.00	$6,975	15	1	1.0	$6,975	$6,975
Utility Cost	Natural Gas Usage	14,336	therms	$1.55	$22,245	1	1	15.0	$413,731	$244,504
								Total Life Cycle Cost	**$420,706**	**$251,479**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$420,706**	**$251,479**

ECONOMIC RETURN ANALYSIS

Green NPV	**$45,327**
Green IRR	**485.6%**

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Condensing DHW Tank

Override with Green Product? No

Final Product Choice

Green Product: Condensing DHW Tank

Notes:

1. *Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.*
2. *Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.*

Energy and Water Conservation Measure (EWCM): # 3 Condensing DHW Tank

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product	**8**
Replacement Year	**9**

Final Product Choice

Green Product:	**Condensing DHW Tank**

Immediate Replacement **Year** **1**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Install/Replace	Condensing DHW Tank	1	ea	$6,975.00	$6,975	15	1	1.0	$6,975	$6,975
Utility Cost	Natural Gas Usage	14,336	therms	$1.55	$22,245	1	1	15.0	$413,731	$244,504
								Total Life Cycle Cost	**$420,706**	**$251,479**

Energy Savings

								Net Life Cycle Cost after Energy Savings	**$420,706**	**$251,479**

Replacement at End of Remaining Useful Life **Year** **9**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Condensing DHW Tank	1	ea	$6,975.00	$6,975	15	9	0.5	$3,209	$2,858
Utility Cost	Natural Gas Usage	14,336	therms	$1.55	$22,245	1	9	7.0	$215,922	$92,860

Expenses for Current Product Through Useful Life

Utility Cost	Natural Gas Usage	17,323	therms	$1.55	$26,881	1	1	8.0	$239,031	$183,246
								Total Life Cycle Cost	**$458,161**	**$278,963**

Energy Savings

								Net Life Cycle Cost after Energy Savings	**$458,161**	**$278,963**

ECONOMIC RETURN ANALYSIS

Timing NPV	**$27,484**
Timing IRR	**207.10%**

TIMING RECOMMENDATION

Replacement Year:	**1**

Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.

2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 4 Exhaust Fans w/VFDs

Exhaust Fans w/Standard Drive	vs.	Exhaust Fans w/VFDs
(Conventional Product)		*(Green Product)*

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term: 20

Conventional Product: Exhaust Fans w/Standard Drive

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	Exhaust Fans	11	ea	845	$9,300	20	1	1.0	$9,300	$9,300
Utility Cost	Electric Usage	4,431	kWh	$0.21	$912	1	1	20.0	$24,509	$12,067
								Total Life Cycle Cost	**$33,809**	**$21,367**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$33,809**	**$21,367**

Green Product: Exhaust Fans w/VFDs

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	Exhaust Fans w/VFDs	11	ea	1,023	$11,250	20	1	1.0	$11,250	$11,250
Utility Cost	Electric Usage	1,241	kWh	$0.21	$255	1	1	20.0	$6,862	$3,379
								Total Life Cycle Cost	**$18,112**	**$14,629**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$18,112**	**$14,629**

ECONOMIC RETURN ANALYSIS

Green NPV	**$6,738**
Green IRR	**55.3%**

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Exhaust Fans w/VFDs

Override with Green Product? No

Final Product Choice

Green Product: Exhaust Fans w/VFDs

Notes:

1. *Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.*
2. *Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.*

Energy and Water Conservation Measure (EWCM): # 4 Exhaust Fans w/VFDs

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product	11
Replacement Year	12

Final Product Choice

Green Product:	Exhaust Fans w/VFDs

Immediate Replacement Year 1

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Discounted
Install/Replace	Exhaust Fans w/VFDs	11	ea	$1,022.73	$11,250	20	1	1.0	$11,250	$11,250
Utility Cost	Electric Usage	1,241	kWh	$0.21	$255	1	1	20.0	$6,862	$3,379
								Total Life Cycle Cost	$18,112	$14,629

Energy Savings

								Net Life Cycle Cost after Energy Savings	$18,112	$14,629

Replacement at End of Remaining Useful Life Year 12

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Exhaust Fans w/VFDs	11	ea	$1,022.73	$11,250	20	12	0.5	$4,723	$4,165
Utility Cost	Electric Usage	1,241	kWh	$0.21	$255	1	12	9.0	$3,591	$1,137

Expenses for Current Product Through Useful Life

Utility Cost	Current Electric Usage	4,431	kWh	$0.21	$912	1	1	11.0	$11,682	$8,005
								Total Life Cycle Cost	$19,996	$13,307

Energy Savings

								Net Life Cycle Cost after Energy Savings	$19,996	$13,307

ECONOMIC RETURN ANALYSIS

Timing NPV	($1,321)
Timing IRR	5.28%

TIMING RECOMMENDATION

Replacement Year:	12

Notes:

1. *Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.*
2. *Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.*

Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 5 Fiberglass Doors

Metal / Wood Solid Core Doors	vs.	Fiberglass Doors
(Conventional Product)		*(Green Product)*

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term: 35

Conventional Product: Metal / Wood Solid Core Doors

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	Solid Core Doors	1	ls	$16,275.00	$16,275	35	1	1.0	$16,275	$16,275
								Total Life Cycle Cost	**$16,275**	**$16,275**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$16,275**	**$16,275**

Green Product: Fiberglass Doors

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	Fiberglass Doors	1	ls	$18,250.00	$18,250	35	1	1.0	$18,250	$18,250
								Total Life Cycle Cost	**$18,250**	**$18,250**
Energy Savings										
Utility Cost	Natural Gas Savings	66	therms	$1.55	($102)	1	1	35.0	($6,192)	($1,791)
								Net Life Cycle Cost after Energy Savings	**$12,058**	**$16,459**

ECONOMIC RETURN ANALYSIS

Green NPV	**($184)**
Green IRR	**7.2%**

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Conventional Product: Metal / Wood Solid Core Doors

Override with Green Product? No

Final Product Choice

Conventional Product: Metal / Wood Solid Core Doors

Notes:

1. *Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.*
2. *Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.*

Energy and Water Conservation Measure (EWCM): # 5 Fiberglass Doors

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product 0

Final Product Choice

Conventional Product: Metal / Wood Solid Core Doors

Immediate Replacement

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Install/Replace	Solid Core Doors	1	ls	$16,275.00	$16,275	35	1	1.0	$16,275	$16,275
								Total Life Cycle Cost	$16,275	$16,275

Energy Savings

								Net Life Cycle Cost after Energy Savings	$16,275	$16,275

ECONOMIC RETURN ANALYSIS

Timing NPV	**n/a**
Timing IRR	**n/a**

TIMING RECOMMENDATION

Replacement Year: 1

Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.

2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 6 **Low-E Fiberglass Frame Dbl Glazed Windows**

Dbl Glazed Metal Frame Windows	vs.	Dbl Glazed Low-E Fiberglass Frame Windows
(Conventional Product)		*(Green Product)*

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term 40

Conventional Product: **Dbl Glazed Metal Frame Windows**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	Dbl Glzd Windows	22	ea	6190.00	$136,180	35	1	1.1	$149,698	$143,719
								Total Life Cycle Cost	**$149,698**	**$143,719**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$149,698**	**$143,719**

Green Product: **Dbl Glazed Low-E Fiberglass Frame Windows**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	Low-E Dbl Glzd Windows	22	ea	7878.18	$173,320	40	1	1.0	$173,320	$173,320
								Total Life Cycle Cost	**$173,320**	**$173,320**
Energy Savings										
Utility Cost	Natural Gas Savings	9736.00	therms	$1.55	($15,107)	1	1	40.0	($1,139,119)	($277,322)
								Net Life Cycle Cost after Energy Savings	**($965,799)**	**($104,002)**

ECONOMIC RETURN ANALYSIS

Green NPV	**$247,721**
Green IRR	**73.6%**

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product:	**Dbl Glazed Low-E Fiberglass Frame Windows**

Override with Green Product? **No**

Final Product Choice

Green Product:	**Dbl Glazed Low-E Fiberglass Frame Windows**

Notes:

1. *Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.*
2. *Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.*

Energy and Water Conservation Measure (EWCM): # 6 **Low-E Fiberglass Frame Dbl Glazed Windows**

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product 0

Final Product Choice

Green Product:	Dbl Glazed Low-E Fiberglass Frame Windows

Immediate Replacement

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Install/Replace	Low-E Dbl Glzd Windows	22	ea	$7,878.18	$173,320	40	1	1.0	$173,320	$173,320
								Total Life Cycle Cost	**$173,320**	**$173,320**

Energy Savings

Utility Cost	Natural Gas Savings	9,736	therms	$1.55	($15,107)	1	1	40.0	($1,139,119)	($277,322)
								Net Life Cycle Cost after Energy Savings	**($965,799)**	**($104,002)**

ECONOMIC RETURN ANALYSIS

Timing NPV	**n/a**
Timing IRR	**n/a**

TIMING RECOMMENDATION

Replacement Year:	**1**

Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.

2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 7 Install a Green (Vegetated) Roof

Rubber Membrane	vs.	Green Roof
(Conventional Product)		*(Green Product)*

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term: 30

Conventional Product: Rubber Membrane

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	Rubber Membrane	46,093	sf	$10.00	$460,928	20	1	1.5	$750,312	$581,247
								Total Life Cycle Cost	**$750,312**	**$581,247**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$750,312**	**$581,247**

Green Product: Green Roof

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	Green Roof	46,093	sf	$23.00	$1,060,134	30	1	1.0	$1,060,134	$1,060,134
Maintain	Green Roof Maintenance	46,093	sf	$0.45	$20,742	5	6	5.0	$165,126	$53,842
								Total Life Cycle Cost	**$1,225,261**	**$1,113,977**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$1,225,261**	**$1,113,977**

ECONOMIC RETURN ANALYSIS

Green NPV	**($532,730)**
Green IRR	**n/a**

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Conventional Product: Rubber Membrane

Override with Green Product? No

Final Product Choice

Conventional Product: Rubber Membrane

Notes:

1. *Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.*
2. *Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.*

Energy and Water Conservation Measure (EWCM): # 7 **Install a Green (Vegetated) Roof**

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product 0

Final Product Choice

Conventional Product: **Rubber Membrane**

Immediate Replacement

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Install/Replace	Rubber Membrane	46,093	sf	$10.00	$460,928	20	1	1.5	$750,312	$581,247
								Total Life Cycle Cost	**$750,312**	**$581,247**

Energy Savings

								Net Life Cycle Cost after Energy Savings	**$750,312**	**$581,247**

ECONOMIC RETURN ANALYSIS

Timing NPV	**n/a**
Timing IRR	**n/a**

TIMING RECOMMENDATION

Replacement Year: **1**

Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.

2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 8 **Retrofit Fluorescent Lighting with LEDs**

Fluorescent Lighting w/Indirect Reflectors	vs.	LED Lighting w/Indirect Reflectors
(Conventional Product)		*(Green Product)*

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term 35

Conventional Product: **Fluorescent Lighting w/Indirect Reflectors**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	Fluorescent Lights	725	ea	$105.00	$76,125	25	1	1.4	$110,734	$90,284
Utility Cost	Electric Usage	46,094	kWh	$0.21	$9,488	1	1	35.0	$573,658	$165,936
								Total Life Cycle Cost	**$684,392**	**$256,220**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$684,392**	**$256,220**

Green Product: **LED Lighting w/Indirect Reflectors**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	LED Lights	725	ea	$275.00	$199,375	35	1	1.0	$199,375	$199,375
Utility Cost	Electric Usage	20,659	kWh	$0.21	$4,252	1	1	35.0	$257,102	$74,369
Utility Cost	Natural Gas Usage	1,081	therms	$1.55	$1,677	1	1	35.0	$101,419	$29,336
								Total Life Cycle Cost	**$557,896**	**$303,080**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$557,896**	**$303,080**

ECONOMIC RETURN ANALYSIS

Green NPV	**($46,861)**
Green IRR	**4.5%**

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Conventional Product: **Fluorescent Lighting w/Indirect Reflectors**

Override with Green Product? **No**

Final Product Choice

Conventional Product: **Fluorescent Lighting w/Indirect Reflectors**

Notes:

1. *Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.*
2. *Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.*

Energy and Water Conservation Measure (EWCM): # 8 **Retrofit Fluorescent Lighting with LEDs**

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product 0

Final Product Choice

Conventional Product: **Fluorescent Lighting w/ Indirect Reflectors**

Immediate Replacement

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Install/Replace	Fluorescent Lights	725	ea	$105.00	$76,125	25	1	1.4	$110,734	$90,284
Utility Cost	Electric Usage	46,094	kWh	$0.21	$9,488	1	1	35.0	$573,658	$165,936
								Total Life Cycle Cost	**$684,392**	**$256,220**

Energy Savings

								Net Life Cycle Cost after Energy Savings	**$684,392**	**$256,220**

ECONOMIC RETURN ANALYSIS

Timing NPV	**n/a**
Timing IRR	**n/a**

TIMING RECOMMENDATION

Replacement Year: **1**

Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.

2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 9 LED Exit Signs

PL Fluorescent Exits	vs.	Replace PL Exits w/LED Exits
(Conventional Product)		*(Green Product)*

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term: 30

Conventional Product: PL Fluorescent Exits

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	PL Fluorescent	2	ea	$40.00	$80	20	1	1.5	$130	$101
Utility Cost	Electric Usage	245	kWh	$0.21	$50	1	1	30.0	$2,402	$827
								Total Life Cycle Cost	**$2,532**	**$928**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$2,532**	**$928**

Green Product: Replace PL Exits w/LED Exits

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	LED	2	e	$65.00	$130	30	1	1.0	$130	$130
Utility Cost	Electric Usage	70	kWh	$0.21	$14	1	1	30.0	$686	$236
Utility Cost	Natural Gas Usage	6	therms	$1.55	$9	1	1	30.0	$443	$153
								Total Life Cycle Cost	**$1,259**	**$519**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$1,259**	**$519**

ECONOMIC RETURN ANALYSIS

Green NPV	**$409**
Green IRR	**121.5%**

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Replace PL Exits w/LED Exits

Override with Green Product? No

Final Product Choice

Green Product: Replace PL Exits w/LED Exits

Notes:

1. *Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.*
2. *Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.*

Energy and Water Conservation Measure (EWCM): # 9 LED Exit Signs

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product 0

Final Product Choice

Green Product:	Replace PL Exits w/LED Exits

Immediate Replacement

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Install/Replace	LED	2	e	$65.00	$130	30	1	1.0	$130	$130
Utility Cost	Electric Usage	70	kWh	$0.21	$14	1	1	30.0	$686	$236
Utility Cost	Natural Gas Usage	6	therms	$1.55	$9	1	1	30.0	$443	$153
								Total Life Cycle Cost	$1,259	$519

Energy Savings

								Net Life Cycle Cost after Energy Savings	$1,259	$519

ECONOMIC RETURN ANALYSIS

Timing NPV	n/a
Timing IRR	n/a

TIMING RECOMMENDATION

Replacement Year:	1

Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.

2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

Life Cycle Cost Analysis

Green Measure (GM): **# 1** **Replace Wood Siding w/Cement Fiberboard**

Wood Siding	vs.	Cement Fiberboard
(Conventional Product)		*(Green Product)*

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term **50**

Conventional Product: **Wood Siding**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Maintain	Wood Repair/Repainting	684	sf	$1.40	$957	5	1	10.0	$20,330	$4,111
								Total Life Cycle Cost	**$20,330**	**$4,111**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$20,330**	**$4,111**

Green Product: **Cement Fiberboard**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	Cement Fiberboard	684	sf	$6.75	$4,614	50	1	1.0	$4,614	$4,614
Maintain	Repair/Repainting	684	sf	$0.90	$615	18	19	1.8	$2,248	$360
								Total Life Cycle Cost	**$6,862**	**$4,974**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$6,862**	**$4,974**

ECONOMIC RETURN ANALYSIS

Green NPV	**($863)**
Green IRR	**6.4%**

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Conventional Product: **Wood Siding**

Override with Green Product? **No**

Final Product Choice

Conventional Product: **Wood Siding**

Notes:

1. *Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.*
2. *Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.*

Green Measure (GM): **# 1** **Replace Wood Siding w/Cement Fiberboard**

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product **0**

Final Product Choice

Conventional Product:	**Wood Siding**

Immediate Replacement

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Maintain	Wood Repair/Repainting	684	sf	$1.40	$957	5	1	10.0	$20,330	$4,111
								Total Life Cycle Cost	**$20,330**	**$4,111**

Energy Savings

								Net Life Cycle Cost after Energy Savings	**$20,330**	**$4,111**

ECONOMIC RETURN ANALYSIS

Timing NPV	**n/a**
Timing IRR	**n/a**

TIMING RECOMMENDATION

Replacement Year:	**1**

Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.

2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

Life Cycle Cost Analysis

Green Measure (GM): **# 2** **Replace Vinyl Flooring w/Linoleum**

Vinyl Flooring (VCT & VAT)	vs.	Linoleum Flooring
(Conventional Product)		*(Green Product)*

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term **25**

Conventional Product: **Vinyl Flooring (VCT & VAT)**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	Hallways -VCT	17,244	sf	$5.00	$86,219	16	1	1.6	$147,897	$114,512
Install/Replace	Admin/Support-VAT	670	sf	$6.00	$4,020	16	1	1.6	$6,896	$5,339
Install/Replace	Classrooms VCT	8,554	sf	$5.00	$42,770	16	1	1.6	$73,366	$56,805
Install/Replace	Classrooms VAT	17,777	sf	$6.00	$106,662	16	1	1.6	$182,964	$141,663
Install/Replace	Cafetorium-VCT	3,075	sf	$5.00	$15,375	16	1	1.6	$26,374	$20,420
								Total Life Cycle Cost	**$437,496**	**$338,739**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$437,496**	**$338,739**

Green Product: **Linoleum Flooring**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	Hallways	17,244	sf	$6.50	$112,085	25	1	1.0	$112,085	$112,085
Install/Replace	Admin/Support	670	sf	$7.80	$5,226	25	1	1.0	$5,226	$5,226
Install/Replace	Classrooms -VCT	8,554	sf	$6.50	$55,601	25	1	1.0	$55,601	$55,601
Install/Replace	Classrooms -VAT	17,777	sf	$7.80	$138,661	25	1	1.0	$138,661	$138,661
Install/Replace	Cafetorium	3,075	sf	$6.50	$19,988	25	1	1.0	$19,988	$19,988
								Total Life Cycle Cost	**$331,560**	**$331,560**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$331,560**	**$331,560**

ECONOMIC RETURN ANALYSIS

Green NPV	**$7,179**
Green IRR	**8.8%**

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: **Linoleum Flooring**

Override with Green Product? **No**

Final Product Choice

Green Product: **Linoleum Flooring**

Notes:

1. *Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.*
2. *Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.*

Green Measure (GM): **# 2** **Replace Vinyl Flooring w/Linoleum**

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product **0**

Final Product Choice

Green Product:	**Linoleum Flooring**

Immediate Replacement

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Install/Replace	Hallways	17,244	sf	$6.50	$112,085	25	1	1.0	$112,085	$112,085
Install/Replace	Admin/Support	670	sf	$7.80	$5,226	25	1	1.0	$5,226	$5,226
Install/Replace	Classrooms -VCT	8,554	sf	$6.50	$55,601	25	1	1.0	$55,601	$55,601
Install/Replace	Classrooms -VAT	17,777	sf	$7.80	$138,661	25	1	1.0	$138,661	$138,661
Install/Replace	Cafetorium	3,075	sf	$6.50	$19,988	25	1	1.0	$19,988	$19,988
								Total Life Cycle Cost	**$331,560**	**$331,560**

Energy Savings

								Net Life Cycle Cost after Energy Savings	**$331,560**	**$331,560**

ECONOMIC RETURN ANALYSIS

Timing NPV	**n/a**
Timing IRR	**n/a**

TIMING RECOMMENDATION

Replacement Year:	**1**

Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.

2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

Life Cycle Cost Analysis

Green Measure (GM): **# 3** **Replace Carpeting w/Linoleum**

Carpeting	vs.	Linoleum
(Conventional Product)		*(Green Product)*

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term **25**

Conventional Product: **Carpeting**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	Carpeting	3,110	sf	$3.10	$9,640	8	1	3.1	$39,771	$21,139
								Total Life Cycle Cost	**$39,771**	**$21,139**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$39,771**	**$21,139**

Green Product: **Linoleum**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Life Cycle Costs										
Install/Replace	Linoleum	3,110	sf	$6.50	$20,213	25	1	1.0	$20,213	$20,213
								Total Life Cycle Cost	**$20,213**	**$20,213**
Energy Savings										
								Net Life Cycle Cost after Energy Savings	**$20,213**	**$20,213**

ECONOMIC RETURN ANALYSIS

Green NPV	**$926**
Green IRR	**8.8%**

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product:	**Linoleum**

Override with Green Product? **No**

Final Product Choice

Green Product:	**Linoleum**

Notes:

1. *Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.*
2. *Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.*

Green Measure (GM): **# 3** **Replace Carpeting w/Linoleum**

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product	3
Replacement Year	4

Final Product Choice

Green Product:	Linoleum

Immediate Replacement **Year** 1

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Cost over Life Cycle (EUL) Inflated	Cost over Life Cycle (EUL) Discounted
Install/Replace	Linoleum	3,110	sf	$6.50	$20,213	25	1	1.0	$20,213	$20,213
								Total Life Cycle Cost	$20,213	$20,213

Energy Savings

								Net Life Cycle Cost after Energy Savings	$20,213	$20,213

Replacement at End of Remaining Useful Life **Year** 4

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Linoleum	3,110	sf	$6.50	$20,213	25	4	0.9	$17,157	$16,756

Expenses for Current Product Through Useful Life

								Total Life Cycle Cost	$17,157	$16,756

Energy Savings

								Net Life Cycle Cost after Energy Savings	$17,157	$16,756

ECONOMIC RETURN ANALYSIS

Timing NPV	($3,457)
Timing IRR	n/a

TIMING RECOMMENDATION

Replacement Year:	4

Notes:

1. *Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.*
2. *Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.*

Statement of Delivery

ON-SITE INSIGHT, Inc. (and/or its representatives) hereby certifies that, this Green Capital Needs Assessment (the "GCNA" or the "Report") is delivered subject to the following terms and conditions:

1. This report and analysis are based upon observations for the visible and apparent condition of the building and its major components on the date of the fieldwork. Although care has been taken in the performance of this assessment, ON-SITE INSIGHT, Inc (and/or its representatives) makes no representations regarding latent or concealed defects that may exist and no warranty or guarantee is expressed or implied. This report is made only in the best exercise of our ability and judgment.

2. We have undertaken no formal evaluations of environmental concerns, including but not limited to asbestos containing materials (ACMs), lead based paint, chlorofluorocarbons (CFCs), polychlorinated biphenyls (PCBs), and mildew/mold.

3. Conclusions in this report are based on estimates of the age and normal working life of various items of equipment and/or statistical comparisons. Actual conditions can alter the useful life of any item. When an item needs immediate replacement depends on many factors, including previous use/misuse, irregularity of servicing, faulty manufacturer, unfavorable conditions, Acts of God and unforeseen circumstances. Certain components that may be working when we made our inspection might deteriorate or break in the future without notice.

4. To prepare this report, we used historic data on capital activities and costs, blueprints (when available), and current prices for capital actions. We have not independently verified this information, have assumed that it is reliable, but assume no responsibility for its accuracy.

5. Unless otherwise noted in the report, we assume that all building components meet code requirements in force when the property was built.

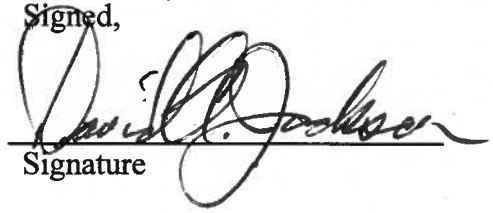
6. If accessibility issues are referenced in the report, the site elements, common areas, and dwelling units at the development were examined for compliance with the requirements of the Uniform Federal Accessibility Standards (UFAS), and for Massachusetts properties, the Massachusetts Architectural Accessibility Board (AAB). The methodology employed in undertaking this examination is adapted from a Technical Assistance Guide (TAG-88-11) titled "Supplemental Information About the Section 504 Transition Plan Requirements" published by the Coordination and Review section of the U.S. Department of Justice Civil Rights Division, and the AAB Rules and Regulations, 521 CMR effective July 10, 1987. The Guide also incorporates the requirements of UFAS, published, April 1, 1988 by the General Services Administration, the Department of Defense, the Department of Housing and Urban Development, and the U.S. Postal Service. Changes in legislation and/or regulations may make some observations moot.

7. Response Actions and estimated costs of responses were developed by ON-SITE INSIGHT, Inc. If additional structural work is necessary, costs for some Response Actions may exceed estimates. Whenever the Response Action is to remove, reposition, or modify walls, a competent structural engineer should be retained before any work is done, because such investigation may disclose that a Response Action is either more costly than estimated, or is not possible.

8. Conclusions reached in this report assume current and continuing responsible ownership and competent property management.

9. Regular updates of this plan are recommended to ensure careful monitoring of major building systems and to adjust the program to accommodate unanticipated circumstances surrounding the buildings, operations, and/or occupants.

Signed,



Signature

David Jackson
Name

Senior Associate/Mechanical Specialist
Title

January 28, 2011
Date