

## Green Capital Needs Assessment and Replacement Reserve Analysis

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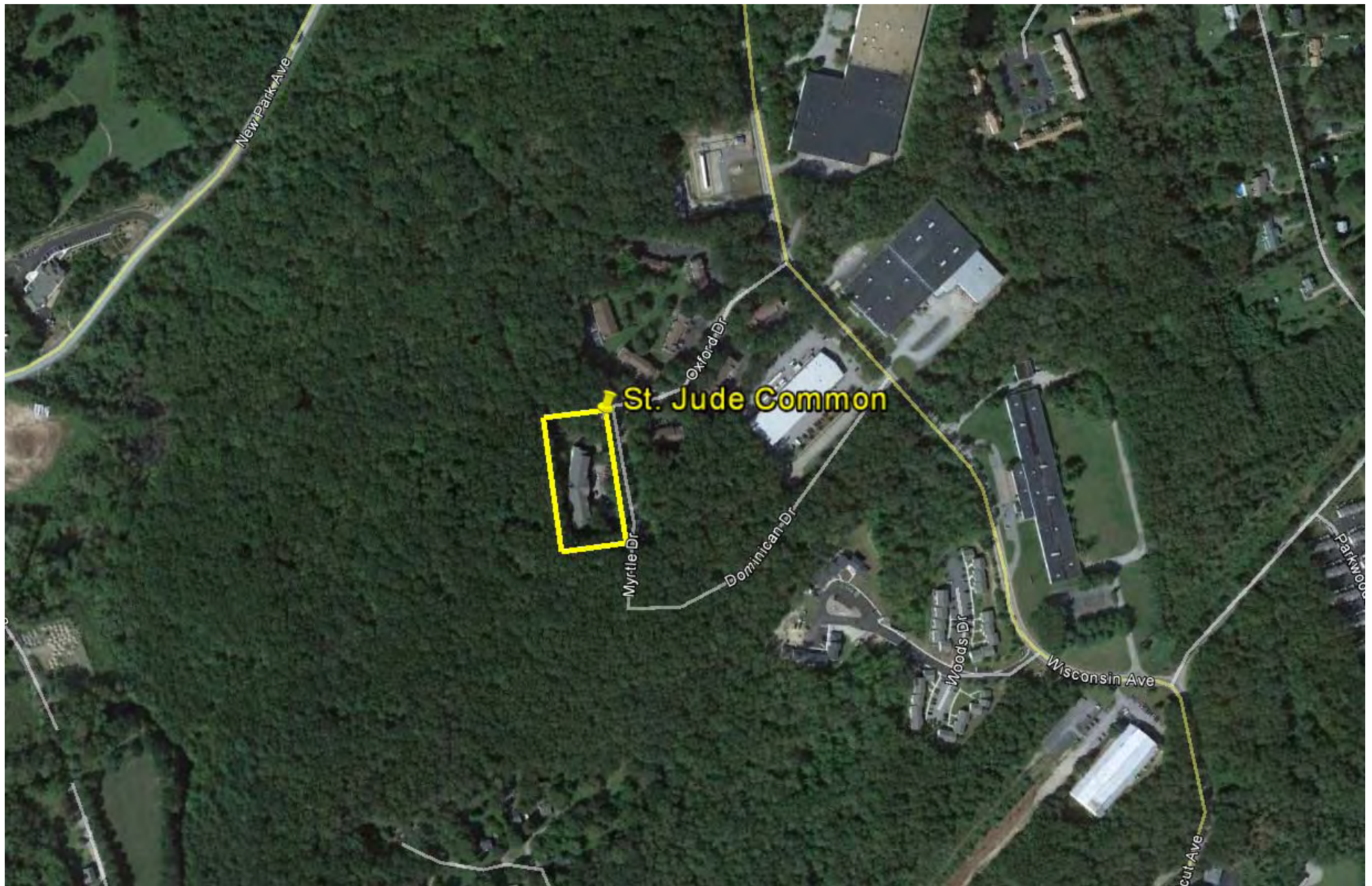
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St. Jude Common  
CHFA # 89037D  
St. Jude Housing Corp.  
Norwich, CT

May 8, 2013

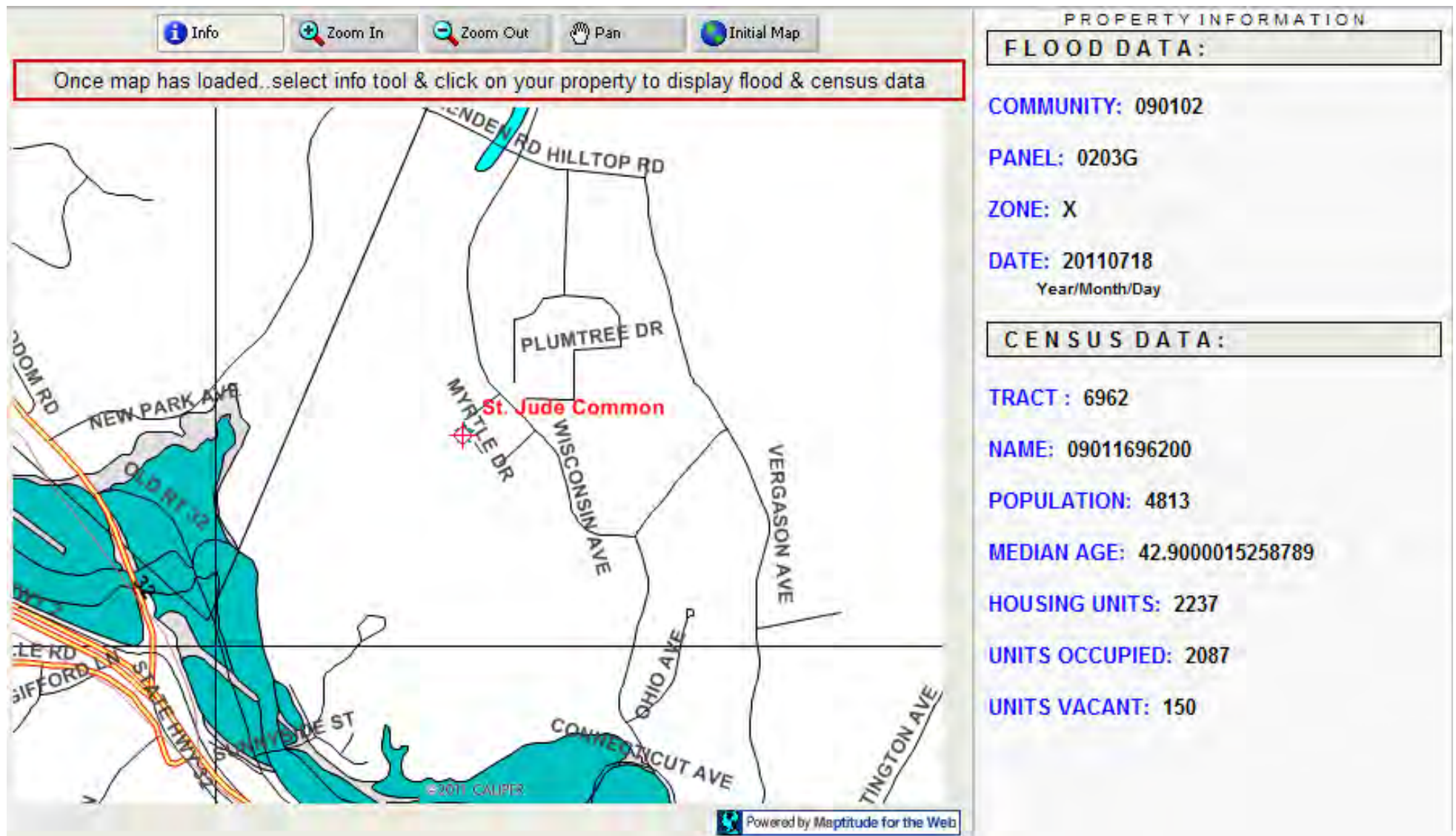
*Final Report*



## **St. Jude Common**

3 Myrtle Drive  
Norwich, CT 06360





## St. Jude Common

3 Myrtle Drive  
Norwich, CT 06360

Zone X = Outside the 500-year floodplain to be  
Outside the 1% and 0.2% annual chance floodplains.

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## 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

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## Overview and Goals

This Green Capital Needs Assessment (GCNA) of St Jude Commons has been undertaken on behalf of the St Jude Housing Corporation and Connecticut Housing Finance Authority (CHFA). 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 \$1,509,421 in current dollars (\$29,596/unit), or \$2,060,019 (\$40,393/unit) in inflated dollars.

Current reserves would be outpaced starting in Year 8. However an infusion of \$800,000 in Year 1 fully funds the plan.

# 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 \$1,685,341 in current dollars (\$33,066/unit), or \$2,289,143 (\$44,885/unit) in inflated dollars.

Current reserves would be outpaced starting in Year 6. However an infusion of \$1,000,000 in Year 1 fully funds the plan.

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, 10 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.

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

# Executive Summary

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.

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.

## **Green Measures (GMs):**

The report identifies 5 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.

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. Additional measures such as water usage, which is currently not modeled in TREAT has been presented using OSI's existing utility models. 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.



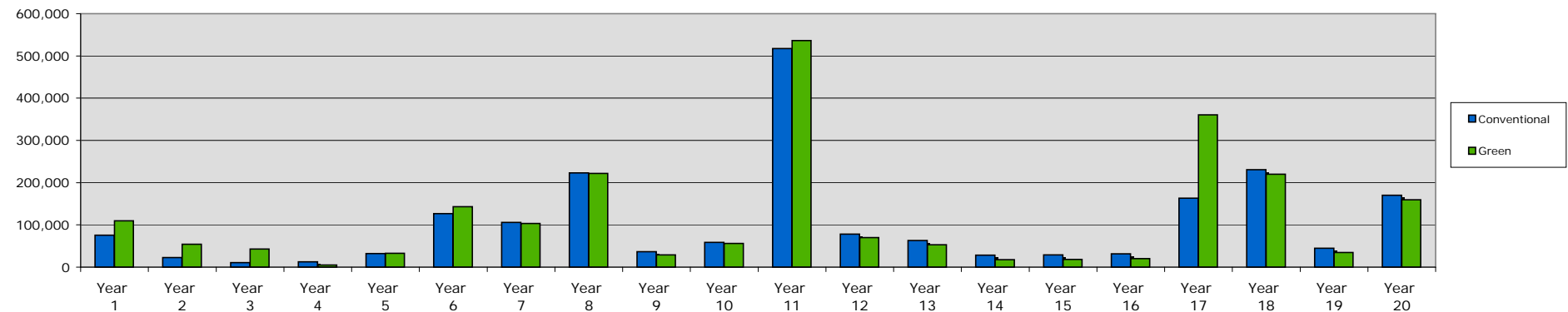
# Executive Summary

## Dashboard

### Property Data

Location:	Norwich, CT
Year Built:	1989
Number of Units:	51
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:	47,320
Resident Population (estimated):	55

	BTUs/yr	Conversion	lbs CO <sub>2</sub>	lbs CO <sub>2</sub> / Res
Gas	2,331,136,000	x 11.023100	256,963	4,672
Oil	0	x 0.000161	0	0
Electricity	1,415,092,880	x 1.582917	656,307	11,933
<b>Total</b>	<b>3,746,228,880</b>		<b>913,270</b>	<b>16,605</b>

### Replacement Reserve Analysis

#### Conventional

- Plan #1: Capital costs exceed reserves starting in Year 8.  
Plan #2: Infusion of \$800K fully funds the plan.

#### Green

- Plan #1: Capital costs exceed reserves starting in Year 6.  
Plan #2: Infusion of \$1M fully funds the plan.

### Health and Safety

#### Hazardous Materials

	Identified	Location / Notes
Lead Based Paint (LBP):	None	n/a
Asbestos Containing Materials (ACMs):	None	n/a
Mold:	None	n/a

#### Indoor Ventilation

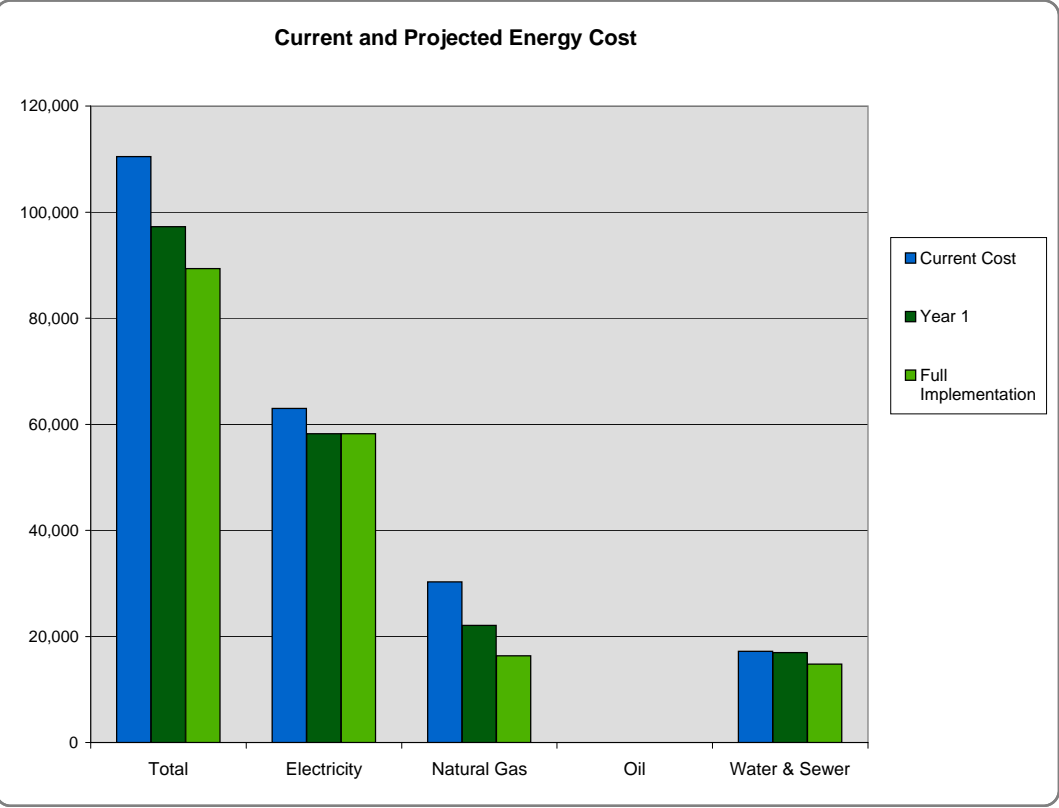
Operable windows, common area AHUs

#### Indoor Air Quality (IAQ)

	Design Specification	Actual Read	Notes
Air Flow Rate	4000-4265 cfm	not measured	AHU ratings
Thermal Comfort	68F-77F	57F, 72.3F	One apt vacant
Carbon Monoxide	0	0	Boiler room
Carbon Dioxide	<1000	787, 806	2 apts

# Executive Summary

## Energy Savings



### Energy Intensity / Benchmarking Data

#### TREAT Modeled Data

Building Square Footage: **47,320**  
Heating Degree Days: 5,345

#### TREAT Model

	Amount	Units	BTUs/yr	Energy Intensity (BTUs/(HDDs x SF))
Heating	18,977	therms	1,897,652,347	8
Cooling	0	kWh	0	0
DHW	4,806	therms	480,649,352	2
Electricity	414,740	kWh	1,415,092,880	6
Total			3,793,394,579	15

	Gallons/yr	Gallons/sf/yr
Water	1,389,877	29

### Energy Usage Summary

#### Billing Data

Utility	Current Usage	Current Cost	Projected Usage	Projected Cost	% Savings
Electricity	414,740 kWh	\$62,995	383,259 kWh	\$58,214	7.6%
Natural Gas	23,311 therms	\$30,263	12,601 therms	\$16,358	45.9%
Oil	0 gallons	\$0	0 gallons	\$0	n/a
Water & Sewer	1,389,877 gallons	\$17,218	1,194,461 gallons	\$14,797	14.1%
Total		\$110,476		\$89,369	19.1%

# Executive Summary

## Green Improvement Plan

						Annual Utility Savings									
Measure	Upfront Cost	EUL	Simple SIR <sup>1</sup>	Incremental Cost <sup>2</sup>	Green NPV <sup>4</sup>	Electric		Gas		Oil		Water & Sewer		Total \$	Recommended Timing
						KWh	\$	Therms	\$	Gallons	\$	Gallons	\$		

### Recommended EWCs (Based on Financial Analysis)

Interactive Group															
EWCM 2 Condensing Boilers	49,500	20	2.04	17,100	17,327			3,892	5,053					5,053	Immediate
EWCM 5 Fiberglass Doors	116,981	35	0.95	8,161	47,260			2,441	3,169					3,169	Year 11
EWCM 6 Fiberglass Windows	55,322	35	1.62	3,860	40,936			1,973	2,561					2,561	Year 11
EWCM 7 Laundry Upgrade	14,454	10	0.86	3,334	7,184	9,984	1,516	(420)	(545)			21,564	267	1,239	Immediate
EWCM 9 Refrigerators	36,733	15	1.04	2,563	25,331	18,819	2,858	(247)	(321)					2,538	Immediate
EWCM 10 Progr. Thermostats	10,302	20	4.18	4,947	23,547			1,659	2,154					2,154	Immediate
<b>Interactive Group Total <sup>5</sup></b>	<b>283,292</b>			<b>39,965</b>			<b>4,375</b>		<b>12,071</b>				<b>267</b>	<b>16,713</b>	
EWCM 1 Exterior Lighting	1,065	30	9.84	1,065	4,656	2,301	349							349	Immediate
EWCM 3 High Eff Motors	5,395	25	0.27	145	704	377	57							57	Immediate
EWCM 4 Condensing DHW Blr	11,550	20	3.17	3,990	10,329			1,412	1,833					1,833	Immediate
EWCM 8 High Eff Toilets	23,800	30	2.71	1,661	6,023							173,852	2,154	2,154	Year 6
<b>EWCM Subtotal</b>	<b>325,102</b>			<b>46,825</b>		<b>2,678</b>	<b>4,782</b>	<b>1,412</b>	<b>13,904</b>	<b>0</b>	<b>0</b>	<b>173,852</b>	<b>2,421</b>	<b>21,107</b>	

### Recommended GMs (Based on Financial Analysis)

GM 3 Apt Linoleum Flooring	112,218	25		14,433	24,468	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Immediate
GM 4 FSC Wood Cabinets	135,692	30		9,467	3,583	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Year 6
<b>GM Subtotal</b>	<b>247,910</b>			<b>23,900</b>		<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	
<b>Total</b>	<b>573,012</b>			<b>70,725</b>		<b>2,678</b>	<b>4,782</b>	<b>1,412</b>	<b>13,904</b>	<b>0</b>	<b>0</b>	<b>173,852</b>	<b>2,421</b>	<b>21,107</b>	

### Optional Actions

GM 1 Metal Roof	107,748	40		52,136	(30,587)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Year 18
GM 2 Common Area Linoleum	61,048	25		27,515	(8,113)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Year 8
GM 5 Stone Countertops	47,175	30		24,982	(8,108)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Year 18

### Notes:

- Simple SIR is calculated as (Total Annual Savings \* Estimated Useful Life) / Upfront Cost.
- Incremental Cost is the difference in cost between the green and conventional alternatives.
- 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.
- Green NPV is the net present value of installing a green vs. conventional product.
- Interactive group total recognizes full interaction of all measures based on the TREAT model.

# Narrative

**St Jude Common** is a single three-story congregate housing building. The facility contains a total of 51 one-bedroom units; all apartments are accessed through a series of interior common hallways and stairwells. The common areas also include a dining room adjacent to the commercial kitchen, which provides a daily meal service for residents. The building was originally constructed in 1989.

## Site & Handicap Accessibility

### Site Surface

St Jude Common is located on a large, parcel of land in Ashford, CT. The site includes an asphalt-paved access road with similarly paved parking areas, concrete walkways that encompass the building, compact fluorescent lighting along the walkways and roadway, and surrounding lawns with flowerbeds, bushes, and trees. The site also features a gazebo.

Roadways, Parking Areas, and Walkways		
Existing conditions	Capital needs	Green alternative
The roadway and parking lot appear to be in good condition, with only minor cracks observed. Cracks were also observed along sections of the asphalt-paved walkways.	The plan includes the cost for surface repairs (crackfilling, sealcoating, and parking lot re-striping) in Years 2, 7, and 12. Resurfacing costs are shown toward the end of the plan in Year 17.	For future repaving, consider a lighter colored porous 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. Using a porous asphalt material also helps to reduce

## Narrative

Existing conditions	Capital needs	Green alternative
		<p>the heat island effect and similar to open pavers (proposed for the parking areas) helps to promote adequate drainage.</p> <p>No green alternative is carried for the crack-fill and sealcoat work; however, it is recommended that a low volatile organic compound (VOC) and/or recycled-content paint (content should be at least 50%; VOCs should not exceed 250 grams per liter) is used during the restriping process.</p>

## Landscaping

Existing conditions	Capital needs	Green alternative
The site features a well-maintained surrounding lawn and garden beds.	The plan includes an allowance for replanting and pruning in Year 5.	The green alternative would be to replace the existing landscaping with a Xeriscape, which employs native and adaptive plantings that require significantly less water and fertilizers than traditional lawns and garden beds.



## Narrative

### Dumpster/Enclosures

Existing conditions	Capital needs	Green alternative
The site's dumpster is located at one end of the parking lot and has a stockade fence enclosure.	The enclosure is in good condition and is shown being replaced in the second half of the plan in Year 12.	No green alternative shown.

### Exterior Lighting

Existing conditions	Capital needs	Green alternative
There are pole-mounted compact fluorescent lamps (CFLs) along the walkway and roadway to provide lighting for residents.	The CFLs, which appear to be cold-weather rated, are to be addressed as an operating concern throughout the plan.	The green alternative to help achieve even greater energy savings than the CFLs is to retrofit the existing lighting with comparable LED fixtures. LED lighting has a significantly longer useful life and lower energy usage than CFLs. Also, this lighting source produces a yellowish-white light, comparable to incandescent lighting. (See EWCM 1)

## **Narrative**

### **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). In general, the units have compliant accessible designs (in part because this is a congregate housing development), with five designated units that are designed to be fully compliant. The accessible units were not available at the time of the inspection, however the units that were inspected had fully compliant bathrooms and general apartment features. The interior common areas are fully compliant, including the common shower rooms (one on each floor). The parking lot has designated parking within close proximity to the main entrance. Also, the main entrance has been upgraded with a power door opener. No capital costs (conventional or green) are shown for this area, which is expected to be maintained from existing operating accounts

## Narrative

### Mechanical Room

The central mechanical room contains the heating and domestic hot water (DHW) systems. The heating system consists of five modular gas-fired hydronic boilers, governed by a step controller (which uses outside air and return water temperature input to adjust the boiler plant output to match the daily heating requirement). A pair of base-mounted 2 horsepower (hp) pumps are used (lead/standby manner) to distribute the hydronic heat throughout the facility. The DHW system, which serves only the common areas, has a gas-fired boiler, an insulated storage tank, and a pair of fractional horsepower pumps. Fresh air for combustion is provided through a louvered opening on the exterior wall, and metal flues are used to vent flue gases to the nearby building chimney.

#### Boilers

Existing conditions	Capital needs	Green alternative
The hydronic boilers appear to be in good condition however they are approaching the end of their useful life.	The boilers are to be replaced in Year 6, after 30 years of use. The cost to replace the step controller is also shown in Year 6. The plan includes the cost to replace the existing fixed fresh air louver, with a motor-operated louver in Year 6. The proposed louver would be controlled by the boiler plant burner motor, opening to provide fresh air once the boiler plant has been energized to produce hydronic heat.	<p>Condensing boilers are the green alternative to the existing boilers, resulting in a higher combustion efficiency and reduced natural gas consumption. (See EWCM 2).</p> <p>The proposed condensing heating boilers include direct combustion air supply (ducted to each boiler's combustion chamber) and corrosion-resistant flues. The resultant flue gases are also low temperature (below 100°F) and require either stainless steel or heat-resistant plastic (CPVC) flues to address corrosive flue vapors.</p>

## Narrative

### Hydronic Circulating Pumps

Existing conditions	Capital needs	Green alternative
One of the hydronic pumps was recently upgraded with a high efficiency pump motor; the other pump has its original standard efficiency motor. Both pumps are available for use.	The older pump and motor are to be replaced in the first year of the plan	The older pump is shown being upgraded with a premium (high) efficiency pump motor in Year 1, which will reduce electric consumption without sacrificing pump performance. See EWCM 3.

### Domestic Hot Water

Existing conditions	Capital needs	Green alternative
The existing DHW system serves only the common area (commercial kitchen and public restrooms). Each apartment has its own DHW tank, which is discussed in the Dwelling Units report section.	The plan includes the costs to replace the DHW boiler, storage tank, and pumps in Year 10, after 20 years of use.	The green alternatives include replacing the DHW boiler with a comparably-sized gas-fired condensing boiler, which will provide energy savings by way of its higher combustion efficiency. See EWCM 4. The DHW pumps are also shown being upgraded with high efficiency motors to reduce electric consumption. See EWCM 3.

**Narrative**

**Building Mechanical and Electrical Systems**

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

Common Area HVAC Systems		
Existing conditions	Capital needs	Green alternative
Two split direct expansion (DX) air conditioning units provide cooling to portions of the common area, via the pair of air handlers (AHUs), each with its own controller.	The plan includes the costs to replace the larger split DX system in Year 8, and the newer (and smaller) split DX system in Year 18. The cost to upgrade the air handlers is shown in Year 8.	The green alternative is to replace the split DX units with comparable Energy Star-rated units. There did not appear to be sufficient utility data to accurately model the cooling savings (the TREAT model could only reliably show one month of usage), however there is a benefit to utilizing replacement air conditioning systems that have a higher Seasonal Energy Efficiency Ratio (SEER) rating.



## Narrative

### Electrical

Existing conditions	Capital needs	Green alternative
<p>The electric main system features centralized equipment and panels. The original individually-metered electric service (which was paid by the client) has been replaced with a master-meter service (lower overall rate). No exposed wires or missing breakers were observed. A natural gas-powered Kohler generator is used to provide 100 kW of emergency power. Also, some of the common area lighting appears to have special ballasts which can store power to in turn provide lighting during a power outage.</p> <p>The central fire alarm system is governed by a Silent Knight fire alarm control panel (FACP), and the main entrance has intercom panel to help control visitor access throughout this facility.</p>	<p>The generator is to be replaced in Year 16.</p> <p>The intercom panel is to be upgraded initially in Year 7 of the plan, with a future upgrade in Year 17. The fire alarm system was recently upgraded with a new fire alarm control panel; this system is expected to perform reliably throughout most of the plan and is to be upgraded in Year 18.</p>	<p>No green alternatives shown.</p>

## Narrative

### Elevators

Existing conditions	Capital needs	Green alternative
A single hydraulic elevator provides access to each floor of this building. The elevator is maintained by a full service contract. The elevator was recently upgraded with a new cylinder (piston).	The elevator cab interior and door operators are to be refurbished in Year 11. The plan also anticipates a major upgrade of the elevator in Year 11.	No green alternative is shown.

# Narrative

## Building Architectural Systems

### Building Exterior

St Jude Common consists of a single walk-up building (three stories plus a basement). No issues were observed or reported with regard to the building framing and it should be monitored going forward. Exterior walls feature synthetic stucco (EIFS) siding throughout with face brick sections on the front elevation. Windows are metal-framed with double glazing. The roof is pitched, covered with architectural shingles, and the attic has R-38 insulation level. The building also has insulated metal exterior doors and a roll-up garage door which also serves as the service door to the basement.

Siding		
Existing conditions	Capital needs	Green alternative
Damaged areas and discoloration was observed on sections of the EIFS. The trim work at the roof line has peeling paint.	The costs for EIFS and trim work repairs and repainting, is shown initially in Year 1, with a future cycle shown in Year 11.	Low VOC paint (significantly lower amounts of volatile organic compounds) should be considered when repainting. No premium is shown for this paint.

## Narrative

### Doors and Windows

Existing conditions	Capital needs	Green alternative
<p>The metal framed glass doors and the insulated metal doors appear to be in good condition. Each apartment also has a metal framed sliding door that provides access to the adjacent private balcony.</p> <p>The windows also appear to be in good condition, with no reports of operational problems and no indication of fogged glazing (failed window seals).</p>	<p>The common, service, and sliding doors are to be replaced at the mid-point of the plan in Year 11.</p> <p>The plan also includes a glazing replacement allowance starting in Year 1 for anticipated glazing and seal failures.</p>	<p>Replacement of the metal-framed doors and windows with fiberglass-framed, double-glazed models with a low-E (low emissivity) coating, and a gas fill between the glazing layers is considered as the green alternatives (EWCMs 5 and 6). The fiberglass frame requires less maintenance than the metal framing and has a better energy saving potential (reduced heat loss). 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. It is recommended that the windows be monitored and appropriately caulked going forward to keep air infiltration to a minimum.</p>

## Narrative

### Balconies

Existing conditions	Capital needs	Green alternative
Upper floor units have private balconies that feature concrete decks and metal railing.  The decking and railing were in good condition at the time of the assessment.	The plan establishes a repair allowance for the balconies starting in Year 16.	No green alternative is shown for balcony upgrades.

### Exterior Lighting

Existing conditions	Capital needs	Green alternative
Metal halide flood lights are mounted at key areas along the exterior walls to augment the site exterior lighting.	Replacement of the metal halide lighting is to be address as an operating concern throughout the plan.	Replacing the metal halide lighting with induction lighting potentially provides a longer-lasting lighting source that also has a longer useful life. See EWCM 1.



## Narrative

Roof		
Existing conditions	Capital needs	Green alternative
<p>The building has a pitched roof, covered recently with architectural shingles and has gutters and downspouts for roof drainage. There were no signs or reports of active roof leaks. The listed insulation level in the attic is R-38 which is excellent by today's standards and represents the green alternative for roof insulation.</p>	<p>Replacement of the existing roof covering is shown in Year 18.</p>	<p>A metal roof was evaluated as a green measure in terms of a longer useful life than the architectural shingles. The existing insulation level addresses the energy savings component. However in terms of a longer lasting roof surface, the metal roof option is not considered to be cost-effective. (See GM 1).</p>

### Note:

We do not, as yet, recommend a 'green vegetative roof' – the installation of soil and vegetation on a waterproof membrane - as an option. While these may also reduce roof temperatures and cooling loads, and reduce stormwater run-off, they are much more expensive than conventional systems, and we see too many questions about performance and maintenance.

## Narrative

### Building Interior Common Areas

The building interior includes the common hallways and stairwells, several community areas, a management office, a public laundry facility, and a set of public restrooms including a shower room (roll-in shower). Walls are mostly painted drywall throughout, with a few areas that have wallpaper. Ceiling finishes are a mix of ceiling tiles and painted surfaces. 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 of vinyl composite tile (VCT) floor covering. The stairways have concrete treads and landings, considered to be the green alternative.

#### Flooring

Existing conditions	Capital needs	Green alternative
The carpeting and VCT throughout the building is in good condition, with no appreciable signs of significant wear or damage.	The floor covering replacement costs are shown every 12 years starting in Year 8.  The ceramic tile bathroom flooring is to be maintained as an operating concern throughout the plan.	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

## Narrative

Existing conditions	Capital needs	Green alternative
		life cycle cost than existing flooring. Despite the longer useful life, this measure is not a cost-effective option. (See GM 2).

### Commercial Kitchen, Common Area Furnishings

Existing conditions	Capital needs	Green alternative
The commercial kitchen includes walk-in refrigerator and freezer, stainless steel cabinets and countertops and quarry tile flooring. Furnishings throughout the common areas include tables, chairs, audio-visual equipment, and recreational facilities.	The plan includes an allowance to the kitchen appliances and common area furnishings starting in Year 11.	No green alternatives shown.

## Narrative

### Laundry Rooms and Restrooms

Existing conditions	Capital needs	Green alternative
The laundry rooms have standard top-loading washers and electric dryers.	The plan includes replacement costs for the washers and dryers in Years 1 and 11.	Replace the top-loading washing machines with high-efficiency front-loading Energy Star rated models. Also, add natural gas service to both laundry rooms and replace the electric dryers with natural gas dryers. The high-efficiency washing machines utilize less water (as much as 40% less) than traditional washing machines and the lower demand for hot water also has an energy-savings component. The natural gas-fired dryers use a significantly lower cost and green fuel for clothes drying. See EWCM 7.
The public restrooms, including the shower room, include low flush toilets (1.6 gallon per flush or gpf) and a low flow showerhead (in the shower rooms).	Toilet replacement is shown in Year 6.	The low flush toilets could also be replaced with high efficient toilets (1.28 gpf). These toilets will reduce water consumption, as shown in EWCM 8 (which also includes apartment toilets).

## Narrative

### Dwelling Units

During the course of the assessment, OSI inspected 4 units which represented all unit types and conditions. A sample of this size is felt to be sufficient given the age, tenancy, design, and location of the development. Additional information about units and capital replacements was obtained from discussions with residents during inspections and additional capital history forms submitted by management.

#### Finishes

Existing conditions	Capital needs	Green alternative
Each unit features painted walls and ceilings, hollow core interior and closet doors. Living areas and kitchens in the basement units are carpeted; VCT flooring is used in all bathrooms and in the living areas and kitchens in the units on the upper floors. The finishes were found to be in good condition, including some of the carpeting that is original.	Apartment repainting and any entry, interior or closet door replacement are to be addressed as operating concerns. Carpet replacement is shown over a 6-year cycle, starting in Years 1 and 13. The vinyl flooring is to be replaced starting in Years 1 and 16.	<p>The existing carpeting and VCT are to be replaced with a linoleum product. This product will offer a substantially longer useful life than the carpeting and VCT.</p> <p>Additionally, the linoleum product should help to improve indoor air quality (IAQ) by being easier to clean and maintain, and being significantly more resistant to dust accumulation (see GM 3).</p>

## Narrative

### Bathrooms

Existing conditions	Capital needs	Green alternative
<p>Bathrooms have a fiberglass bathtub with a fiberglass tub surround, and an anti-scald mixing valve. Ventilation is provided via a ceiling-mounted exhaust fan. Low-flow showerheads (2.0 gallons per minute (gpm) or less) are in place, and existing toilets are rated at 1.6 gallons per flush (gpf).</p> <p>Bathrooms also have wall-hung sinks.</p>	<p>The plan includes an annual allowance starting in Year 1 for replacement of general bathroom accessories. Exhaust fans are shown being replaced in Year 5. The plan also shows sink and toilet replacement starting in Year 6 and tub repairs starting in Year 11.</p>	<p>The one viable green option for bathrooms is to replace the existing 1.6 gpf toilets with high efficiency 1.28 gpf toilets, shown starting in Year 6. (See EWCM 9).</p> <p>Bathrooms could also be upgraded with variable speed exhaust fans, designed to react to humidity (moisture) level variations. These fans are controlled by a humidistat and will automatically adjust their fan speed and exhaust rate to match the variations in humidity levels. This item was not included as part of the TREAT energy model, but should be discussed at the client review meeting.</p>

## Narrative

### Kitchens

Existing conditions	Capital needs	Green alternative
Kitchens have laminated particleboard cabinets and countertops, frost-free refrigerators, ducted ceiling exhaust fans, and 20-inch electric ranges. The finishes and appliances appear to be in good condition.	Cabinet replacement, which also includes the initial replacement of the countertops, is shown over the first 3 years of the plan. Future countertop replacement is shown toward the end of the plan, starting in Year 18. The plan also shows the costs to replace the ranges starting in Year 4. Refrigerator replacements start in Years 1 and 16. The exhaust fans are to be replaced starting in Year 6.	<p>The refrigerators are to be replaced with comparable Energy Star rated units, which significantly reduce energy consumption. This green opportunity, shown in EWCM 9 also slightly increases the space heating requirement, since the proposed refrigerators have a lower standby heat loss from the more efficient refrigerator motors.</p> <p>Replacing the existing cabinets with comparable FSC-certified wood cabinets will reduce the existence of formaldehyde gases (from adhesives used with laminated particleboard products), and as well provide a product that has a longer useful life. This proposed opportunity was shown as being cost-effective. (See GM 4).</p>



## Narrative

		<p>Stone countertops were considered as the green alternative to the existing countertops, primarily because of a longer useful life. However, despite the longer useful life, this opportunity was not shown to be cost-effective. (See GM 5).</p>
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## Unit Mechanical and Electrical

Existing conditions	Capital needs	Green alternative
<p>Hydronic baseboard sections are used throughout the apartments, each controlled by a wall-mounted thermostat (one per apartment). Each apartment has an electric-heated DHW tank.</p> <p>Additionally, each apartment has its own circuit breaker panel and there is a hardwired smoke detector in the living area of the apartments.</p>	<p>The plan includes the costs to start replacing the DHW tanks starting in Years 5 and 17, and baseboard sections starting in Year 6. The existing thermostats are to be replaced in the 11.</p> <p>Also, smoke detectors are to be added to all bedrooms and existing apartment smoke detectors replaced in Year 1. Future replacement of all apartment smoke detectors is shown in Year 11.</p>	<p>The green plan includes the cost to upgrade each apartment with a programmable thermostat to govern hydronic baseboard heat. These thermostats, when properly used can control space temperatures to match occupant's preference, including a night setback and time-of-day use.</p> <p>(See EWCM 10).</p>

## 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. No areas or components containing LPBs or ACMs were identified or reported.

#### *Other Health and Safety Issues:*

- Domestic hot water temperatures were recorded at 120°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 (Common Areas and Apartments):*

This building has mechanically supplied fresh air at some of the common areas. The entire building has operable windows to provide fresh air. There is a series of rooftop exhaust fans used to remove stale air from bathrooms and the community kitchen. The exhaust fans appear to be in continuous operation.

## Narrative

### *Temperature, Humidity, Carbon Dioxide (CO<sub>2</sub>)*

Space temperature and humidity are the key components for comfort level. Temperature and relative humidity was measured in two apartments. The temperature of the conditioned spaces averaged 72°F db, and the humidity average 22% rH.

Carbon dioxide levels were measured during the inspection, and are included in Table B below. Carbon Monoxide was also tested during the inspection and is included in Table C below.

### *Mold and airborne concerns:*

No suspected mold was observed on the interior of the apartments, nor in any common spaces at the property.

### *Reporting:*

The tables below describe actual conditions versus design specifications for flow rate and carbon dioxide. The “Notes” column describes a possible reason for a discrepancy between these values where applicable.

Table A. Flow Rate:

Conditioned Space	Actual Read	Design Specification	Notes
Hallways / Stairwells	Not measured		N/A No mechanical ventilation
Community Room	Not measured		Served by common AHUs
Apartments	Not measured		N/A No mechanical ventilation

## Narrative

Table B. Carbon Dioxide:

Space	Actual Read	Design Specification	Notes
Apartment G0-03	806 ppm	< 1,000 ppm	Conditioned space
Apartment 103	787 ppm	< 1,000 ppm	Conditioned space

Table C. Carbon Monoxide:

Conditioned Space	Actual Read	Design Specification	Notes
Central Mechanical Room	0 ppm	≈0 ppm	Unconditioned space
Community Room	0 ppm	≈0 ppm	Conditioned space
Office			Carbon Monoxide level was not measured.

## 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 \$1,509,421 in current dollars (\$29,596/unit), or \$2,060,019 (\$40,393/unit) in inflated dollars.

Two approaches to funding the property's physical needs through replacement reserves are presented in the Replacement Reserve Analysis section of the report, with accompanying graphics.

**Plan #1** presents current capital funding circumstances. The development is estimated to have a replacement reserve balance of \$185,930 on December 31, 2013. Annual contributions are currently \$27,031 per year, or \$530 per unit. From OSI's experience, this is seen as an inadequate funding level for a property of this age and complexity. For planning purposes here, these contributions are shown being indexed at 3% for inflation going forward. Under this scenario, the property's needs exceed reserves starting in Year 8.

**Plan #2**, as one alternative, is aimed at fully meeting projected needs through Year 20. It starts with the same annual funding assumptions outlined above. The plan calls for an infusion of \$800,000 in Year 1. Contributions are then indexed at 3%. This is one hypothetical option, and is included for illustrative purposes only. No assumptions are made about its viability; various alternatives might achieve similar results.

## 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 \$1,685,341 in current dollars (\$33,066/unit), or \$2,289,143 (\$44,885/unit) in inflated dollars.

Two approaches to funding the property's physical needs through replacement reserves are presented in the Replacement Reserve Analysis section of the report, with accompanying graphics.

**Plan #1** presents current capital funding circumstances. The development is estimated to have a replacement reserve balance of \$185,930 on December 31, 2013. Annual contributions are currently \$27,031 per year, or \$530 per unit. From OSI's experience, this is seen as an inadequate funding level for a property of this age and complexity. For planning purposes here, these contributions are shown being indexed at 3% for inflation going forward. Under this scenario, the property's needs exceed reserves starting in Year 8.

**Plan #2**, as one alternative, is aimed at fully meeting projected needs through Year 20. It starts with the same annual funding assumptions outlined above. The plan calls for an infusion of \$1,000,000 in Year 1. Contributions are then indexed at 3%. This is one hypothetical option, and is included for illustrative purposes only. No assumptions are made about its viability; various alternatives might achieve similar results.

## Narrative

### Additional Notes:

1. The Physical Assessment of the property was conducted on March 14<sup>th</sup>, 2013. Members of the site 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. Mr. Jackson 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 site includes this gazebo.



The driveway is asphalt-paved. In the rear is the dumpster enclosure.



This is one of the asphalt-paved walkways; note the cracks along the right side.



A view of the main entrance.





A view of the rear elevation.



This is the set of exterior stairs that lead to the dining room.



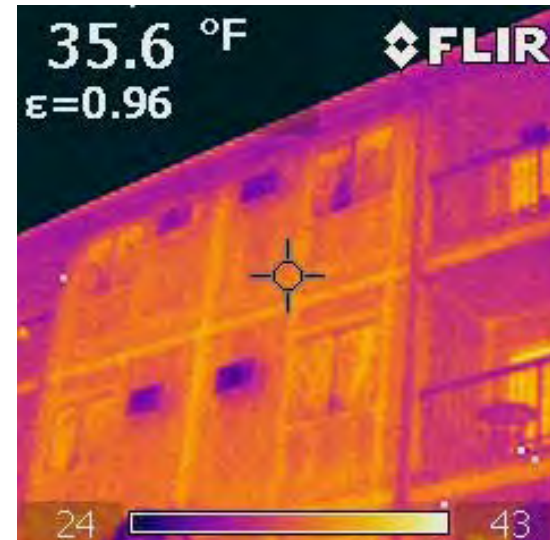
Most of the siding is synthetic stucco.  
The arrow is pointing to a damaged section.



The wood trim along the roof line  
needs to be repainted.



Isolated trim sections have been damaged by woodpeckers.



An infra-red image of the buildings elevation. Lighter colors indicate warmer surfaces. The dark purple sections on the walls are the insulated air conditioner covers, indicating how they are preventing heat loss.



One of the common hallways, with T8 fluorescent lighting in ceiling, and LED wall sconces.



This is one of the occupancy sensors.





This is the chapel, located on the third floor.



This roof deck is covered with a rubber membrane.



The reading room is also located on the third floor.



This community space is part of the dining room located on the main floor.



A view of the commercial kitchen.



This is the larger of the two laundry rooms.



The garage contains the various maintenance and landscaping equipment.



An infra-red image showing heat loss through a sliding glass door (left) and the garage door seams (right).

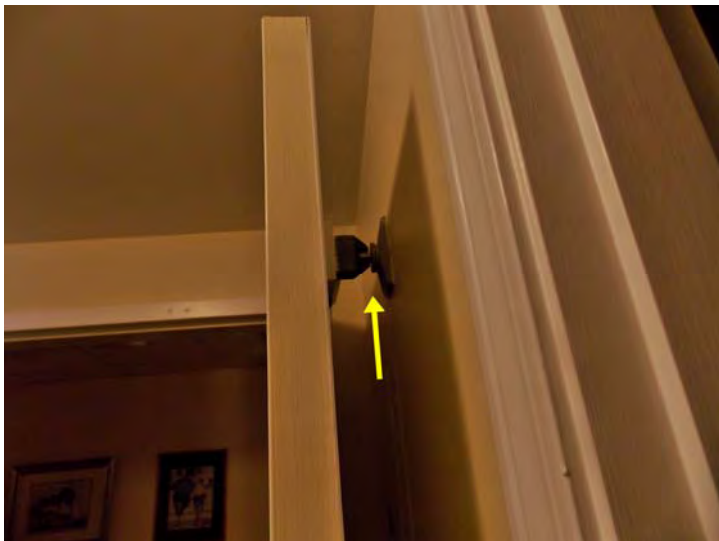




Each apartment has hydronic baseboard heat and a through-wall air conditioner sleeve. (Resident-owned air conditioner).



Balconies have a concrete deck and metal rails.



Unit doors have door holders. Since this is a congregate housing development, the unit doors will unlock during an alarm condition.



Kitchens have 20-inch electric ranges, laminated particleboard cabinets and countertops and the same flooring type as the adjacent living area; in this unit the floor covering is carpeting.



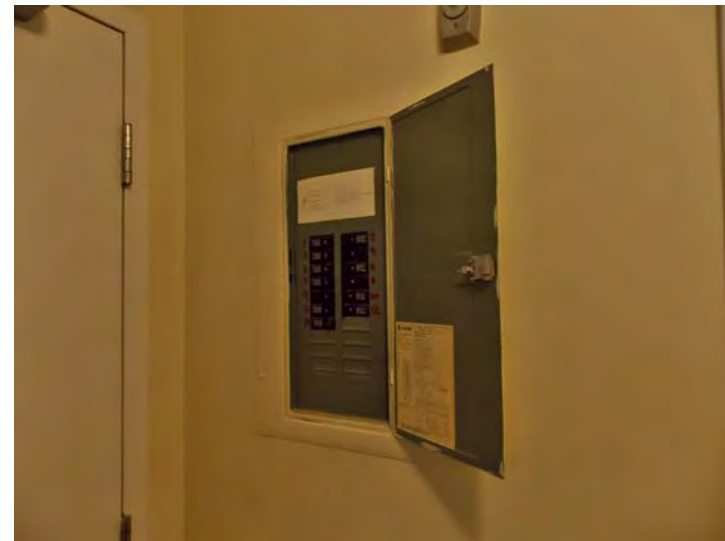
Bathrooms have wall-hung sinks and VCT flooring.



Bathtubs have an anti-scald mixing valve (arrow).



Each unit has an electric-heated DHW tank.



This is a typical circuit breaker panel in an apartment.



This is the boiler plant that produces the hydronic heat.



This dedicated DHW boiler (right) and storage tank (left) serve the common areas. The arrow is pointing to a DHW circulating pump.



Fresh air for combustion in the boiler room is provided through this louvered opening.



One of the hydronic circulating pumps.





This is one of 2 air handlers, both which serve the common areas.



The controller for one of the air handlers.



The air handlers have cooling coils from split DX air conditioning systems. The arrows point to the air-cooled condensers.



The fire sprinkler system has a backflow preventer, to keep stagnant sprinkler water from flowing back into the potable water.





The central fire alarm control panel; it governs the common area detection and alarm devices.



Emergency power is provided by this 100 kW generator.

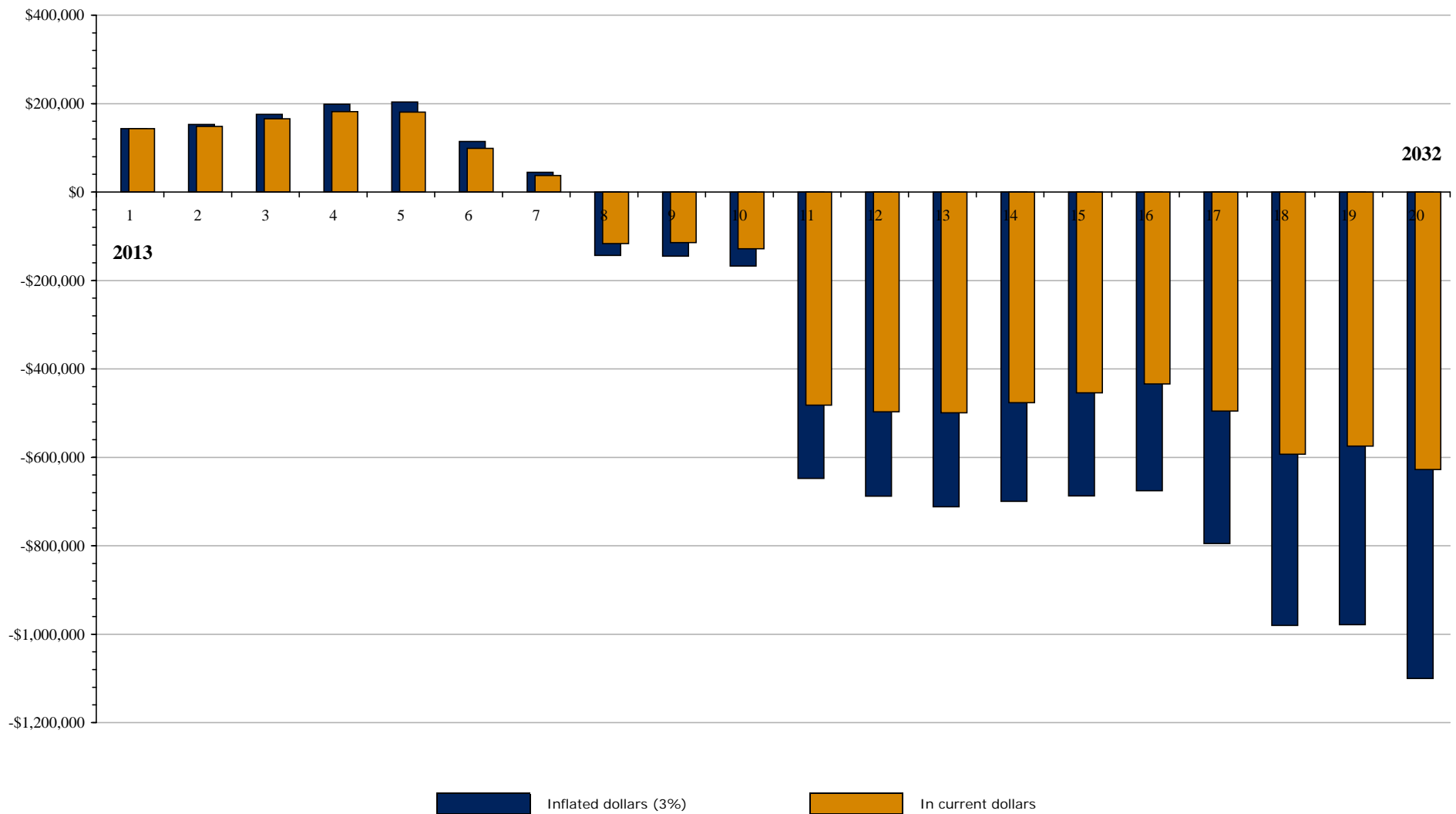


At the main entrance are the intercom panel (left) and the fire alarm annunciator panel (right).



A view of the elevator hydraulic pump station.

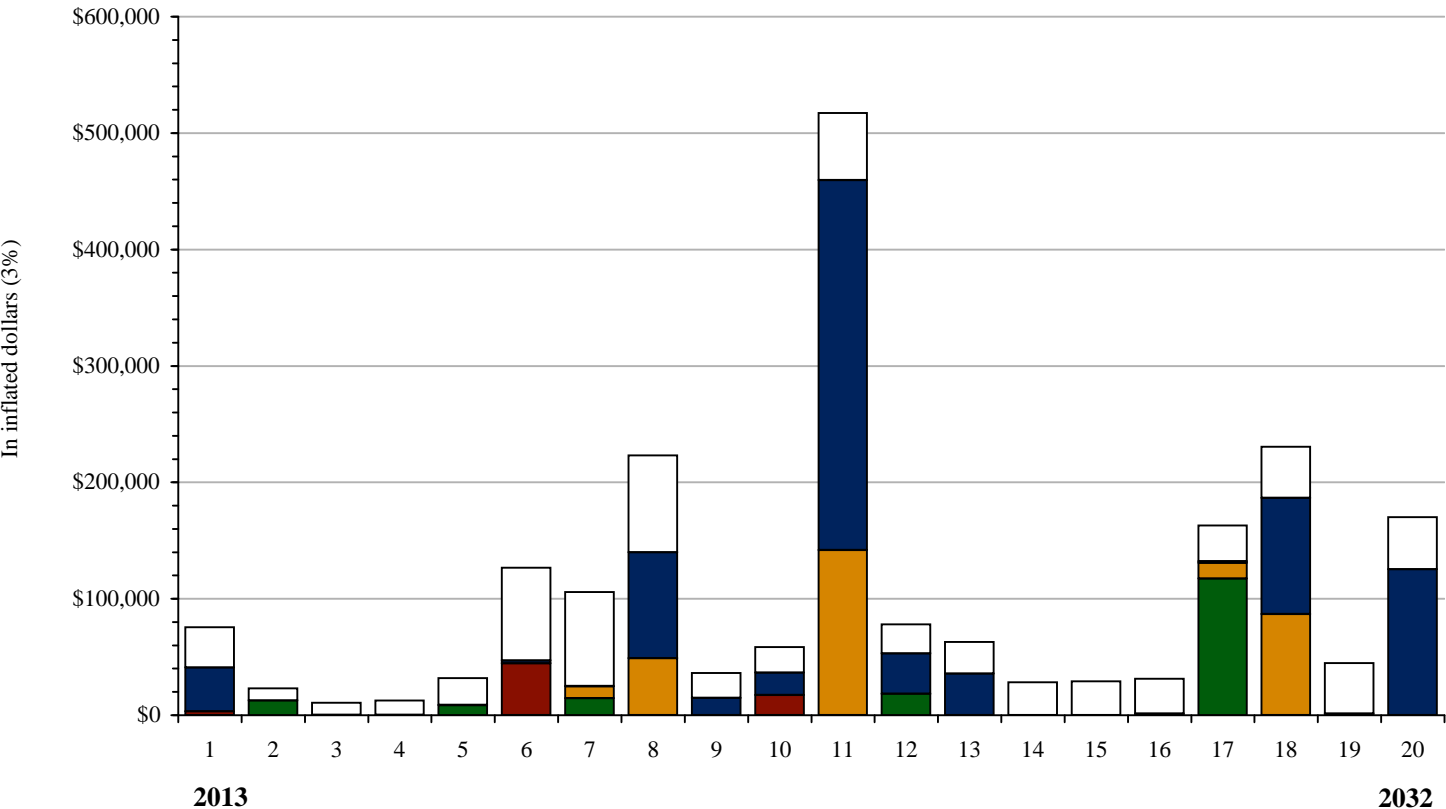
## Replacement Reserve (RR) Analysis: *Plan One - Conventional*



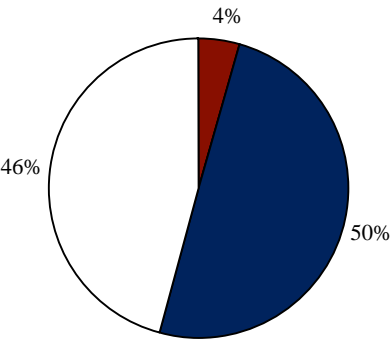
Current Replacement Reserve Balance: **\$185,930**  
 Adjusted Replacement Reserve Balance: **\$185,930**  
 Current annual contributions to reserve accounts: **\$27,031**

At the end of Year One, Reserve Balances are projected to be: **\$143,315**  
 At the end of Year 20, Reserve Balances are projected to be: **(\$1,100,289)**  
 Unmet needs projected in most years of the plan

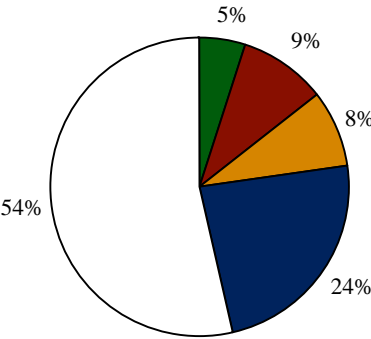
Capital Needs Summary - Conventional



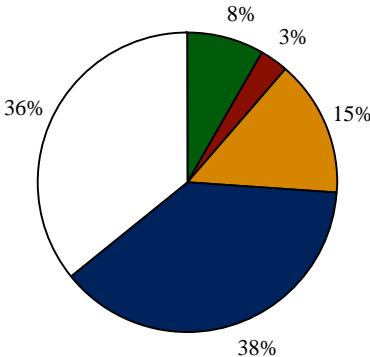
St. Jude Common



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		\$35,529 or \$697/unit	\$171,106 or \$3,355/unit
Mechanical Room	\$3,350 or \$66/unit	\$65,349 or \$1,281/unit	\$65,349 or \$1,281/unit
Building Mech. & Elec.		\$59,068 or \$1,158/unit	\$301,374 or \$5,909/unit
Building Architectural	\$37,643 or \$738/unit	\$166,150 or \$3,258/unit	\$783,441 or \$15,362/unit
Dwelling Units	\$34,636 or \$679/unit	\$378,476 or \$7,421/unit	\$738,749 or \$14,485/unit
In inflated dollars:	\$75,629 or \$1,483/unit	\$704,570 or \$13,815/unit	\$2,060,019 or \$40,393/unit
In current dollars:	\$75,629 or \$1,483/unit	\$600,998 or \$11,784/unit	\$1,509,421 or \$29,596/unit

# Capital Needs Summary - *Conventional*

OSI Ref: **13177**  
 Property Age: **24 Years**  
 Financing: **CHFA**

Residential Buildings: **1**  
 Total Number of Units: **51**  
 Occupancy: **Elderly**

	2013 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
<b>Site Systems &amp; Accessibility</b>										
Surface	\$0	\$12,545	\$0	\$0	\$8,441	\$0	\$14,543	\$0	\$0	\$0
Accessibility	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Site Sub-Total	<b>\$0</b>	<b>\$12,545</b>	<b>\$0</b>	<b>\$0</b>	<b>\$8,441</b>	<b>\$0</b>	<b>\$14,543</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>Mechanical Room</b>										
Boilers	\$3,350	\$0	\$0	\$0	\$0	\$44,632	\$0	\$0	\$0	\$0
Boiler Room Systems	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$17,367
Mechanical Sub-Total	<b>\$3,350</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$44,632</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$17,367</b>
<b>Building Mech. &amp; Electrical</b>										
Mechanical	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$48,918	\$0	\$0
Electrical	\$0	\$0	\$0	\$0	\$0	\$0	\$10,149	\$0	\$0	\$0
Elevators	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Mechanical & Electrical Sub-Total	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$10,149</b>	<b>\$48,918</b>	<b>\$0</b>	<b>\$0</b>
<b>Building Architectural</b>										
Structural and Exterior	\$26,523	\$222	\$229	\$236	\$243	\$900	\$258	\$266	\$274	\$4,000
Roof Systems	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Halls, Stairs, Lobbies	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$14,065	\$14,487	\$14,921
Community Spaces	\$11,120	\$0	\$0	\$0	\$0	\$1,426	\$0	\$76,574	\$200	\$206
Building Architectural Sub-Total	<b>\$37,643</b>	<b>\$222</b>	<b>\$229</b>	<b>\$236</b>	<b>\$243</b>	<b>\$2,326</b>	<b>\$258</b>	<b>\$90,905</b>	<b>\$14,960</b>	<b>\$19,128</b>
<b>Dwelling Units</b>										
Living Areas	\$6,346	\$6,537	\$6,733	\$6,935	\$7,143	\$7,357	\$6,315	\$6,504	\$6,699	\$6,900
Bathrooms	\$1,277	\$1,315	\$1,354	\$1,395	\$7,751	\$11,021	\$11,351	\$11,692	\$3,213	\$3,310
Kitchens	\$2,278	\$2,346	\$2,417	\$4,128	\$4,252	\$55,324	\$56,984	\$58,693	\$4,786	\$4,929
Mechanical & Electrical	\$24,735	\$0	\$0	\$0	\$4,066	\$6,101	\$6,284	\$6,472	\$6,666	\$6,866
Dwelling Units Sub-Total	<b>\$34,636</b>	<b>\$10,198</b>	<b>\$10,504</b>	<b>\$12,458</b>	<b>\$23,212</b>	<b>\$79,802</b>	<b>\$80,934</b>	<b>\$83,362</b>	<b>\$21,365</b>	<b>\$22,006</b>
<b>Total Capital Costs</b>	<b>\$75,629</b>	<b>\$22,965</b>	<b>\$10,733</b>	<b>\$12,694</b>	<b>\$31,896</b>	<b>\$126,760</b>	<b>\$105,884</b>	<b>\$223,185</b>	<b>\$36,325</b>	<b>\$58,500</b>

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.

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	
\$0	\$18,312	\$0	\$0	\$0	\$0	\$117,265	\$0	\$0	\$0	<b>Site Systems &amp; Accessibility</b> Surface Accessibility
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
<b>\$0</b>	<b>\$18,312</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$117,265</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	Site Sub-Total
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	<b>Mechanical Room</b> Boilers Boiler Room Systems
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	Mechanical Sub-Total
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$14,256	\$0	\$0	<b>Building Mech. &amp; Electrical</b> Mechanical Electrical Elevators
\$62,761	\$0	\$0	\$0	\$0	\$0	\$13,640	\$72,560	\$0	\$0	
\$79,089	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
<b>\$141,850</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$13,640</b>	<b>\$86,816</b>	<b>\$0</b>	<b>\$0</b>	Mechanical & Electrical Sub-Total
\$253,649	\$0	\$0	\$0	\$0	\$1,315	\$1,354	\$1,395	\$1,436	\$1,480	<b>Building Architectural</b> Structural and Exterior Roof Systems Halls, Stairs, Lobbies Community Spaces
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$98,521	\$0	\$0	
\$15,369	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$20,053	
\$48,754	\$34,606	\$35,644	\$0	\$0	\$0	\$0	\$0	\$0	\$103,716	
<b>\$317,772</b>	<b>\$34,606</b>	<b>\$35,644</b>	<b>\$0</b>	<b>\$0</b>	<b>\$1,315</b>	<b>\$1,354</b>	<b>\$99,916</b>	<b>\$1,436</b>	<b>\$125,249</b>	Building Architectural Sub-Total
\$7,107	\$7,320	\$9,048	\$9,319	\$9,599	\$9,887	\$10,184	\$10,489	\$9,003	\$9,273	<b>Dwelling Units</b> Living Areas Bathrooms Kitchens Mechanical & Electrical
\$5,123	\$5,276	\$5,435	\$5,598	\$5,766	\$5,939	\$6,117	\$6,300	\$6,489	\$6,684	
\$5,077	\$5,230	\$5,387	\$5,548	\$5,715	\$5,886	\$6,063	\$18,472	\$19,026	\$19,597	
\$40,314	\$7,285	\$7,503	\$7,728	\$7,960	\$8,199	\$8,445	\$8,698	\$8,959	\$9,228	
<b>\$57,621</b>	<b>\$25,111</b>	<b>\$27,372</b>	<b>\$28,193</b>	<b>\$29,039</b>	<b>\$29,910</b>	<b>\$30,808</b>	<b>\$43,959</b>	<b>\$43,477</b>	<b>\$44,782</b>	Dwelling Units Sub-Total
<b>\$517,244</b>	<b>\$78,029</b>	<b>\$63,016</b>	<b>\$28,193</b>	<b>\$29,039</b>	<b>\$31,225</b>	<b>\$163,067</b>	<b>\$230,691</b>	<b>\$44,914</b>	<b>\$170,031</b>	<b>Total Capital Costs</b>

## Replacement Reserve (RR) Analysis: *Plan One - Conventional*

Reserve Funding In Year 1										
Starting Balance:		\$185,930 or \$3,646/unit				Replacement Reserve (RR) analysis starts here with the starting RR balance reported, or imputed, to have been on hand at the start of Year 1, and current annual RR contributions. The projections below reflect Starting RR Balance (Line A), plus the Total Annual RR Contributions (Line D) and Interest Earnings on RR (Line E), minus Total Annual Capital Costs (Line F), taken from the CNS above. This is expressed arithmetically as (A+D+E)-F=G, Year-End Balances, then carries forward to Line A of the following Year.				
Contributions to Reserves:		\$27,031 or \$530/unit								
	2013 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
<b>(A) Reserve Balances</b>										
Starting Replacement Reserves	\$185,930	\$143,315	\$152,909	\$175,871	\$198,433	\$203,370	\$114,517	\$44,830	(\$143,267)	(\$144,836)
<b>(B) Annual Funding</b>										
Contributions Indexed at 3%	\$530	\$546	\$562	\$579	\$597	\$614	\$633	\$652	\$671	\$692
<b>(C) Additional Unit Contributions</b>										
<b>(D) Total Annual Reserve Funding</b>	\$27,031	\$27,842	\$28,677	\$29,537	\$30,423	\$31,336	\$32,276	\$33,245	\$34,242	\$35,269
<b>(E) Interest on Reserves at 3%</b>	\$5,983	\$4,717	\$5,017	\$5,719	\$6,409	\$6,571	\$3,920	\$1,844	\$514	\$529
<b>Total Funds Available</b>	<b>\$218,944</b>	<b>\$175,874</b>	<b>\$186,604</b>	<b>\$211,127</b>	<b>\$235,266</b>	<b>\$241,277</b>	<b>\$150,713</b>	<b>\$79,918</b>	<b>(\$108,511)</b>	<b>(\$109,038)</b>
<b>(F) Total Capital Cost</b>	\$75,629	\$22,965	\$10,733	\$12,694	\$31,896	\$126,760	\$105,884	\$223,185	\$36,325	\$58,500
<b>(G) Reserve Balances</b>	<b>\$143,315</b>	<b>\$152,909</b>	<b>\$175,871</b>	<b>\$198,433</b>	<b>\$203,370</b>	<b>\$114,517</b>	<b>\$44,830</b>	<b>(\$143,267)</b>	<b>(\$144,836)</b>	<b>(\$167,538)</b>
Outside Capital:										
Adjusted Reserve Balances	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

### Notes:

1. Starting reserve balance is \$185,930.
2. Annual contribution is \$27,031.
3. Capital costs outpace reserves starting in Year 8.

\*ANNUAL RR CONTRIBUTIONS are shown being indexed for inflation at the % specified above except when Additional Contributions are called for.

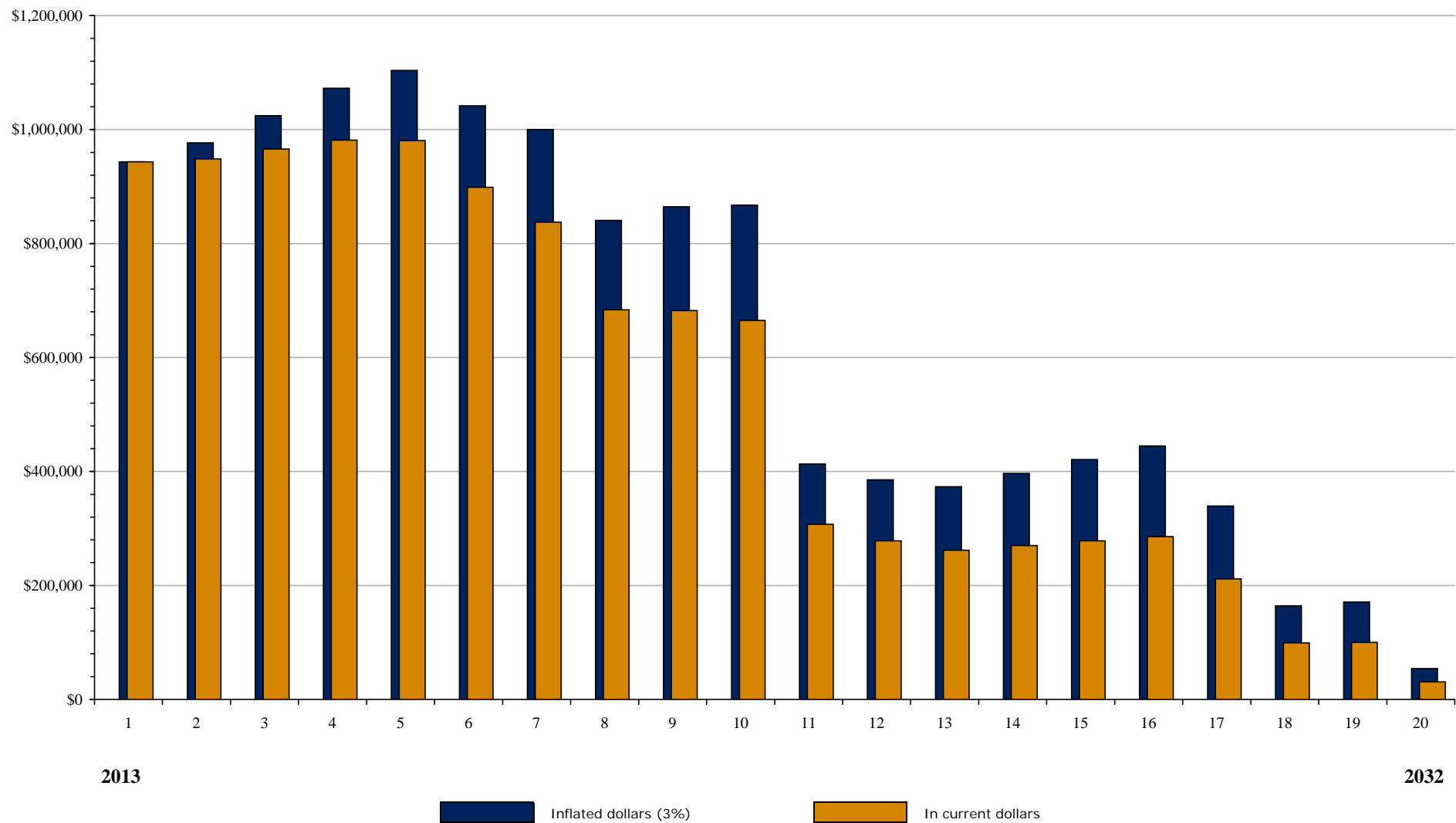
Line C, Additional Contributions allows for material adjustments in annual RR funding that would enable the property to meet all projected needs out of reserves through Year 20.

\*\*INTEREST EARNINGS ON RESERVES are calculated on 100% of starting balances and on 50% of the total annual contribution for the year at the rate shown

Replacement Reserve (RR) Analysis: *Plan One - Conventional*

Reserve Funding In Year 20										
Projected replacement reserve balance is <b>(\$1,100,289)</b>					This is (\$21,574)per unit in inflated dollars or (\$12,304) per unit in uninflated dollars					
Projected annual funding to reserves is <b>\$47,399</b>					This is \$929 per unit in inflated dollars or \$530 per unit in current dollars					
2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	
Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
										<b>Reserve Balances (A)</b>
(\$167,538)	(\$647,910)	(\$687,961)	(\$711,859)	(\$699,762)	(\$687,301)	(\$675,781)	(\$794,821)	(\$980,163)	(\$978,368)	Starting Replacement Reserves
										<b>Annual Funding (B)</b>
\$712	\$734	\$756	\$778	\$802	\$826	\$851	\$876	\$902	\$929	Contributions Indexed at 3%
										Additional Unit Contributions <b>(C)</b>
\$36,327	\$37,417	\$38,540	\$39,696	\$40,887	\$42,113	\$43,377	\$44,678	\$46,018	\$47,399	Total Annual Reserve Funding <b>(D)</b>
\$545	\$561	\$578	\$595	\$613	\$632	\$651	\$670	\$690	\$711	Interest on Reserves at 3% <b>(E)</b>
<b>(\$130,666)</b>	<b>(\$609,932)</b>	<b>(\$648,843)</b>	<b>(\$671,568)</b>	<b>(\$658,262)</b>	<b>(\$644,556)</b>	<b>(\$631,754)</b>	<b>(\$749,472)</b>	<b>(\$933,455)</b>	<b>(\$930,259)</b>	<b>Total Funds Available</b>
\$517,244	\$78,029	\$63,016	\$28,193	\$29,039	\$31,225	\$163,067	\$230,691	\$44,914	\$170,031	Total Capital Cost <b>(F)</b>
<b>(\$647,910)</b>	<b>(\$687,961)</b>	<b>(\$711,859)</b>	<b>(\$699,762)</b>	<b>(\$687,301)</b>	<b>(\$675,781)</b>	<b>(\$794,821)</b>	<b>(\$980,163)</b>	<b>(\$978,368)</b>	<b>(\$1,100,289)</b>	<b>Reserve Balances (G)</b>
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	

Replacement Reserve (RR) Analysis: *Plan Two - Conventional*



2013

2032

Current Replacement Reserve Balance: **\$185,930**  
Adjusted Replacement Reserve Balance: **\$185,930**  
Current annual contributions to reserve accounts: **\$27,031**

At the end of Year One, Reserve Balances are projected to be: **\$943,315**  
At the end of Year 20, Reserve Balances are projected to be: **\$54,031**  
All projected capital needs are met throughout the plan



## Replacement Reserve (RR) Analysis: *Plan Two - Conventional*

<div> <div>Reserve Funding In Year 1</div> <div>                     Replacement Reserve (RR) analysis starts here with the starting RR balance reported, or imputed, to have been on hand at the start of Year 1, and current annual RR contributions. The projections below reflect Starting RR Balance (Line A), plus the Total Annual RR Contributions (Line D) and Interest Earnings on RR (Line E), minus Total Annual Capital Costs (Line F), taken from the CNS above. This is expressed arithmetically as (A+D+E)-F=G, Year-End Balances, then carries forward to Line A of the following Year.                 </div> </div>										
		Starting Balance: <b>\$185,930</b> or \$3,646/unit Contributions to Reserves: <b>\$27,031</b> or \$530/unit								
	2013 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
<b>(A) Reserve Balances</b>										
Starting Replacement Reserves	\$185,930	\$943,315	\$976,909	\$1,024,591	\$1,072,615	\$1,103,777	\$1,041,937	\$1,000,071	\$840,632	\$864,282
<b>(B) Annual Funding</b>										
Contributions Indexed at 3%	\$530	\$546	\$562	\$579	\$597	\$614	\$633	\$652	\$671	\$692
<b>(C) Additional Unit Contributions</b>										
<b>(D) Total Annual Reserve Funding</b>	\$27,031	\$27,842	\$28,677	\$29,537	\$30,423	\$31,336	\$32,276	\$33,245	\$34,242	\$35,269
<b>(E) Interest on Reserves at 3%</b>	\$5,983	\$28,717	\$29,737	\$31,181	\$32,635	\$33,583	\$31,742	\$30,501	\$25,733	\$26,457
<b>Total Funds Available</b>	<b>\$218,944</b>	<b>\$999,874</b>	<b>\$1,035,324</b>	<b>\$1,085,309</b>	<b>\$1,135,673</b>	<b>\$1,168,697</b>	<b>\$1,105,955</b>	<b>\$1,063,817</b>	<b>\$900,607</b>	<b>\$926,008</b>
<b>(F) Total Capital Cost</b>	\$75,629	\$22,965	\$10,733	\$12,694	\$31,896	\$126,760	\$105,884	\$223,185	\$36,325	\$58,500
<b>(G) Reserve Balances</b>	<b>\$143,315</b>	<b>\$976,909</b>	<b>\$1,024,591</b>	<b>\$1,072,615</b>	<b>\$1,103,777</b>	<b>\$1,041,937</b>	<b>\$1,000,071</b>	<b>\$840,632</b>	<b>\$864,282</b>	<b>\$867,508</b>
Outside Capital:	<b>\$800,000</b>									
Adjusted Reserve Balances	\$943,315	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

### Notes:

1. Same starting reserve balance and annual contribution as shown in Plan 1.
2. An infusion of \$800K is shown in Year 1.
3. Plan is fully funded.

\*ANNUAL RR CONTRIBUTIONS are shown being indexed for inflation at the % specified above except when Additional Contributions are called for.

Line C, Additional Contributions allows for material adjustments in annual RR funding that would enable the property to meet all projected needs out of reserves through Year 20.

\*\*INTEREST EARNINGS ON RESERVES are calculated on 100% of starting balances and on 50% of the total annual contribution for the year at the rate shown

## Replacement Reserve (RR) Analysis: *Plan Two - Conventional*

Reserve Funding In Year 20									
Projected replacement reserve balance is <b>\$54,031</b>					This is \$1,059 per unit in inflated dollars or \$604 per unit in uninflated dollars				
Projected annual funding to reserves is <b>\$47,399</b>					This is \$929 per unit in inflated dollars or \$530 per unit in current dollars				
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
\$867,508	\$413,162	\$385,506	\$373,172	\$396,465	\$420,820	\$444,965	\$339,274	\$164,110	\$170,828
\$712	\$734	\$756	\$778	\$802	\$826	\$851	\$876	\$902	\$929
\$36,327	\$37,417	\$38,540	\$39,696	\$40,887	\$42,113	\$43,377	\$44,678	\$46,018	\$47,399
\$26,570	\$12,956	\$12,143	\$11,791	\$12,507	\$13,256	\$14,000	\$10,848	\$5,614	\$5,836
<b>\$930,406</b>	<b>\$463,535</b>	<b>\$436,189</b>	<b>\$424,659</b>	<b>\$449,859</b>	<b>\$476,189</b>	<b>\$502,341</b>	<b>\$394,800</b>	<b>\$215,741</b>	<b>\$224,062</b>
\$517,244	\$78,029	\$63,016	\$28,193	\$29,039	\$31,225	\$163,067	\$230,691	\$44,914	\$170,031
<b>\$413,162</b>	<b>\$385,506</b>	<b>\$373,172</b>	<b>\$396,465</b>	<b>\$420,820</b>	<b>\$444,965</b>	<b>\$339,274</b>	<b>\$164,110</b>	<b>\$170,828</b>	<b>\$54,031</b>
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

**Reserve Balances (A)**  
Starting Replacement Reserves

**Annual Funding (B)**  
Contributions Indexed at 3%

**(C)**  
Additional Unit Contributions

**(D)**  
Total Annual Reserve Funding

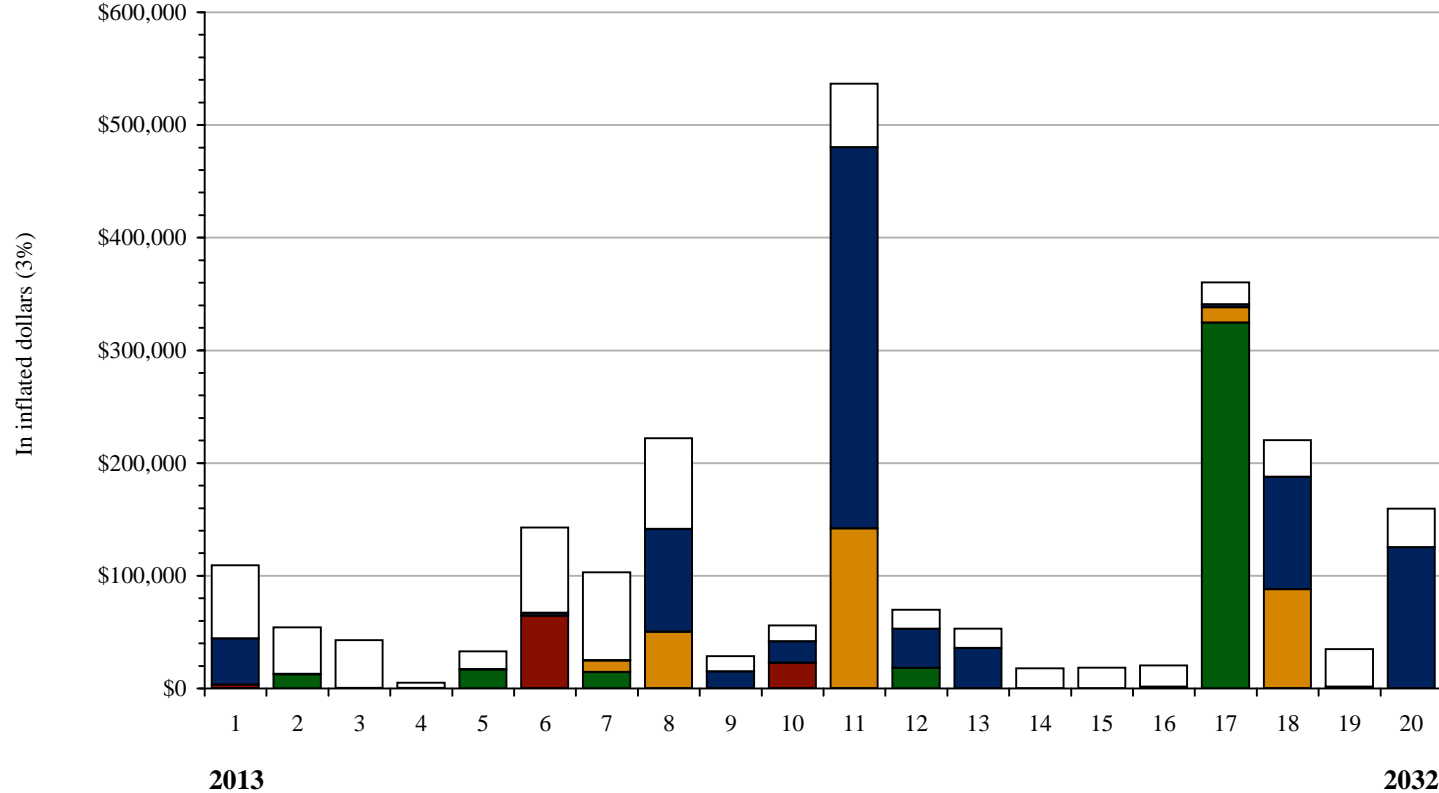
**(E)**  
Interest on Reserves at 3%

**Total Funds Available**

**(F)**  
Total Capital Cost

**Reserve Balances (G)**

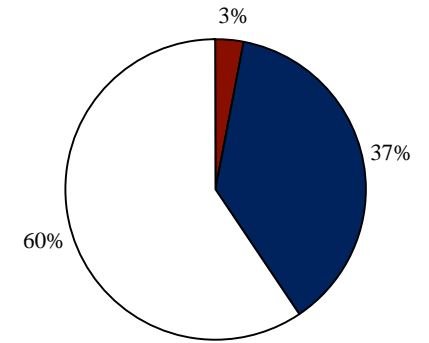
## Capital Needs Summary - *Green*



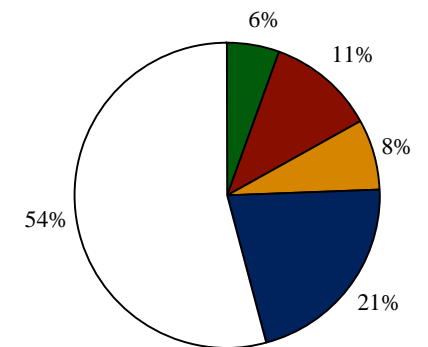
### Total Costs by Building System (inflated dollars)

	Year 1	Years 1-10	Years 1-20
Site Systems & Accessibility		\$43,970 or \$862/unit	\$386,861 or \$7,586/unit
Mechanical Room	\$3,425 or \$67/unit	\$90,545 or \$1,775/unit	\$90,545 or \$1,775/unit
Building Mech. & Elec.		\$60,394 or \$1,184/unit	\$303,769 or \$5,956/unit
Building Architectural	\$40,977 or \$803/unit	\$169,974 or \$3,333/unit	\$809,105 or \$15,865/unit
Dwelling Units	\$65,059 or \$1,276/unit	\$432,981 or \$8,490/unit	\$698,864 or \$13,703/unit
In inflated dollars:	\$109,461 or \$2,146/unit	\$797,863 or \$15,644/unit	<b>\$2,289,143 or \$44,885/unit</b>
In current dollars:	\$109,461 or \$2,146/unit	\$692,626 or \$13,581/unit	\$1,686,341 or \$33,066/unit

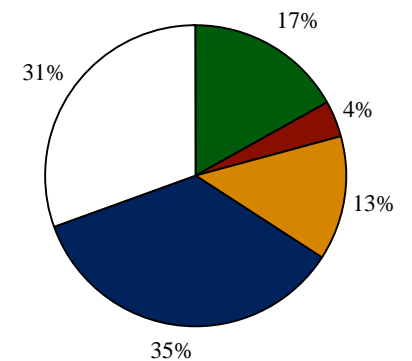
## St. Jude Common



### Year One Distribution



### Ten Year Distribution



### Twenty Year Distribution

## Capital Needs Summary - Green

OSI Ref: **13177**  
 Property Age: **24 Years**  
 Financing: **CHFA**

Residential Buildings: **1**  
 Total Number of Units: **51**  
 Occupancy: **Elderly**

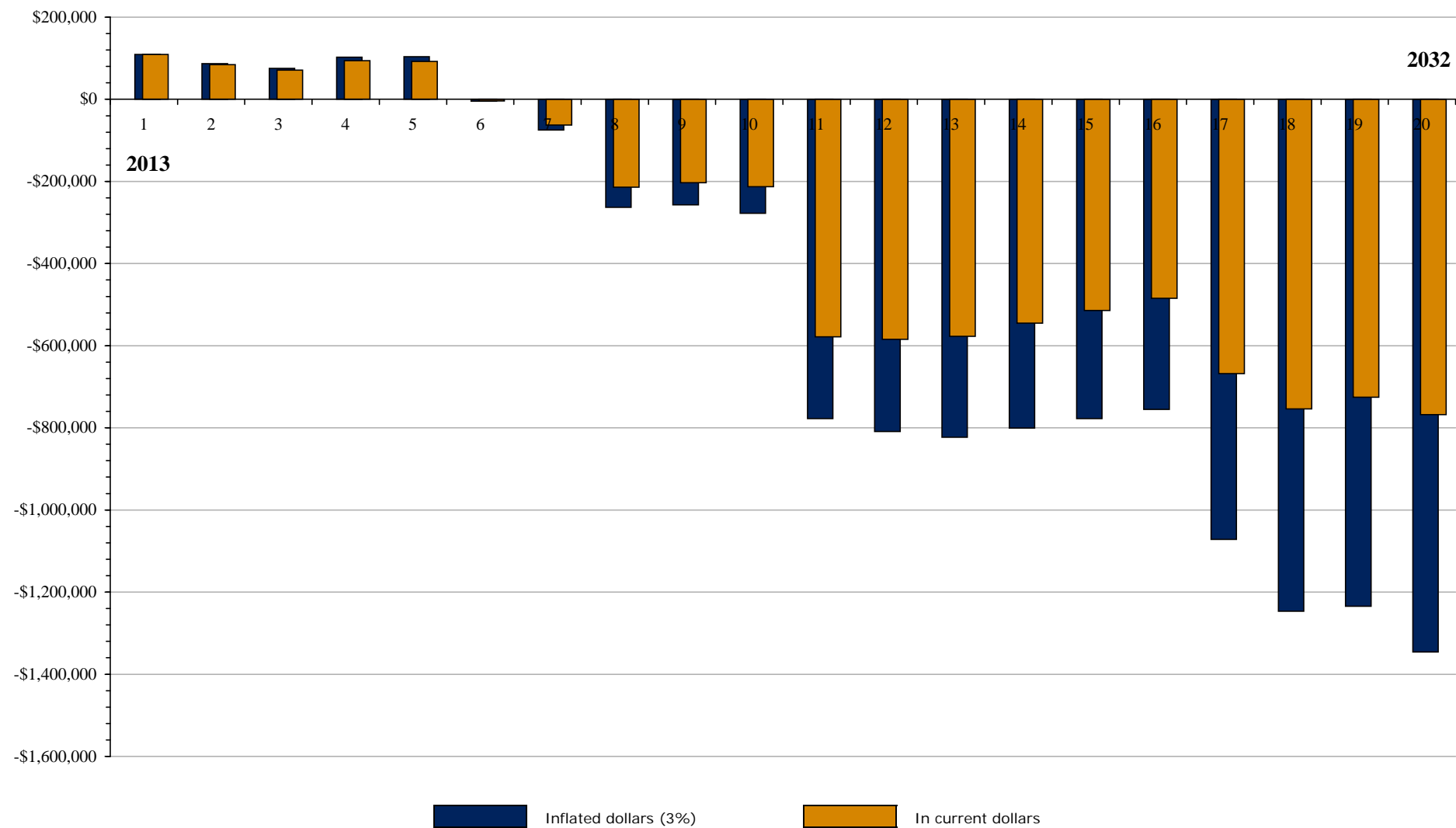
	2013 Year 1	2014 Year 2	2015 Year 3	2016 Year 4	2017 Year 5	2018 Year 6	2019 Year 7	2020 Year 8	2021 Year 9	2022 Year 10
<b>Site Systems &amp; Accessibility</b>										
Surface	\$0	\$12,545	\$0	\$0	\$16,883	\$0	\$14,543	\$0	\$0	\$0
Accessibility	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Site Sub-Total	<b>\$0</b>	<b>\$12,545</b>	<b>\$0</b>	<b>\$0</b>	<b>\$16,883</b>	<b>\$0</b>	<b>\$14,543</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>Mechanical Room</b>										
Boilers	\$3,425	\$0	\$0	\$0	\$0	\$64,456	\$0	\$0	\$0	\$0
Boiler Room Systems	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$22,664
Mechanical Sub-Total	<b>\$3,425</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$64,456</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$22,664</b>
<b>Building Mech. &amp; Electrical</b>										
Mechanical	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$50,244	\$0	\$0
Electrical	\$0	\$0	\$0	\$0	\$0	\$0	\$10,149	\$0	\$0	\$0
Elevators	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Mechanical & Electrical Sub-Total	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$10,149</b>	<b>\$50,244</b>	<b>\$0</b>	<b>\$0</b>
<b>Building Architectural</b>										
Structural and Exterior	\$26,523	\$222	\$229	\$236	\$243	\$900	\$258	\$266	\$274	\$4,000
Roof Systems	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Halls, Stairs, Lobbies	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$14,065	\$14,487	\$14,921
Community Spaces	\$14,454	\$0	\$0	\$0	\$0	\$1,533	\$0	\$76,957	\$200	\$206
Building Architectural Sub-Total	<b>\$40,977</b>	<b>\$222</b>	<b>\$229</b>	<b>\$236</b>	<b>\$243</b>	<b>\$2,432</b>	<b>\$258</b>	<b>\$91,288</b>	<b>\$14,960</b>	<b>\$19,128</b>
<b>Dwelling Units</b>										
Living Areas	\$32,965	\$33,954	\$34,972	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathrooms	\$4,910	\$5,058	\$5,209	\$513	\$7,316	\$10,691	\$11,011	\$11,342	\$2,190	\$2,256
Kitchens	\$2,449	\$2,522	\$2,598	\$4,315	\$4,444	\$59,180	\$60,956	\$62,784	\$5,002	\$5,152
Mechanical & Electrical	\$24,735	\$0	\$0	\$0	\$4,066	\$6,101	\$6,284	\$6,472	\$6,666	\$6,866
Dwelling Units Sub-Total	<b>\$65,059</b>	<b>\$41,534</b>	<b>\$42,780</b>	<b>\$4,828</b>	<b>\$15,826</b>	<b>\$75,972</b>	<b>\$78,251</b>	<b>\$80,598</b>	<b>\$13,859</b>	<b>\$14,275</b>
<b>Total Capital Costs</b>	<b>\$109,461</b>	<b>\$54,301</b>	<b>\$43,009</b>	<b>\$5,064</b>	<b>\$32,952</b>	<b>\$142,860</b>	<b>\$103,201</b>	<b>\$222,130</b>	<b>\$28,819</b>	<b>\$56,067</b>

# St. Jude Common

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.

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	
\$0	\$18,312	\$0	\$0	\$0	\$0	\$324,578	\$0	\$0	\$0	<b>Site Systems &amp; Accessibility</b> Surface Accessibility
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
<b>\$0</b>	<b>\$18,312</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$324,578</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	Site Sub-Total
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	<b>Mechanical Room</b> Boilers Boiler Room Systems
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	Mechanical Sub-Total
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$15,325	\$0	\$0	<b>Building Mech. &amp; Electrical</b> Mechanical Electrical Elevators
\$62,761	\$0	\$0	\$0	\$0	\$0	\$13,640	\$72,560	\$0	\$0	
\$79,089	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
<b>\$141,850</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$13,640</b>	<b>\$87,885</b>	<b>\$0</b>	<b>\$0</b>	Mechanical & Electrical Sub-Total
\$269,804	\$0	\$0	\$0	\$0	\$1,315	\$2,558	\$1,395	\$1,436	\$1,480	<b>Building Architectural</b> Structural and Exterior Roof Systems Halls, Stairs, Lobbies Community Spaces
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$98,521	\$0	\$0	
\$15,369	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$20,053	
\$53,235	\$34,606	\$35,644	\$0	\$0	\$0	\$0	\$0	\$0	\$103,716	
<b>\$338,408</b>	<b>\$34,606</b>	<b>\$35,644</b>	<b>\$0</b>	<b>\$0</b>	<b>\$1,315</b>	<b>\$2,558</b>	<b>\$99,916</b>	<b>\$1,436</b>	<b>\$125,249</b>	Building Architectural Sub-Total
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	<b>Dwelling Units</b> Living Areas Bathrooms Kitchens Mechanical & Electrical
\$4,037	\$4,159	\$4,283	\$4,412	\$4,544	\$4,680	\$4,821	\$4,965	\$5,114	\$5,268	
\$5,307	\$5,466	\$5,630	\$5,799	\$5,973	\$6,152	\$6,337	\$18,754	\$19,317	\$19,896	
\$46,962	\$7,285	\$7,503	\$7,728	\$7,960	\$8,199	\$8,445	\$8,698	\$8,959	\$9,228	
<b>\$56,307</b>	<b>\$16,909</b>	<b>\$17,416</b>	<b>\$17,939</b>	<b>\$18,477</b>	<b>\$19,031</b>	<b>\$19,602</b>	<b>\$32,418</b>	<b>\$33,390</b>	<b>\$34,392</b>	
										Dwelling Units Sub-Total
<b>\$536,565</b>	<b>\$69,827</b>	<b>\$53,060</b>	<b>\$17,939</b>	<b>\$18,477</b>	<b>\$20,346</b>	<b>\$360,378</b>	<b>\$220,218</b>	<b>\$34,827</b>	<b>\$159,641</b>	<b>Total Capital Costs</b>

Replacement Reserve (RR) Analysis: *Plan One - Green*



Current Replacement Reserve Balance: **\$185,930**

Adjusted Replacement Reserve Balance: **\$185,930**

Current annual contributions to reserve accounts: **\$27,031**

At the end of Year One, Reserve Balances are projected to be: **\$109,483**

At the end of Year 20, Reserve Balances are projected to be: **(\$1,346,075)**

Unmet needs projected in most years of the plan

## Replacement Reserve (RR) Analysis: *Plan One - Green*

Reserve Funding In Year 1										
Starting Balance:		\$185,930 or \$3,646/unit		Replacement Reserve (RR) analysis starts here with the starting RR balance reported, or imputed, to have been on hand at the start of Year 1, and current annual RR contributions. The projections below reflect Starting RR Balance (Line A), plus the Total Annual RR Contributions (Line D) and Interest Earnings on RR (Line E), minus Total Annual Capital Costs (Line F), taken from the CNS above. This is expressed arithmetically as (A+D+E)-F=G, Year-End Balances, then carries forward to Line A of the following Year.						
Contributions to Reserves:		\$27,031 or \$530/unit								
	2013 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
<b>(A) Reserve Balances</b>										
Starting Replacement Reserves	\$185,930	\$109,483	\$86,726	\$75,427	\$102,606	\$103,612	(\$4,333)	(\$74,774)	(\$263,161)	(\$257,224)
<b>(B) Annual Funding</b>										
Contributions Indexed at 3%	\$530	\$546	\$562	\$579	\$597	\$614	\$633	\$652	\$671	\$692
<b>(C) Additional Unit Contributions</b>										
<b>(D) Total Annual Reserve Funding</b>	\$27,031	\$27,842	\$28,677	\$29,537	\$30,423	\$31,336	\$32,276	\$33,245	\$34,242	\$35,269
<b>(E) Interest on Reserves at 3%</b>	\$5,983	\$3,702	\$3,032	\$2,706	\$3,535	\$3,578	\$484	\$499	\$514	\$529
<b>Total Funds Available</b>	<b>\$218,944</b>	<b>\$141,027</b>	<b>\$118,435</b>	<b>\$107,670</b>	<b>\$136,564</b>	<b>\$138,527</b>	<b>\$28,428</b>	<b>(\$41,030)</b>	<b>(\$228,405)</b>	<b>(\$221,426)</b>
<b>(F) Total Capital Cost</b>	\$109,461	\$54,301	\$43,009	\$5,064	\$32,952	\$142,860	\$103,201	\$222,130	\$28,819	\$56,067
<b>(G) Reserve Balances</b>	<b>\$109,483</b>	<b>\$86,726</b>	<b>\$75,427</b>	<b>\$102,606</b>	<b>\$103,612</b>	<b>(\$4,333)</b>	<b>(\$74,774)</b>	<b>(\$263,161)</b>	<b>(\$257,224)</b>	<b>(\$277,493)</b>
Outside Capital:										
Adjusted Reserve Balances	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

### Notes:

1. Starting reserve balance is \$185,930.
2. Annual contribution is \$27,031.
3. Capital costs outpace reserves starting in Year 6.

\*ANNUAL RR CONTRIBUTIONS are shown being indexed for inflation at the % specified above except when Additional Contributions are called for.

Line C, Additional Contributions allows for material adjustments in annual RR funding that would enable the property to meet all projected needs out of reserves through Year 20.

\*\*INTEREST EARNINGS ON RESERVES are calculated on 100% of starting balances and on 50% of the total annual contribution for the year at the rate shown

Replacement Reserve (RR) Analysis: *Plan One - Green*

Reserve Funding In Year 20

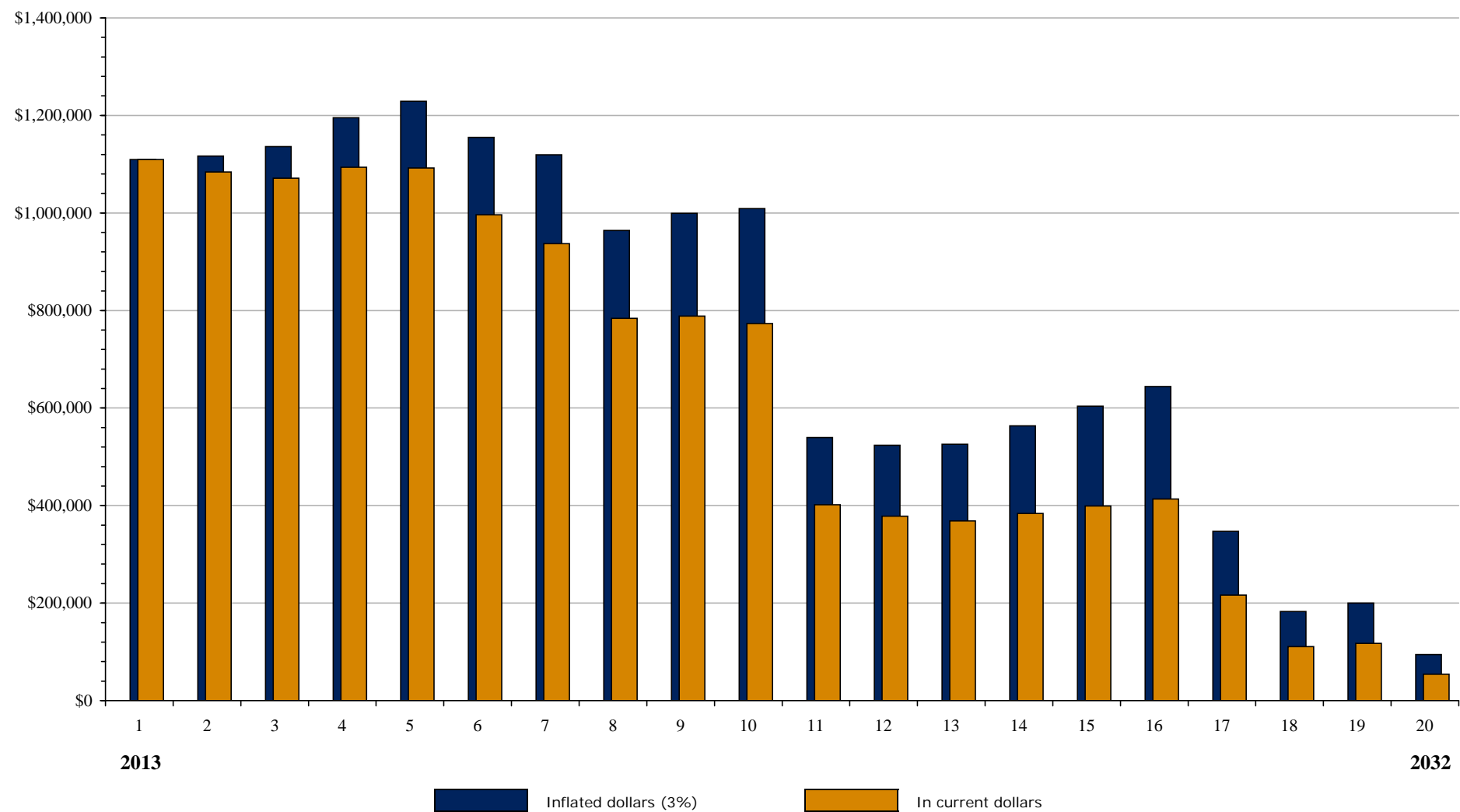
Projected replacement reserve balance is **(\$1,346,075)** This is (\$26,394)per unit in inflated dollars or (\$15,052) per unit in uninflated dollars

Projected annual funding to reserves is **\$47,399** This is \$929 per unit in inflated dollars or \$530 per unit in current dollars

2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	
Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
										<b>Reserve Balances (A)</b>
(\$277,493)	(\$777,186)	(\$809,035)	(\$822,978)	(\$800,626)	(\$777,603)	(\$755,204)	(\$1,071,555)	(\$1,246,425)	(\$1,234,543)	Starting Replacement Reserves
										<b>Annual Funding (B)</b>
\$712	\$734	\$756	\$778	\$802	\$826	\$851	\$876	\$902	\$929	Contributions Indexed at 3%
										Additional Unit Contributions <b>(C)</b>
\$36,327	\$37,417	\$38,540	\$39,696	\$40,887	\$42,113	\$43,377	\$44,678	\$46,018	\$47,399	Total Annual Reserve Funding <b>(D)</b>
\$545	\$561	\$578	\$595	\$613	\$632	\$651	\$670	\$690	\$711	Interest on Reserves at 3% <b>(E)</b>
<b>(\$240,621)</b>	<b>(\$739,208)</b>	<b>(\$769,917)</b>	<b>(\$782,687)</b>	<b>(\$759,126)</b>	<b>(\$734,858)</b>	<b>(\$711,177)</b>	<b>(\$1,026,207)</b>	<b>(\$1,199,717)</b>	<b>(\$1,186,434)</b>	<b>Total Funds Available</b>
\$536,565	\$69,827	\$53,060	\$17,939	\$18,477	\$20,346	\$360,378	\$220,218	\$34,827	\$159,641	Total Capital Cost <b>(F)</b>
<b>(\$777,186)</b>	<b>(\$809,035)</b>	<b>(\$822,978)</b>	<b>(\$800,626)</b>	<b>(\$777,603)</b>	<b>(\$755,204)</b>	<b>(\$1,071,555)</b>	<b>(\$1,246,425)</b>	<b>(\$1,234,543)</b>	<b>(\$1,346,075)</b>	<b>Reserve Balances (G)</b>
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	



Replacement Reserve (RR) Analysis: *Plan Two - Green*



Current Replacement Reserve Balance: **\$185,930**

Adjusted Replacement Reserve Balance: **\$185,930**

Current annual contributions to reserve accounts: **\$27,031**

At the end of Year One, Reserve Balances are projected to be: **\$1,109,483**

At the end of Year 20, Reserve Balances are projected to be: **\$94,503**

All projected capital needs are met throughout the plan

## Replacement Reserve (RR) Analysis: *Plan Two - Green*

		Reserve Funding In Year 1								
		Starting Balance:	\$185,930 or \$3,646/unit		Replacement Reserve (RR) analysis starts here with the starting RR balance reported, or imputed, to have been on hand at the start of Year 1, and current annual RR contributions. The projections below reflect Starting RR Balance (Line A), plus the Total Annual RR Contributions (Line D) and Interest Earnings on RR (Line E), minus Total Annual Capital Costs (Line F), taken from the CNS above. This is expressed arithmetically as (A+D+E)-F=G, Year-End Balances, then carries forward to Line A of the following Year.					
		Contributions to Reserves:	\$27,031 or \$530/unit							
	2013 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
<b>(A) Reserve Balances</b>										
Starting Replacement Reserves	\$185,930	\$1,109,483	\$1,116,726	\$1,136,327	\$1,195,333	\$1,229,121	\$1,154,941	\$1,119,149	\$964,336	\$999,202
<b>(B) Annual Funding</b>										
Contributions Indexed at 3%	\$530	\$546	\$562	\$579	\$597	\$614	\$633	\$652	\$671	\$692
<b>(C) Additional Unit Contributions</b>										
<b>(D) Total Annual Reserve Funding</b>	\$27,031	\$27,842	\$28,677	\$29,537	\$30,423	\$31,336	\$32,276	\$33,245	\$34,242	\$35,269
<b>(E) Interest on Reserves at 3%</b>	\$5,983	\$33,702	\$33,932	\$34,533	\$36,316	\$37,344	\$35,132	\$34,073	\$29,444	\$30,505
<b>Total Funds Available</b>	<b>\$218,944</b>	<b>\$1,171,027</b>	<b>\$1,179,335</b>	<b>\$1,200,397</b>	<b>\$1,262,073</b>	<b>\$1,297,801</b>	<b>\$1,222,350</b>	<b>\$1,186,466</b>	<b>\$1,028,022</b>	<b>\$1,064,977</b>
<b>(F) Total Capital Cost</b>	\$109,461	\$54,301	\$43,009	\$5,064	\$32,952	\$142,860	\$103,201	\$222,130	\$28,819	\$56,067
<b>(G) Reserve Balances</b>	<b>\$109,483</b>	<b>\$1,116,726</b>	<b>\$1,136,327</b>	<b>\$1,195,333</b>	<b>\$1,229,121</b>	<b>\$1,154,941</b>	<b>\$1,119,149</b>	<b>\$964,336</b>	<b>\$999,202</b>	<b>\$1,008,910</b>
Outside Capital:	\$1,000,000									
Adjusted Reserve Balances	\$1,109,483	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

### Notes:

1. Same starting reserve balance and annual contribution as shown in Plan 1.
2. An infusion of \$1M is shown in Year 1.
3. Plan is fully funded.

\*ANNUAL RR CONTRIBUTIONS are shown being indexed for inflation at the % specified above except when Additional Contributions are called for.

Line C, Additional Contributions allows for material adjustments in annual RR funding that would enable the property to meet all projected needs out of reserves through Year 20.

\*\*INTEREST EARNINGS ON RESERVES are calculated on 100% of starting balances and on 50% of the total annual contribution for the year at the rate shown

Replacement Reserve (RR) Analysis: *Plan Two - Green*

Reserve Funding In Year 20

Projected replacement reserve balance is **\$94,503** This is \$1,853 per unit in inflated dollars or \$1,057 per unit in uninflated dollars

Projected annual funding to reserves is **\$47,399** This is \$929 per unit in inflated dollars or \$530 per unit in current dollars

2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	
Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
										<b>Reserve Balances (A)</b>
\$1,008,910	\$539,484	\$523,820	\$525,591	\$563,711	\$603,646	\$644,154	\$347,127	\$182,671	\$200,033	Starting Replacement Reserves
										<b>Annual Funding (B)</b>
\$712	\$734	\$756	\$778	\$802	\$826	\$851	\$876	\$902	\$929	Contributions Indexed at 3%
										Additional Unit Contributions <b>(C)</b>
\$36,327	\$37,417	\$38,540	\$39,696	\$40,887	\$42,113	\$43,377	\$44,678	\$46,018	\$47,399	Total Annual Reserve Funding <b>(D)</b>
\$30,812	\$16,746	\$16,293	\$16,363	\$17,525	\$18,741	\$19,975	\$11,084	\$6,170	\$6,712	Interest on Reserves at 3% <b>(E)</b>
<b>\$1,076,050</b>	<b>\$593,647</b>	<b>\$578,652</b>	<b>\$581,650</b>	<b>\$622,123</b>	<b>\$664,500</b>	<b>\$707,506</b>	<b>\$402,889</b>	<b>\$234,860</b>	<b>\$254,144</b>	<b>Total Funds Available</b>
\$536,565	\$69,827	\$53,060	\$17,939	\$18,477	\$20,346	\$360,378	\$220,218	\$34,827	\$159,641	Total Capital Cost <b>(F)</b>
<b>\$539,484</b>	<b>\$523,820</b>	<b>\$525,591</b>	<b>\$563,711</b>	<b>\$603,646</b>	<b>\$644,154</b>	<b>\$347,127</b>	<b>\$182,671</b>	<b>\$200,033</b>	<b>\$94,503</b>	<b>Reserve Balances (G)</b>
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	

Projected Capital Needs Over Twenty Years

SITE SYSTEMS

Replacement Items	Quantity	Cost / Unit in 2013 \$	Total Cost in 2013 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)			Notes
SURFACE										
Roadways/Parking	31,072 sf	2.10	\$65,251		≈3	20	17	in	1 Year	Asphalt paved, minor cracks observed Resurface in Year 17
Roadways/Parking (Green)	31,072 sf	5.75	\$178,664	\$113,413	≈3	20	17	in	1 Year	Resurface using porous asphalt
Walkways	3,726 sf	2.10	\$7,825		≈3	20	17	in	1 Year	Asphalt, cracks observed Resurface in Year 17
Walkways (Green)	3,726 sf	6.25	\$23,288	\$15,463	≈3	20	17	in	1 Year	Resurface using open pavers
Crack-Fill and Sealcoat	34,798 sf	0.35	\$12,179		≈3	5	2 /7 /12	in	1 Year	Repairs (crackfill, sealcoat and re-stripe) in Years 2, 7, and 12.
Dumpster Enclosure	1 ls	1050.00	\$1,050		≈3	15	12	in	1 Year	Stockade fencing with metal posts, in good condition. Replace in Year 12
Dumpster Enclosure (Green)	sf									
Fencing	lf									
Fencing (Green)	lf									
Site Lighting	7 ea				≈3	20				Pole-mounted CFLs Maintain out of Operating
Site Lighting (Green)	7 ea	45.00	\$315		≈3	20	17	in	1 Year	Replace existing w/LED lighting Longevity and energy savings. EWCM 1
Site Amenities	1 ls				≈5	20				Gazebo, in good condition Maintain out of Operating
Landscaping	1 ea	7500.00	\$7,500		24	40	5	in	1 Year	Surrounding lawn/flowerbeds, in good condition Allowance to replant and prune
Landscaping (Green)	1 ea	15000.00	\$15,000	\$7,500	24	40	5	in	1 Year	Replace existing w/Xeriscape (local plantings) Minimum maintenance and water use. <b>Discuss</b>
ACCESSIBILITY										
Circulation	1 ls				24	10				Compliant design
Circulation (Green)	ls									
Common Areas	1 ea				24	20				Compliant design
Common Areas (Green)	ea									
Dwelling Units	1 ls				24	20				Compliant design and services
Dwelling Units (Green)	ea									
Miscellaneous	ls									

Replacement Items	Year 1 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
<b>SURFACE</b>																				
Roadways/Parking	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$104,709	\$0	\$0	\$0
Roadways/Parking (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$286,703	\$0	\$0	\$0
Walkways	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$12,556	\$0	\$0	\$0
Walkways (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$37,370	\$0	\$0	\$0
Crack-Fill and Sealcoat	\$0	\$12,545	\$0	\$0	\$0	\$0	\$14,543	\$0	\$0	\$0	\$0	\$16,859	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Dumpster Enclosure	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,453	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Dumpster Enclosure (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
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	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Site Lighting (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$505	\$0	\$0	\$0
Site Amenities	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Landscaping	\$0	\$0	\$0	\$0	\$8,441	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Landscaping (Green)	\$0	\$0	\$0	\$0	\$16,883	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>ACCESSIBILITY</b>																				
Circulation	\$0	\$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
Dwelling Units	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Dwelling Units (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 2013 \$	Total Cost in 2013 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)		Notes
BOILERS									
									Hydrotherm boilers (300 MBH each)
Boilers - 1	5 ea	6,480	\$32,400		24	25	6	in 1 Year	Replace in Year 6
Boilers - 1 (Green)	5 ea	9,900	\$49,500	\$17,100	New	20	6	in 1 Year	Replace existing with condensing boilers (93% eff) Energy savings. EWCM 2
Controls	1 ea	3,850	\$3,850		≈9	15	6	in 1 Year	Hydrotherm step controller Replace in Year 6
Controls (Green)	ea								
Hydronic Pumps Old	1 ea	3,350	\$3,350		24	25	1	in 1 Year	2 hp base-mounted pump with standard eff motor (82.5%) Replace
Hydronic Pumps Old (Green)	1 ea	3,425	\$3,425	\$75	24	25	1	in 1 Year	Replace existing with high efficiency motor (87%) Energy savings. EWCM 3
Hydronic Pumps New	1 ea				24	25			2 hp base-mounted pump recently upgraded with high eff motor. Maintain out of Operating
Hydronic Pumps New (Green)	1 ea				24	25			Green option in place.
Boiler Water Pumps	ea								
Boiler Water Pumps (Green)	ea								
Heating Water Pumps - 1	ea								
Heating Water Pumps - 1 (Green)	ea								
Combustion Air System	1 ls	2,250	\$2,250		24	30	6	in 1 Year	Replace fixed louvered opening with motorized louwer, controlled by boiler/burner motor
Combustion Air System (Green)	1 ls				24	30			Direct combustion air supply included with proposed condensing boilers
Flue Exhaust	1 ls				24	30			Metal flues: no loose, damaged, or missing sections observed. Maintain out of Operating
Flue Exhaust (Green)	1 ls				24	30			Corrosion-resistant flues included with proposed condensing boilers
Condensate & Feed Water	ea								
Miscellaneous	ea								
Miscellaneous (Green)	ea								
Miscellaneous	ea								
Miscellaneous (Green)	ea								

St. Jude Common  
MECHANICAL ROOM

Costs projected at 3%

Replacement Items	Year 1 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
BOILERS																				
Boilers - 1	\$0	\$0	\$0	\$0	\$0	\$37,560	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boilers - 1 (Green)	\$0	\$0	\$0	\$0	\$0	\$57,384	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Controls	\$0	\$0	\$0	\$0	\$0	\$4,463	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Controls (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hydronic Pumps Old	\$3,350	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hydronic Pumps Old (Green)	\$3,425	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hydronic Pumps New	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hydronic Pumps New (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boiler Water Pumps	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boiler Water Pumps (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Heating Water Pumps - 1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Heating Water Pumps - 1 (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Combustion Air System	\$0	\$0	\$0	\$0	\$0	\$2,608	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Combustion Air System (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Flue Exhaust	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Flue Exhaust (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Condensate & Feed Water	\$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

Projected Capital Needs Over Twenty Years

MECHANICAL ROOM--continued

Replacement Items	Quantity	Cost / Unit in 2013 \$	Total Cost in 2013 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)			Notes
BOILER ROOM SYSTEMS										
Boiler Room Piping/Valves	ea									
Boiler Room Piping/Valves (Green)	ea									
3-Way Valve & Controller	ea									
3-Way Valve & Controller (Green)	ea									
Heat Exchanger	ea									
Heat Exchanger (Green)	ea									
DHW Generation - 1	1 ea	7560.00	\$7,560		≈10	20	10	in	1 Year	Natural gas-fired Raypak boiler (350 MBH, 80% eff) Replace
DHW Generation - 1 (Green)	1 ea	11550.00	\$11,550	\$3,990	≈10	20	10	in	1 Year	Replace existing w/gas-fired condensing boiler Energy savings. EWCM 4
DHW Pumps	2 ea	950.00	\$1,900		≈10	20	10	in	1 Year	In-line fractional hp pumps (standard eff) Replace in Year 10
DHW Pumps (Green)	2 ea	985.00	\$1,970	\$70	≈10	20	10	in	1 Year	Replace existing w/high efficiency motors Energy savings. EWCM 3
DHW Storage - 1	1 ea	3850.00	\$3,850		≈10	20	10	in	1 Year	Insulated storage tank, 115 gallon capacity Replace in Year 10
DHW Storage - 1 (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 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
BOILER ROOM SYSTEMS																				
Boiler Room Piping/Valves	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boiler Room Piping/Valves (Green)	\$0	\$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	\$0	\$9,864	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Generation - 1 (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$15,070	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Pumps	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,479	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Pumps (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,570	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Storage - 1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$5,023	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Storage - 1 (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 2013 \$	Total Cost in 2013 \$	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				24	35			Connected to water main; backflow preventer in place. Maintain out of Operating
Building Distribution Systems	1 ls				24	50			No observed or reported systemic problems Maintain out of Operating
Large Central Air Conditioner	1 ea	14375.00	\$14,375		≈12	20	8	in 1 Year	Split DX 12.5 tons of cooling Replace
Large Central Air Conditioner (Green)	1 ea	15453.13	\$15,453	\$1,078	≈12	20	8	in 1 Year	Replace existing with higher SEER system Energy savings
Small Central Air Conditioner	1 ea	8625.00	\$8,625		≈2	20	18	in 1 Year	Split DX 7.5 tons of cooling Replace
Small Central Air Conditioner (Green)	1 ea	9271.88	\$9,272	\$647	≈2	20	18	in 1 Year	Replace existing with higher SEER system Energy savings
Common Area AHUs	2 ea	12700.00	\$25,400		≈12	20	8	in 1 Year	Serves common areas, hydronic and DX coils Upgrade (coils, motors, controls)
Common Area AHUs (Green)	ea								
Building Vent. & Exhaust	1 ea				24	20			Maintain out of Operating
Building Vent. & Exhaust (Green)	ea								
Cold Water Booster Pumps	ea								
Cold Water Booster Pumps (Green)	ea								
BUILDING ELECTRICAL									
Building Power Wiring	1 ls				24	99			Maintain out of Operating
Emergency Generator	1 ea	46700.00	\$46,700		24	35	11	in 1 Year	100 kW gas-powered Kohler Replace in Year 11
Emergency Lights	1 ea				24	10			Powered by generator Maintain out of Operating
Smoke / Fire Detection	1 ls	43900.00	\$43,900		2	20	18	in 1 Year	Silent Knight FACP w/hardwired common area detection/alarm devices. Upgrade in Year 18
Signaling / Communication	1 ls	8500.00	\$8,500		5	20	7 17	in 1 Year	Entry intercom - phone based. Video monitoring Upgrade allowance
BUILDING ELEVATORS									
Shafts and Doorways	1 ea				24	30			Otis hydraulic elevator, serves all floors Maintained by a full service contract
Cabs	1 ea	7150.00	\$7,150		≈2	10	11	in 1 Year	Cab interior and door operator not in service contract Refurbish in Year 11
Controller/Dispatcher	1 ea				24	20			Maintained by a full service contract Recently replaced cylinder/piston
Machine Room Equipment	1 ea	51700.00	\$51,700		24	30	11	in 1 Year	Major upgrade in Year 11

BUILDING MECHANICAL AND ELECTRICAL

Costs projected at 3%

Replacement Items	Year 1 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
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	\$0	\$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
Large Central Air Conditioner	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$17,679	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Large Central Air Conditioner (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$19,005	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Small Central Air Conditioner	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$14,256	\$0	\$0
Small Central Air Conditioner (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$15,325	\$0	\$0
Common Area AHUs	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$31,239	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Common Area AHUs (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building Vent. & Exhaust	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building Vent. & Exhaust (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Cold Water Booster Pumps	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Cold Water Booster Pumps (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$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	\$0	\$0	\$0	\$0	\$62,761	\$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	\$72,560	\$0	\$0
Signaling / Communication	\$0	\$0	\$0	\$0	\$0	\$0	\$10,149	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$13,640	\$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	\$0	\$9,609	\$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	\$69,480	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Projected Capital Needs Over Twenty Years

BUILDING ARCHITECTURE

Replacement Items	Quantity	Cost / Unit in 2013 \$	Total Cost in 2013 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)		Notes
STRUCTURE									
Foundation	720 lf				24	50			Concrete walls and floor Monitor
Framing	ls								
Slab	sf								
Miscellaneous	ea								
BUILDING EXTERIOR									
Exterior Common Doors	2 ea	3196.00	\$6,392		24	35	11	in 1 Year	Metal framed glass doors, storefront type Replace
Exterior Common Doors (Green)	2 ea	3435.70	\$6,871	\$479	24	35	11	in 1 Year	Replace with fiberglass framed storefront type Energy savings. EWCM 5
Exterior Secondary Doors - 2	5 ea	1935.50	\$9,678		24	35	11	in 1 Year	Metal framed glass doors Replace
Exterior Secondary Doors - 2 (Green)	5 ea	2080.66	\$10,403	\$726	24	35	11	in 1 Year	Replace with fiberglass framed insulated glass doors Energy savings. EWCM 5
Glass Sliding Doors	53 ea	1750.00	\$92,750		24	35	11	in 1 Year	Metal framed glass doors Replace
Glass Sliding Doors (Green)	53 ea	1881.25	\$99,706	\$6,956	24	35	11	in 1 Year	Replace with fiberglass framed insulated glass doors Energy savings. EWCM 5
Service Doors	1 ea	560.00	\$560		24	25	6	in 1 Year	Insulated metal door Replace
Garage Doors	1 ea	2150.00	\$2,150		≈15	25	11	in 1 Year	Metal roll-up door Replacce
Exterior Walls - EIFS	492 sf	4.55	\$2,239		24	30	1 11	in 1 Year	Synthetic stucco, isolated damaged areas. Repair and repaint Years 1 and 11
Exterior Walls - EIFS (Green)	24,600 sf	0.95	\$23,370	\$0	24	30	1 11	in 1 Year	Use low VOC paints
Exterior Walls - Brick	1,920 sf				24	20			Face brick along lower front elevation Maintain out of Operating
Exterior Walls - Brick (Green)	sf								
Exterior Walls - 3	sf								
Trim, Soffit, Fascia	1 ls	698.40	\$698		24	20	1 11	in 1 Year	Wood trim along roofline, peeling paint Repaint in Years 1 and 11
Trim, Soffit, Fascia (Green)	1 lf	698.40	\$698	\$0	24	20	1 11	in 1 Year	Use low VOC paint
Entrance Awning	1 ls	2850.00	\$2,850		10	20	10	in 1 Year	Canvas awning at main entrance Replace
Miscellaneous	ea								
Miscellaneous (Green)	ea								

BUILDING ARCHITECTURE

Costs projected at 3%

Replacement Items	Year 1 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
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																				
Exterior Common Doors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$8,590	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Common Doors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$9,235	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Secondary Doors - 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$13,006	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Secondary Doors - 2 (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$13,981	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Glass Sliding Doors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$124,648	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Glass Sliding Doors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$133,997	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Service Doors	\$0	\$0	\$0	\$0	\$0	\$649	\$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	\$2,889	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Walls - EIFS	\$25,609	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$34,416	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Walls - EIFS (Green)	\$25,609	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$34,416	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Walls - Brick	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Walls - Brick (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Walls - 3	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Trim, Soffit, Fascia	\$698	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$939	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Trim, Soffit, Fascia (Green)	\$698	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$939	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Entrance Awning	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3,719	\$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 2013 \$	Total Cost in 2013 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)		Notes
BUILDING EXTERIORS (cont.)									
Windows - 1	108 ea	476.50	\$51,462		24	35	11	in 1 Year	Double glazed metal framed Replace
Windows - 1 (Green)	108 ea	512.24	\$55,322	\$3,860	24	35	11	in 1 Year	Replace existing w/fiberglass framed insulated glass windows. EWCM 6
Windows - 2	ea								
Windows - 2 (Green)	ea								
Window Glazing	27 ea	80.00	\$2,160		24	10	1	over 10 Years	Replacement allowance for anticipated glazing/window seal failures
Window Glazing (Green)	ea								
Window Lintels	ea								
Unit Balconies	45 ea	375.00	\$16,875		24	40	16	over 20 Years	Concrete decks, metal rails - in good condition Repair allowance starting in Year 16
Unit Balconies (Green)	ea								
Unit Patios	ea								
Unit Patios (Green)	ea								
Building Mounted Lighting	6 ea				Varies	20			HID floods (150 w metal halide) Maintain out of Operating
Building Mounted Lighting (Green)	6 ea	125.00	\$750		Varies	20	17	in 1 Year	Replace existing with 65 w induction lighting Energy savings, longevity EWCM 1
ROOF SYSTEMS									
Structure	14,373 sf				24	50			Wood tramed, wood decking Monitor
Roof Covering - 1	13,903 sf	4.00	\$55,612		≈2	20	18	in 1 Year	Architectural shingles, in good condition Replace in Year 18
Roof Covering - 1 (Green)	13,903 sf	7.75	\$107,748	\$52,136	≈2	40		Years	Replace existing with metal roofing Longevity. Not cost-effective. GM 1
Roof Covering - 2	470 sf	8.50	\$3,995		≈2	20	18	in 1 Year	Rubber membrane over roof deck Replace
Roof Covering - 2 (Green)	sf								
Insulation	1 ls				≈8	40			Insulation at R38
Skylights	ea								
Penthouses	ea								

Costs projected at 3%

Replacement Items	Year 1 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
BUILDING EXTERIORS (cont.)																				
Windows - 1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$69,161	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Windows - 1 (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$74,348	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Windows - 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Windows - 2 (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Window Glazing	\$216	\$222	\$229	\$236	\$243	\$250	\$258	\$266	\$274	\$282	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
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
Unit Balconies	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,315	\$1,354	\$1,395	\$1,436	\$1,480
Unit Balconies (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Patios	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit 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
Building Mounted Lighting (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,204	\$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 - 1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$91,918	\$0	\$0
Roof Covering - 1 (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Roof Covering - 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$6,603	\$0	\$0
Roof Covering - 2 (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Insulation	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Skylights	\$0	\$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 2013 \$	Total Cost in 2013 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)				Notes
<b>HALLS</b>											
Hallway Walls and Ceilings	19,034 sf	1.15	\$21,913		Varies	12	8	20	over 4 Years	Ceiling tiles and painted walls, in good condition Replace tiles and repaint walls in Years 8 and 20	
Hallway Walls and Ceilings (Green)	19,034 sf	1.15	\$21,913	\$0	Varies	12	8	20	over 4 Years	Use low VOC paints and materials	
Hallway Floors	6,531 sf	3.00	\$19,593		Varies	12	8	20	over 4 Years	Carpeted, in good condition Replace in Years 8 and 18	
Hallway Floors (Green)	6,531 sf	5.50	\$35,921	\$16,328	Varies	25			Years	Replace existing w/faux wood linoleum. Longer life Longevity. Not cost-effective. GM 2	
Hallway, Common Area Lighting	108 ea				≈2	20				2L fluorescent T8 lamps, recessed, Maintain out of Operating	
Hallway, Common Area Lighting (Green)	sf									Green option in place	
Hallway Interior Lighting	56 ea				≈2	30				LED wall sconces, 3.5 w each Maintain out of Operating	
Hallway Interior Lighting (Green)	ea									Green option in place	
Exit Signs	27 ea				≈2	30				LED exit signs Maintain out of Operating	
Exit Signs (Green)	ea									Green option in place.	
Hallway Doors	ea										
CFL Fixtures	4 ea				24	20				Recessed cans, 13 w each Maintain out of Operating	
CFL Fixtures (Green)	ea									Green option in place	
<b>STAIRS</b>											
Stair Walls and Ceilings	6,438 sf	0.62	\$3,991		Varies	12	8	20	over 4 Years	Repaint	
Stair Walls and Ceilings (Green)	6,438 sf	0.62	\$3,991	\$0	Varies	12	8	20	over 4 Years	Repaint using low VOC paints	
Stair Floors	398 sf	0.62	\$246		Varies	12	8	20	over 4 Years	Painted and sealed concrete landings and treads Repaint	
Stair Floors (Green)	398 sf	0.62	\$246	\$0	Varies	12	8	20	over 4 Years	Use low VOC paints	
Stair Interior Lighting	21 ea				≈2	20				1L fluorescent lamps T8 wall valence Maintain out of Operating	
Stair Interior Lighting (Green)	ea									Green option in place	
Stair Doors	1 ls				24	35				Maintain out of Operating	
Stair Railings	1 ls				24	40				Maintain out of Operating	



Costs projected at 3%

Replacement Items	Year 1 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
HALLS																				
Hallway Walls and Ceilings	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$6,738	\$6,940	\$7,148	\$7,362	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$9,606
Hallway Walls and Ceilings (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$6,738	\$6,940	\$7,148	\$7,362	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$9,606
Hallway Floors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$6,024	\$6,205	\$6,391	\$6,583	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$8,589
Hallway Floors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hallway, Common Area Lighting	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hallway, Common Area Lighting (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hallway Interior Lighting	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hallway Interior Lighting (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exit Signs	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exit Signs (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	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
CFL Fixtures	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
CFL Fixtures (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	\$0	\$0	\$0	\$0	\$1,227	\$1,264	\$1,302	\$1,341	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,750
Stair Walls and Ceilings (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,227	\$1,264	\$1,302	\$1,341	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,750
Stair Floors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$76	\$78	\$80	\$83	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$108
Stair Floors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$76	\$78	\$80	\$83	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$108
Stair Interior Lighting	\$0	\$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 2013 \$	Total Cost in 2013 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)		Notes
LOBBIES / MAIL FACILITIES									
Lobby Walls & Ceilings	548 sf	1.15	\$631		4	12	8	20	over 4 Years
Lobby Walls & Ceilings (Green)	548 sf	1.15	\$631	\$0	4	12	8	20	over 4 Years
Lobby Floors	32 sf	5.00	\$161		4	12	8	20	in 1 Year
Lobby Floors (Green)	32 sf	5.50	\$177	\$16	4	25			Years
									Carpeting
									Replace existing w/Linoleum
									Longevity. Not cost-effective. GM2
COMMUNITY ROOM / OFFICE									
									Ceiling tiles and painted walls, in good condition
Walls and Ceilings	13,012 sf	3.38	\$44,011		4	12	8	20	in 1 Year
Walls and Ceilings (Green)	13,012 sf	3.38	\$44,011	\$0	4	12	8	20	in 1 Year
Floor Covering	4,279 sf	3.00	\$12,836		4	12	8	20	in 1 Year
Floor Covering (Green)	4,279 sf	5.50	\$23,532	\$10,697	4	25			Years
									Carpeting
									Replace existing w/Linoleum
									Longevity. Not cost-effective. GM2
Appliances//Furniture	1 ls	75000.00	\$75,000		24	30	11		over 3 Years
Appliances//Furniture (Green)	ea								
									Commercial kitchen: walk-in refrig & freezer, gas ovens
									dishwasher w/booster, furnishings, etc.
Dining Room Lighting	8 ea				24	20			
Dining Room Lighting (Green)	ea								
									10L LED chandliers, 3.5 w per lamp
									Maintain out of Operating
									Green option in place
PUBLIC LAUNDRY / RESTROOMS									
Walls and Ceilings	3,198 sf	0.62	\$1,983		4	12	8	20	in 1 Year
Walls and Ceilings (Green)	3,198 sf	0.62	\$1,983	\$0	4	12	8	20	in 1 Year
Floor Covering	623 sf	5.00	\$3,114		Varies	15	8		in 1 Year
Floor Covering (Green)	623 sf	5.50	\$3,425	\$311	Varies	25	8		in 1 Year
Laundry Equipment	8 ea	1390.00	\$11,120		24	10	1	11	in 1 Year
Laundry Equipment (Green)	8 ea	1806.75	\$14,454	\$3,334	24	10	1	11	in 1 Year
Restroom Fixtures / Accessories	ea								
Common Toilets	3 ea	410.00	\$1,230		24	30	6		in 1 Year
Common Toilets (Green)	3 ea	440.75	\$1,322	\$92	24	30	6		in 1 Year
									Painted
									Repaint
									VCT flooring
									Replace
									Replace existing w/Linoleum
									Longevity. Not cost-effective. GM2
									Two laundry rooms, total of 4 top-loading washers
									and 4 electric dryers. Replace
									Replace top loading washers with front loading &
									add gas service and gas dryers. EWCM 7
									Low flush toilets (1.6 gpf)
									Replace
									Replace existing with high eff toilets (1.28 gpf<)
									Water savings. EWCM 8

## BUILDING ARCHITECTURE--continued

Costs projected at 3%

Replacement Items	Year 1 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
<b>LOBBIES / MAIL FACILITIES</b>																				
Lobby Walls & Ceilings	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$194	\$200	\$206	\$212	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$277
Lobby Walls & Ceilings (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$194	\$200	\$206	\$212	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$277
Lobby Floors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$198	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$283
Lobby Floors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>COMMUNITY ROOM / OFFICE</b>																				
Walls and Ceilings	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$54,127	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$77,173
Walls and Ceilings (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$54,127	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$77,173
Floor Covering	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$15,787	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$22,508
Floor Covering (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Appliances//Furniture	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$33,598	\$34,606	\$35,644	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Appliances//Furniture (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Dining Room Lighting	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Dining Room Lighting (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>PUBLIC LAUNDRY / RESTROOMS</b>																				
Walls and Ceilings	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,438	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3,477
Walls and Ceilings (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,438	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3,477
Floor Covering	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3,830	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Floor Covering (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4,212	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Laundry Equipment	\$11,120	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$14,944	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Laundry Equipment (Green)	\$14,454	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$19,425	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Restroom Fixtures / Accessories	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Common Toilets	\$0	\$0	\$0	\$0	\$0	\$1,426	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Common Toilets (Green)	\$0	\$0	\$0	\$0	\$0	\$1,533	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

# Projected Capital Needs Over Twenty Years

## DWELLING UNITS

Replacement Items	Quantity	Cost / Unit 2013.00	Total Cost in 2013 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)		Notes
<b>LIVING AREA FINISHES</b>									
									Solid core
Unit Hallway Doors	51 ea				24	30			Maintain out of Operating
									Hollow core
Unit Interior Doors	102 ea				24	25			Maintain out of Operating
									Hollow core
Unit Closet Doors	153 ea				24	25			Maintain out of Operating
									Painted surfaces
Unit Walls and Ceilings	92,823 sf				24	10			Maintain out of Operating
Unit Walls and Ceilings (Green)	92,823 sf				24	10			Use Low VOC paints
									VCT (includes kitchens), in good condition
Living Area Floors - Upper Flrs	15,865 sf	5.00	\$79,327		Varies	15	1 16	over 15 Years	Replace
Living Area Floors - Upper Flrs (Green)	15,865 sf	5.50	\$87,259	\$7,933	Varies	25	1	over 3 Years	Replace existing with faux wood linoleum starting in Year 1. GM 3
									Carpeting (includes kitchens), in good condition
Living Area Floors - Bsmt	2,115 sf	3.00	\$6,346		Varies	12	1 13	over 6 Years	Replace
									Replace existing with faux wood linoleum
Living Area Floors - Bsmt (Green)	2,115 sf	5.50	\$11,635	\$5,288	Varies	25	1	over 3 Years	starting in Year 1. GM 3
<b>BATHROOMS</b>									
									VCT in good condition
Bathroom Floors	2,423 sf	5.00	\$12,113		Varies	15	1 16	over 15 Years	Replace
									Replace existing with faux wood linoleum
Bathroom Floors (Green)	2,423 sf	5.50	\$13,324	\$1,211	Varies	25	1	over 3 Years	starting in Year 1. GM 3
									Fiberglass tubs and surrounds
Bathtub and Shower	51 ea	375.00	\$19,125		Varies	20	11	over 15 Years	Repair allowance
Bathtub and Shower (Green)	ea								
Bathroom Vanity	ea								
Bathroom Vanity (Green)	ea								
									Wall-hung sinks, in good condition
Bathroom Sinks	51 ea	420.00	\$21,420		24	30	6	over 17 Years	Replacement allowance starts in Year 17
									Low flush toilets (1.6 gpf)
Bathroom Toilets	51 ea	410.00	\$20,910		24	30	6	over 3 Years	Replace
									Replace existing with high eff toilets (1.28 gpf<)
Bathroom Toilets (Green)	51 ea	440.75	\$22,478	\$1,568	24	30	6	over 3 Years	Water savings. EWCM 8
									Ceiling mounted fans
Ventilation & Exhaust	51 ea	110.00	\$5,610		Varies	20	5	in 1 Year	Replace in Year 5
									Replace existing with humidistat controlled variable speed exhaust fans. <b>Discuss</b>
Ventilation & Exhaust (Green)	51 ea	118.25	\$6,031	\$421	Varies	20	5	in 1 Year	
									Towel bars, mirrors, etc.
Accessories	51 ea	184.00	\$9,384		24	20	1	over 20 Years	Replace starting in Year 1

Costs projected at 3%

Replacement Items	Year 1 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
LIVING AREA FINISHES																				
Unit Hallway Doors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Interior Doors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Closet Doors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Walls and Ceilings	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Walls and Ceilings (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Living Area Floors - Upper Flrs	\$5,288	\$5,447	\$5,611	\$5,779	\$5,952	\$6,131	\$6,315	\$6,504	\$6,699	\$6,900	\$7,107	\$7,320	\$7,540	\$7,766	\$7,999	\$8,239	\$8,486	\$8,741	\$9,003	\$9,273
Living Area Floors - Upper Flrs (Green)	\$29,086	\$29,959	\$30,858	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Living Area Floors - Bsmt	\$1,058	\$1,089	\$1,122	\$1,156	\$1,190	\$1,226	\$0	\$0	\$0	\$0	\$0	\$0	\$1,508	\$1,553	\$1,600	\$1,648	\$1,697	\$1,748	\$0	\$0
Living Area Floors - Bsmt (Green)	\$3,878	\$3,995	\$4,114	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
BATHROOMS																				
Bathroom Floors	\$808	\$832	\$857	\$882	\$909	\$936	\$964	\$993	\$1,023	\$1,054	\$1,085	\$1,118	\$1,151	\$1,186	\$1,221	\$1,258	\$1,296	\$1,335	\$1,375	\$1,416
Bathroom Floors (Green)	\$4,441	\$4,574	\$4,712	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathtub and Shower	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,713	\$1,765	\$1,818	\$1,872	\$1,929	\$1,986	\$2,046	\$2,107	\$2,171	\$2,236
Bathtub and Shower (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathroom Vanity	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathroom Vanity (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathroom Sinks	\$0	\$0	\$0	\$0	\$0	\$1,461	\$1,505	\$1,550	\$1,596	\$1,644	\$1,693	\$1,744	\$1,796	\$1,850	\$1,906	\$1,963	\$2,022	\$2,083	\$2,145	\$2,209
Bathroom Toilets	\$0	\$0	\$0	\$0	\$0	\$8,080	\$8,323	\$8,572	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathroom Toilets (Green)	\$0	\$0	\$0	\$0	\$0	\$8,686	\$8,947	\$9,215	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ventilation & Exhaust	\$0	\$0	\$0	\$0	\$6,314	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ventilation & Exhaust (Green)	\$0	\$0	\$0	\$0	\$6,788	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Accessories	\$469	\$483	\$498	\$513	\$528	\$544	\$560	\$577	\$594	\$612	\$631	\$649	\$669	\$689	\$710	\$731	\$753	\$776	\$799	\$823

Projected Capital Needs Over Twenty Years

DWELLING UNITS--continued

Replacement Items	Quantity	Cost / Unit in 2013 \$	Total Cost in 2013 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)		Notes
KITCHENS									
Kitchen Floors	2,869 sf				Varies	15			Included with "Living Area Floors"
Kitchen Floors (Green)	sf								
Kitchen Cabinets	51 ea	2475.00	126,225		24	25	6	over 3 Years	Laminated particleboard cabinets, in good condition Replace starting in Year 6
Kitchen Cabinets (Green)	51 ea	2660.63	135,692	\$9,467	24	30	6	over 3 Years	Replace existing w/FSC certified wood cabinets Longevity, lower VOCs. GM 4
Kitchen Cabinets	ea								
Kitchen Cabinets (Green)	ea								
Kitchen Countertops	51 ea	435.16	22,193		Varies	12	18	over 3 Years	Laminated particleboard. Future replacement starts in Year 18
Kitchen Countertops (Green)	51 ea	925.00	47,175	\$24,982	Varies	30		Years	Replace existing with solid stone countertops, longer EUL. Not cost-effective. GM 5
Range	51 ea	500.00	25,500		Varies	20	4	over 17 Years	20-inch electric ranges, in good condition Replace
Range (Green)	ea								
Range	ea								
Range (Green)	ea								
Refrigerator	51 ea	670.00	34,170		Varies	15	1 16	over 15 Years	Frost-free Replace
Refrigerator (Green)	51 ea	720.25	36,733	\$2,563	Varies	15	1 16	over 15 Years	Replace existing w/Energy Star refrigerators Energy savings. EWCM 9
Refrigerator	ea								
Refrigerator (Green)	ea								
Dishwasher	ea								
Dishwasher (Green)	ea								
Rangehood and Vent	51 ea	110.00	5,610		Varies	20	6	over 3 Years	Fan in soffit above range, ducted to roof exhaust Replace
Disposals	ea								
Miscellaneous	ea								
Miscellaneous (Green)	ea								

Costs projected at 3%

Replacement Items	Year 1 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
<b>KITCHENS</b>																				
Kitchen Floors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Kitchen Floors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Kitchen Cabinets	\$0	\$0	\$0	\$0	\$0	\$48,776	\$50,240	\$51,747	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Kitchen Cabinets (Green)	\$0	\$0	\$0	\$0	\$0	\$52,435	\$54,008	\$55,628	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Kitchen Cabinets	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Kitchen Cabinets (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Kitchen Countertops	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$12,227	\$12,594	\$12,972
Kitchen Countertops (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Range	\$0	\$0	\$0	\$1,639	\$1,688	\$1,739	\$1,791	\$1,845	\$1,900	\$1,957	\$2,016	\$2,076	\$2,139	\$2,203	\$2,269	\$2,337	\$2,407	\$2,479	\$2,554	\$2,630
Range (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Range	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Range (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Refrigerator	\$2,278	\$2,346	\$2,417	\$2,489	\$2,564	\$2,641	\$2,720	\$2,802	\$2,886	\$2,972	\$3,061	\$3,153	\$3,248	\$3,345	\$3,446	\$3,549	\$3,656	\$3,765	\$3,878	\$3,994
Refrigerator (Green)	\$2,449	\$2,522	\$2,598	\$2,676	\$2,756	\$2,839	\$2,924	\$3,012	\$3,102	\$3,195	\$3,291	\$3,390	\$3,491	\$3,596	\$3,704	\$3,815	\$3,930	\$4,048	\$4,169	\$4,294
Refrigerator	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$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
Dishwasher	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Dishwasher (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Rangehood and Vent	\$0	\$0	\$0	\$0	\$0	\$2,168	\$2,233	\$2,300	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Disposals	\$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

DWELLING UNITS--continued

Replacement Items	Quantity	Cost / Unit in 2013 \$	Total Cost in 2013 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)		Notes
IN-UNIT MECHANICAL									
Unit Warm Air Furnaces	ea								
Unit Warm Air Furnaces (Green)	ea								
Unit Thermostats	51 ea	105.00	\$5,355		Varies	20	11	in 1 Year	Wall mounted manual thermostats Replace
Unit Thermostats (Green)	51 ea	202.00	\$10,302	\$4,947	Varies	20	11	in 1 Year	Replace existing with programmable thermostats. Energy savings. EWCM 10
Unit Air Conditioning	If								
Unit Air Conditioning (Green)	If								
Unit Radiation	51 ea	550.00	\$28,050		24	30	6	over 17 Years	Hydronic baseboard, in good condition Replacement allowance
Unit Radiation (Green)	ea								
Unit Domestic Hot Water	51 ea	850.00	\$43,350		Varies	12	5 17	over 12 Years	Electric DHW tanks Replace starting in Years 5 and 17
Unit Domestic Hot Water (Green)	ea								
Miscellaneous	ea								
Miscellaneous (Green)	ea								
IN-UNIT ELECTRICAL									
Unit Electrical Panel	51 ea				24	50			Circuit breaker panels; no missing breakers or exposed wires. Maintain out of Operating
Unit Wiring	1 ls				24	50			Maintain out of Operating
Unit Security Call System	51 ea				24	20			Phone-based intercom. Local emergency call assist system. Maintain out of Operating
Unit Smoke/Fire Detection	51 un	380.00	\$19,380		Varies	10	11	in 1 Year	Add hardwired smokes to bdrms & replace existing
	51 un	485.00	\$24,735		Varies	10	1	in 1 Year	in Yr 1; future replacements in Yr 11.
Unit Lighting	1 ls				24	10			Maintain out of Operating
Unit Lighting (Green)	If								
Unit Lighting	ea								
Unit Lighting (Green)	ea								
Miscellaneous	ea								



Costs projected at 3%

Replacement Items	Year 1 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
IN-UNIT MECHANICAL																				
Unit Warm Air Furnaces	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Warm Air Furnaces (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Thermostats	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$7,197	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Thermostats (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$13,845	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Air Conditioning	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Air Conditioning (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Radiation	\$0	\$0	\$0	\$0	\$0	\$1,913	\$1,970	\$2,029	\$2,090	\$2,153	\$2,217	\$2,284	\$2,353	\$2,423	\$2,496	\$2,571	\$2,648	\$2,727	\$2,809	\$2,893
Unit Radiation (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	\$4,066	\$4,188	\$4,314	\$4,443	\$4,576	\$4,713	\$4,855	\$5,001	\$5,151	\$5,305	\$5,464	\$5,628	\$5,797	\$5,971	\$6,150	\$6,335
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	\$24,735	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$26,045	\$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

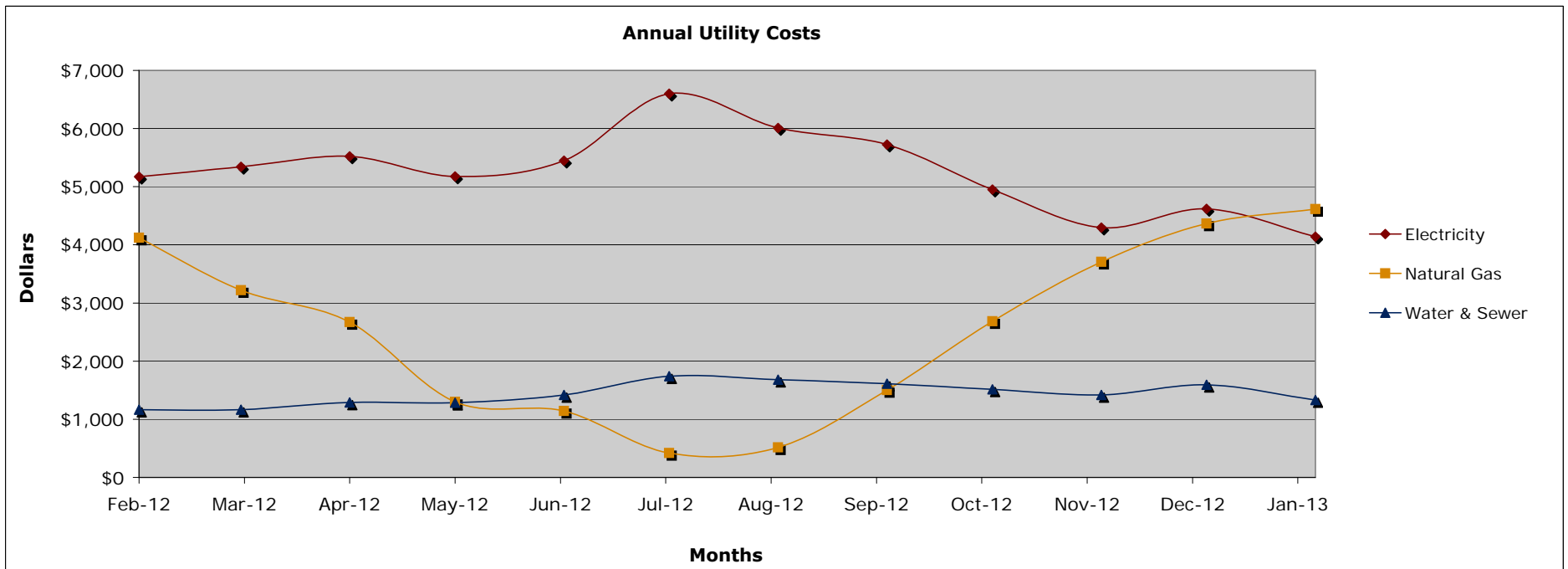
# Energy Analysis

## Utility Usage

### St Jude Commons

The energy analysis portion of this GCNA examines utility bills for the most recent 12 months to summarize at electricity, natural gas, and water/sewer use. The following table and charts show the utility information by utility source, and by cost.

	ELECTRICITY		NATURAL GAS		WATER / SEWER				OIL		TOTAL
	kWh	\$	Therms	\$	Gallons	Water \$	Sewer \$	Total \$	Gallons	\$	
Jan-13	29,880	\$4,140	3,578	\$4,614	97,247	\$556	\$774	\$1,330			<b>\$10,084</b>
Dec-12	35,000	\$4,618	3,384	\$4,367	118,940	\$648	\$946	\$1,594			<b>\$10,579</b>
Nov-12	31,560	\$4,297	2,868	\$3,708	111,459	\$533	\$886	\$1,419			<b>\$9,424</b>
Oct-12	38,560	\$4,950	2,067	\$2,685	119,688	\$564	\$951	\$1,515			<b>\$9,151</b>
Sep-12	36,080	\$5,723	1,142	\$1,503	127,917	\$594	\$1,017	\$1,611			<b>\$8,836</b>
Aug-12	38,440	\$6,009	369	\$515	133,901	\$617	\$1,064	\$1,680			<b>\$8,204</b>
Jul-12	41,880	\$6,601	295	\$421	139,137	\$636	\$1,105	\$1,741			<b>\$8,763</b>
Jun-12	33,080	\$5,448	861	\$1,144	111,459	\$533	\$886	\$1,419			<b>\$8,011</b>
May-12	31,520	\$5,176	981	\$1,297	112,956	\$456	\$828	\$1,284			<b>\$7,757</b>
Apr-12	34,360	\$5,520	2,056	\$2,671	113,704	\$458	\$834	\$1,292			<b>\$9,482</b>
Mar-12	32,880	\$5,341	2,484	\$3,217	101,735	\$420	\$746	\$1,167			<b>\$9,725</b>
Feb-12	31,500	\$5,173	3,226	\$4,120	101,735	\$420	\$746	\$1,167			<b>\$10,460</b>
<b>Total</b>	<b>414,740</b>	<b>\$62,995</b>	<b>23,311</b>	<b>\$30,263</b>	<b>1,389,877</b>	<b>\$6,434</b>	<b>\$10,784</b>	<b>\$17,218</b>			<b>\$110,476</b>
<i>Unit Cost</i>		<i>\$0.152</i>		<i>\$1.2982</i>				<i>\$0.01239</i>			



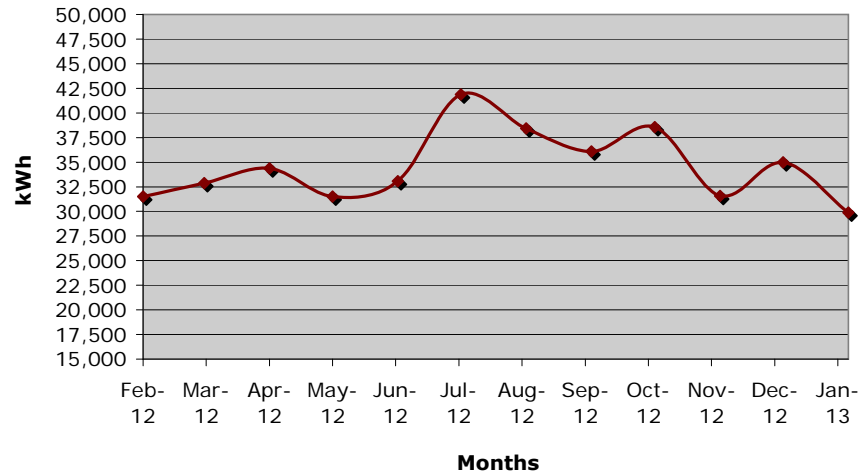
# Energy Analysis

## Utility Usage, By Type

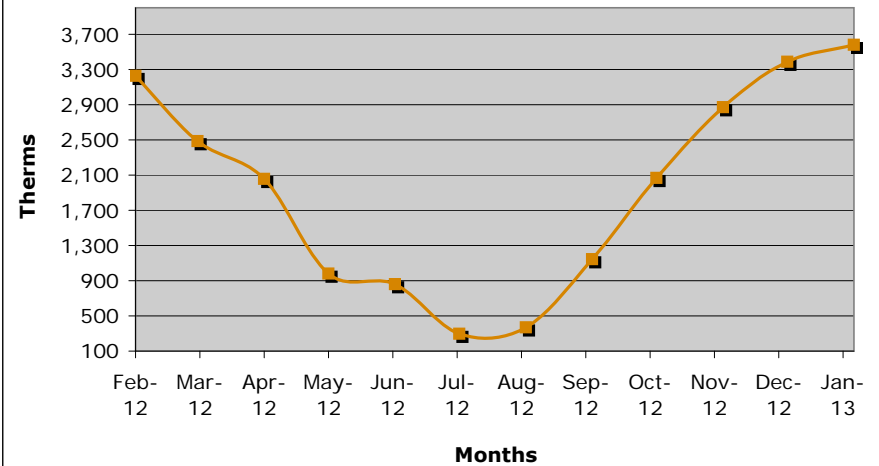
### St Jude Commons

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

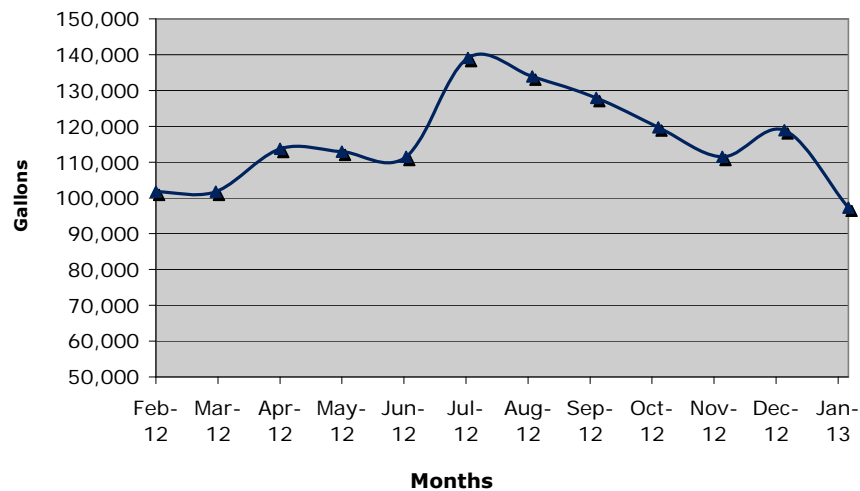
**Electricity**



**Natural Gas**



**Water & Sewer**

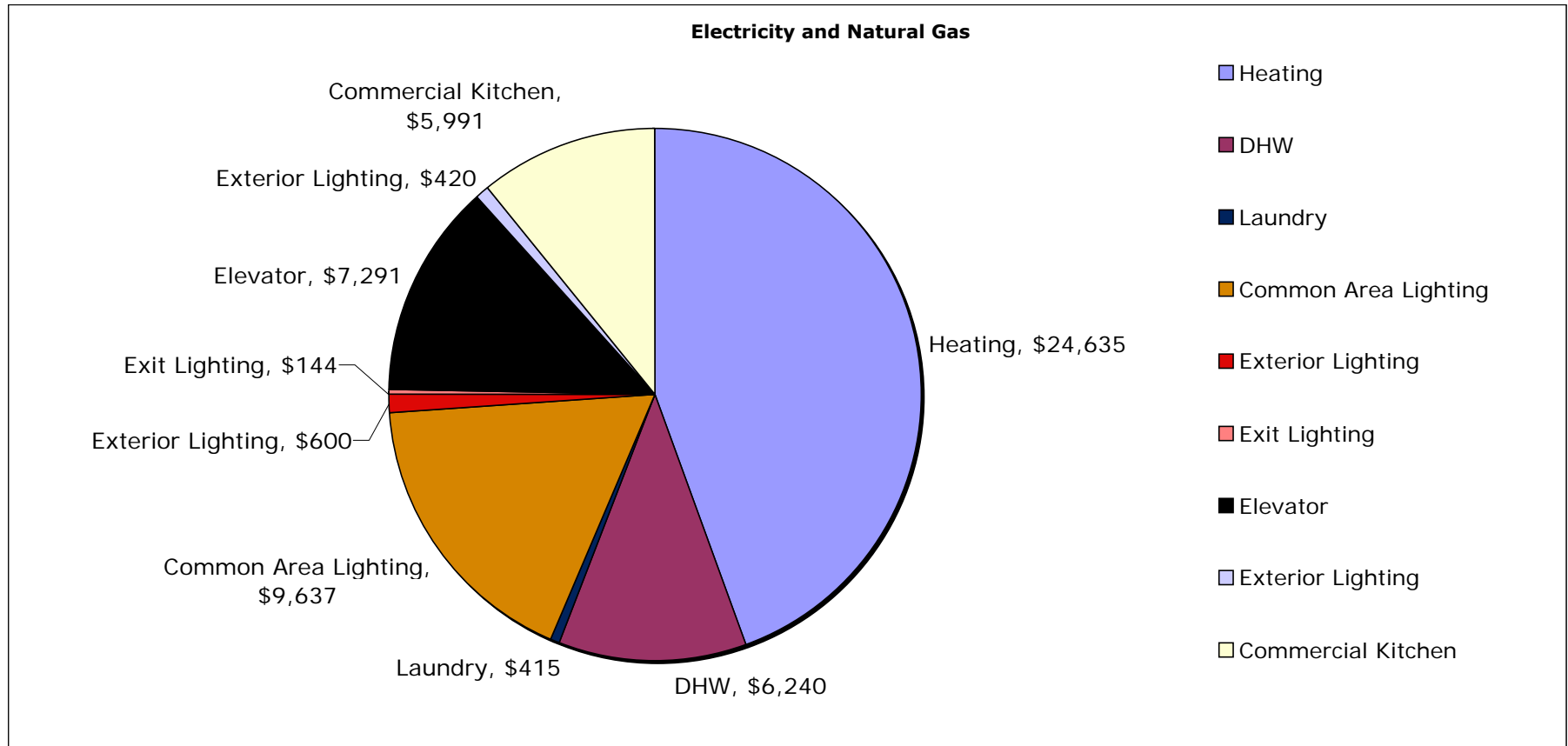


# Energy Analysis

## Disaggregated End Uses

### St Jude Commons

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	\$24,635		18,977	1,897,652,347
DHW	Natural Gas	\$6,240		4,806	480,649,352
Laundry	Electricity	\$415		320	31,967,460
Common Area Lighting	Electricity	\$9,637	63,447		216,480,925
Exterior Lighting	Electricity	\$600	3,950		13,478,111
Exit Lighting	Electricity	\$144	948		3,234,747
Elevator	Electricity	\$7,291	48,002		163,781,511
Exterior Lighting	Electricity	\$420	2,765		9,434,678
Commercial Kitchen	Electricity	\$5,991	39,443		134,578,938

# Energy Analysis

## Notes

### St Jude Commons

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 all utilities: natural gas, electricity, and water/sewer.

#### Natural Gas

Natural gas shows a normal consumption pattern, with spikes during the heating season since the property utilizes natural gas for heating purposes. Natural gas is used for space heating, common area DHW, and commercial kitchen cooking.

#### Electricity

Electricity usage peaks during the summer indicating usage related to space cooling (common area and unit air conditioners). This property also has a significant electric demand (kW) which is related to the commercial kitchen systems (e.g. walk-in refrigerator, freezer, and the electric-heated booster station for the dishwasher). Each apartment has its own electric-heated DHW tank, and electric range.

#### Water and Sewer

Water and sewer is billed monthly. The summer peak usage suggests increased water usage for possible irrigation.

# 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): **Elderly, Congregate**  
 Resident Population Persons: **55**

## Space Types

Units, Common Areas	Square Footage:	<b>41,070</b>	Conditioned:	<b>Yes</b>
Basement	Square Footage:	<b>6,250</b>	Conditioned:	<b>No</b>
Basement	Square Footage:	<b>6,250</b>	Conditioned:	

## Utility Metering

Common Spaces	Utility Type:	<b>Electricity</b>	Individual, Master:	<b>Master</b>
Whole Building	Utility Type:	<b>Natural Gas</b>	Individual, Master:	<b>Master</b>
Whole Building	Utility Type:	<b>Water/Sewer</b>	Individual, Master:	<b>Master</b>
Dwelling Units	Utility Type:	<b>Electricity</b>	Individual, Master:	<b>Master</b>

## Infiltration

Infiltration Condition	Tight, Leaky:	<b>Average</b>
Infiltration Rate	ACH:	<b>0.8</b>

## Architectural

Wall Insulation	Type:	<b>Batt</b>	R-Value:	<b>R-19</b>
Roof Insulation	Type:	<b>Cellulose</b>	R-Value:	<b>R-38</b>
Exterior Doors 1	Type:	<b>Flush Metal</b>	R-Value:	<b>&lt; R-5</b>
Exterior Doors 2	Type:	<b>Wood/Glass</b>	R-Value:	<b>&lt; R-5</b>
Windows 1	Type:	<b>Aluminum</b>	U-Factor:	<b>0.5</b>

## Heating and Cooling

### Temperature Control:

Occupied Heating Temp	Degrees F:	<b>73</b>
Occupied Cooling Temp	Degrees F:	<b>80</b>
Unoccupied <sup>1</sup> Heating Temp	Degrees F:	<b>68</b>
Unoccupied <sup>1</sup> Heating Time	Hours / Day:	<b>8</b>

### Boilers / DHW Generation:

Boiler (5 Modules)	Type:	<b>Gas-Fired</b>	Capacity:	<b>1500 MBH</b>	Efficiency:	<b>78%</b>
Domestic Hot Water 1	Type:	<b>Gas-Fired</b>	Capacity:	<b>350 MBH</b>	Efficiency:	<b>81%</b>

<sup>1</sup>Unoccupied temps/times based on opportunity for savings based on programmable thermostats

## Water & Sewer

### Domestic Hot Water:

DHW Daily Usage	Gallons/Resident:	<b>18</b>
DHW Delivery Temp	Degrees F:	<b>120</b>

### Domestic Cold Water:

Showerheads	Gallons / Minute:	<b>2</b>
Toilets	Gallons / Flush:	<b>1.6</b>
Irrigation	Gallons / Year:	<b>None</b>

## Lighting Loads

Hallway	Type:	<b>Fluorescent, LED</b>	Wattage:	<b>61, 3.5</b>	Hours per Day:	<b>24</b>
Storage	Type:	<b>T8</b>	Wattage:	<b>32</b>	Hours per Day:	<b>10</b>
Common Kitchen	Type:	<b>T8</b>	Wattage:	<b>61</b>	Hours per Day:	<b>1</b>
Exit Lighting	Type:	<b>LED</b>	Wattage:	<b>4</b>	Hours per Day:	<b>24</b>
Community / Office	Type:	<b>Fluorescent, LED</b>	Wattage:	<b>61, 3.5</b>	Hours per Day:	<b>4-8</b>
Exterior	Type:	<b>Metal Halide</b>	Wattage:	<b>150</b>	Hours per Day:	<b>12</b>

## Appliances, Miscellaneous Loads

Range	Energy Star (Y/N):	<b>No</b>	Usage per Year:	<b>2049 kWh</b>
Refrigerator	Energy Star (Y/N):	<b>No</b>	Usage per Year:	<b>884 kWh</b>
Laundry	Energy Star (Y/N):	<b>No</b>	Usage per Year:	<b>450 kWh</b>
Miscellaneous Load			Usage per Year:	<b>6920 kWh</b>

# Simple Payback Analysis

**EWCM** #1 Convert Exterior Lighting

## Replacement Costs

A. Total cost to convert X to X:

\$1,065.00

## Utility Cost

Electricity: \$0.15  
Natural Gas: \$1.30

## Existing Types / Usage

Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage \$/Year
Type 1: Pole-mounted CFLs	26	7	11	365	731	\$110.99
Type 2: Bldg Mounted MH Floods	150	6	11	365	3,614	\$548.86
Type 3:					0	\$0.00
Type 4:					0	\$0.00
Type 5:					0	\$0.00
				Total:	4,344	\$659.85

## Proposed Green Types / Usage

Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage \$/Year
Type 1: Pole-mounted LEDs	17	7	11	365	478	\$72.57
Type 2: Bldg Mntd Induction Floods	65	6	11	365	1,566	\$237.84
Type 3:					0	\$0.00
Type 4:					0	\$0.00
Type 5:					0	\$0.00
				Total:	2,044	\$310.41

## Annual Electric Savings

7,849,630 BTUs  
2,300.60 kWh  
Savings = 2,300.60 x \$0.15 = \$349.44/yr

## Annual Natural Gas Savings<sup>1</sup>

0 BTUs  
0.00 therms  
Savings = 0.00 x \$1.30 = \$0.00/yr

## Annual Net Cost Savings

\$349.44 + \$0.00 = \$349.44

## 5. Simple Payback

\$1,065.00 / \$349.44 = 3.05 yrs

## Additional Notes/Comments:

<sup>1</sup>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.



# Simple Payback Analysis

**EWCM #2 Condensing Boiler Plant**

## Description

Replace existing atmospheric modular boiler plant with a comparably-sized condensing boiler plant.

## Replacement Costs

	Type	Cost
A. Proposed Conventional:	Atmospheric Boiler Plant	\$32,400
B. Proposed Green:	Condensing Boiler Plant	\$49,500
C. Incremental Cost Between Proposed Conventional and Proposed Green:		\$17,100.00

## Boiler Efficiencies

A. Existing Efficiency:	78%
B. Conventional Efficiency:	85%
C. Green Efficiency:	94%

## Annual Utility Cost

	Existing	Conventional	Green
	1,897,652,347 btus	1,722,674,433 btus	1,508,442,788 btus
	18976.52 therms	17226.74 therms	15084.43 therms
Utility Cost	\$1.30 /therm	\$1.30 /therm	\$1.30 /therm
Heating Cost	\$24,635.23	\$22,363.68	\$19,582.53

## Annual Savings: Existing to Conventional

$$\text{Savings} = \$24,635.23 - \$22,363.68 = \$2,271.55/\text{yr}$$

## Annual Savings: Conventional to Green

$$\text{Savings} = \$22,363.68 - \$19,582.53 = \$2,781.14/\text{yr}$$

## Annual Savings: Existing to Green

$$\text{Savings} = \$2,271.55 + \$2,781.14 = \$5,052.70/\text{yr}$$

## Simple Payback: Conventional

$$\frac{\$32,400.00}{\$2,271.55} = 14.3 \text{ yrs}$$

## Simple Payback: Green

$$\frac{\$49,500.00}{\$5,052.70} = 9.8 \text{ yrs}$$

## Incremental Payback: Conventional to Green

$$\frac{\$17,100.00}{\$2,781.14} = 6.1 \text{ yrs}$$

## Additional Notes:

The condensing boilers will require new corrosion resistant flues (i.e. stainless steel or heat resistant plastic (CPVC)) to address the corrosive flue gas vapors as a result of the condensing operation. Condensing boiler plant will have low temperature flue gases (under 100°F).

The energy savings are from the TREAT energy model of St Jude Common.

# Simple Payback Analysis

**EWCM #3 Replace Pump Motors**

**Description:** This worksheet calculates the annual savings and simple payback of replacing existing pump motors with comparable premium efficient motors.

**Methodology:** Energy usage for each motor is calculated by converting the motor's horsepower (hp) rating to kilowatts (kW), and multiplying the kW value by the annual hours of use, and dividing this amount by the motor's efficiency:

$$\{ (\text{hp}) \times (0.746 \text{ kW/hp}) \times (\text{hours}) \} \div (\text{Motor efficiency})$$

## Replacement Costs

	Type	Cost
A. Proposed Conventional:	Standard Efficiency Motors	\$5,250.00
B. Proposed Green:	High Efficiency Motors	\$5,395.00
C. Incremental Cost Between Proposed Conventional and Proposed Green:		\$145.00

## Utility Cost

Electricity: \$0.15

## Existing Conditions

Existing Motor	Quantity	Size: hp	Conversion Factor kW/hp	kW per Motor	Usage hrs/Yr	Load	Existing Efficiency	Total Usage kWh	Operational Cost \$
Heat P1	1	2	.746	1.4920	3200	100%	82.5%	5,787	\$879
Heat P2			.746	0.0000		100%		0	\$0
Heat P3			.746	0.0000		100%		0	\$0
Heat P4			.746	0.0000		100%		0	\$0
DHW P1	2	0.25	.746	0.1865	4400	100%	78.0%	2,104	\$320
DHW P2			.746	0.0000		100%		0	\$0
DHW P3			.746	0.0000		100%		0	\$0
Totals:								7,891	\$1,199

## Proposed Green Conditions

Existing Motor	Quantity	Size: hp	Conversion Factor kW/hp	kW per Motor	Usage hrs/Yr	Load	Proposed Efficiency	Total Usage kWh	Operational Cost \$
Heat P1	1	2	.746	1.4920	3200	100%	87.0%	5,488	\$834
Heat P2			.746	0.0000		100%		0	\$0
Heat P3			.746	0.0000		100%		0	\$0
Heat P4			.746	0.0000		100%		0	\$0
DHW P1	2	0.25	.746	0.1865	4400	100%	81.0%	2,026	\$308
DHW P2			.746	0.0000		100%		0	\$0
DHW P3			.746	0.0000		100%		0	\$0
Totals:								7,514	\$1,141

## Annual Savings: Existing to Proposed Green

Savings = \$1,198.61 - \$1,141.31 = \$57.30 / yr

## Simple Payback: Existing to Proposed Green

\$145.00 / \$57.30 = 2.5 yrs

# Simple Payback Analysis

**EWCM #4 Condensing DHW Boiler**

## Description

Replace existing atmospheric modular boiler plant with a comparably-sized condensing boiler plant.

## Replacement Costs

	Type	Cost
A. Proposed Conventional:	Atmospheric DHW Boiler	\$7,560.00
B. Proposed Green:	Condensing DHW Boiler	\$11,550.00
C. Incremental Cost Between Proposed Conventional and Proposed Green:		\$3,990.00

## Boiler Efficiencies

A. Existing Efficiency:	80%
B. Conventional Efficiency:	85%
C. Green Efficiency:	94%

## Annual Utility Cost

	Existing	Conventional	Green
	480,649,352 btus	422,813,875 btus	339,446,165 btus
	4806.49 therms	4228.14 therms	3394.46 therms
Utility Cost	\$1.30 /therm	\$1.30 /therm	\$1.30 /therm
Heating Cost	\$6,239.77	\$5,488.95	\$4,406.67

## Annual Savings: Existing to Conventional

Savings = \$6,239.77 - \$5,488.95 = \$750.82 /yr

## Annual Savings: Conventional to Green

Savings = \$5,488.95 - \$4,406.67 = \$1,082.28 /yr

## Annual Savings: Existing to Green

Savings = \$750.82 + \$1,082.28 = \$1,833.09 /yr

## Simple Payback: Conventional

\$7,560.00 / \$750.82 = 10.1 yrs

## Simple Payback: Green

\$11,550.00 / \$1,833.09 = 6.3 yrs

## Incremental Payback: Conventional to Green

\$3,990.00 / \$1,082.28 = 3.7 yrs

## Additional Notes:

The condensing DHW boiler will require new corrosion resistant flues (i.e. stainless steel or heat resistant plastic (CPVC)) to address the corrosive flue gas vapors as a result of the condensing operation. Condensing boiler plant will have low temperature flue gases (under 100°F).

The energy savings are from the TREAT energy model of St Jude Common.

# Simple Payback Analysis

**EWCM #5 Replace Exterior Glass Doors**

Replacement Costs		Type	Cost
A. Proposed Conventional:		Metal-framed Glass Doors	\$108,819.50
B. Proposed Green:		Fiberglass Framed Doors	\$116,980.96
C. Incremental Cost Between Proposed Conventional and Proposed Green:			\$8,161.46

Existing Conditions	
General: Replace metal-framed glass doors (common and unit sliding) with fiberglass-framed insulated glass doors.	
A. Utility Cost:	Gas \$1.30 /therm

U-Factor <sup>1</sup>	
A. Existing:	0.50
B. Conventional:	0.50
C. Green:	0.33

Annual Savings: Existing to Conventional	
	0 BTUs
	0.00 therms
Savings =	\$1.30 x 0.00 = \$0.00 /yr

Annual Savings: Conventional to Green	
	244,100,000 BTUs
	2441.00 therms
Savings =	\$1.30 x 2441.00 = \$3,168.89 /yr

Annual Savings: Existing to Green	
	244,100,000 BTUs
	2441.00 therms
Savings =	\$0.00 + \$3,168.89 = \$3,168.89 /yr

Simple Payback: Conventional	
\$108,819.50	/ \$0.00 = n/a yrs
Simple Payback: Green	
\$116,980.96	/ \$3,168.89 = 36.9 yrs
Incremental Payback: Conventional to Green	
\$8,161.46	/ \$3,168.89 = 2.6 yrs

**Additional Notes:**  
<sup>1</sup> The U-Factors were derived from the 2001 ASHRAE Fundamentals Handbook, based on the specifications in the plan

# Simple Payback Analysis

**EWCM** #6 Replace Windows

Replacement Costs		Type	Cost
A. Proposed Conventional:		Metal-framed Windows	\$51,462.00
B. Proposed Green:		Fiberglass-framed Windows	\$55,321.65
C. Incremental Cost Between Proposed Conventional and Proposed Green:			\$3,859.65

Existing Conditions	
General: Slider models have poor fit and allow for appreciable air infiltration. Remaining models in fair condition with limited air infiltration.	
C. Utility Cost:	Gas <input type="text" value="\$1.30"/> sf /therm

U-Factor <sup>1</sup>	
A. Existing:	0.50
B. Conventional:	0.50
C. Green:	0.33

Annual Savings: Existing to Conventional	
	<input type="text" value="0"/> BTUs
	<input type="text" value="0.00"/> therms
Savings =	<input type="text" value="\$1.30"/> x <input type="text" value="0.00"/> = <input type="text" value="\$0.00"/> /yr

Annual Savings: Conventional to Green	
	<input type="text" value="197,300,000"/> BTUs
	<input type="text" value="1973.00"/> therms
Savings =	<input type="text" value="\$1.30"/> x <input type="text" value="1973.00"/> = <input type="text" value="\$2,561.34"/> /yr

Annual Savings: Existing to Green	
	<input type="text" value="197,300,000"/> BTUs
	<input type="text" value="1973.00"/> therms
Savings =	<input type="text" value="\$0.00"/> + <input type="text" value="\$2,561.34"/> = <input type="text" value="\$2,561.34"/> /yr

<b>Simple Payback: Conventional</b>				
<input type="text" value="\$51,462.00"/>	/	<input type="text" value="\$0.00"/>	=	<input type="text" value="n/a"/> yrs
<b>Simple Payback: Green</b>				
<input type="text" value="\$55,321.65"/>	/	<input type="text" value="\$2,561.34"/>	=	<input type="text" value="21.6"/> yrs
<b>Incremental Payback: Conventional to Green</b>				
<input type="text" value="\$3,859.65"/>	/	<input type="text" value="\$2,561.34"/>	=	<input type="text" value="1.5"/> 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 Replace Washing Machines - Common Area**

## 1. Replacement Costs

A. Proposed Conventional (Top loading washers & electric dryers)	\$11,120
B. Proposed Green (Front loading washers and gas dryers)	\$14,454
C. Incremental Cost Between Proposed Conventional and Proposed Green	\$3,334.00

## 2. Existing Conditions

A. Total number of inefficient washing machines	4
B. Total of electric dryers	4

## 3. Annual Energy and Water Use Existing Models

	Annual energy use <sup>2</sup>		Utility cost		Total annual cost
Gas (therms):	238.28	x	\$1.30	=	\$309.33
Electric (kWh):	10920.00	x	\$0.15	=	\$1,658.65
Water/Sewer (gal):	43,128.00	x	\$0.0124	=	\$534.28
					3
					\$2,502.26

## 4. Annual Energy and Water Use Proposed Conventional Models

	Annual energy use <sup>2</sup>		Utility cost		Total annual cost
Gas (therms):	238.28	x	\$1.30	=	\$309.33
Electric (kWh):	10920.00	x	\$0.15	=	\$1,658.65
Water/Sewer (gal):	43,128.00	x	\$0.0124	=	\$534.28
					4
					\$2,502.26

## 5. Annual Energy and Water Use Proposed Green Models

	Annual energy use <sup>2</sup>		Utility cost		Total annual cost
Gas (therms):	658.00	x	\$1.30	=	\$854.21
Electric (kWh):	936.00	x	\$0.15	=	\$142.17
Water/Sewer (gal):	21,564.00	x	\$0.0124	=	\$267.14
					5
					\$1,263.52

## 6. Annual Savings: Existing to Proposed Conventional

3	4	6			
\$2,502.26	-	\$1,263.52	=	\$1,238.74	/yr

## 7. Annual Savings: Proposed Conventional to Proposed Green

4	5	7			
\$2,502.26	-	\$1,263.52	=	\$1,238.74	/yr

## 9. Simple Payback: Existing to Proposed Green

\$14,454.00	/	\$1,238.74	=	11.67	yrs
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## Incremental Payback: Proposed Conventional to Proposed Green

\$3,334.00	/	\$1,238.74	=	2.69	yrs
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## Additional Notes/Comments:

<sup>1</sup> This worksheet assumes that on average, residents use the washing machines 1-2 times per week

<sup>2</sup> Replacing electric dryers with gas dryers results in increased natural gas usage. The electric savings is also increased due to the dryer replacement.

Proposed green cost also includes related plumbing to provide natural gas service to the public laundry rooms

# Simple Payback Analysis

**EWCM #8 High Efficiency Toilets (Apts and Common)**

## Replacement Costs

A. Proposed Conventional	\$22,140.00
B. Proposed Green	\$23,800.50
C. Incremental Cost Between Proposed Conventional and Proposed Green	\$1,660.50

## Existing Conditions

A. Total number of existing toilets	54	
B. Average gallons per flush:	1.6	
C. Estimated total number of flushes per day:	6.0	
D. Estimated total daily usage per toilet:	10	gal/day
E. Estimated number of days per year facility in use:	365	
F. Cost of water and sewer:	\$0.0124	(\$/gal)

## Proposed Conditions: Conventional Models

A. Total number of toilets	54	
B. Average gallons per flush:	1.6	
C. Estimated total number of flushes per day	6.0	
D. Estimated total daily usage per toilet:	10	gal/day
E. Estimated number of days per year facility in use:	365	
F. Cost of water and sewer:	\$0.0124	(\$/gal)

## Proposed Conditions: Green Models

A. Total number of toilets	54	
B. Average gallons per flush:	1.28	
C. Estimated total number of flushes per day	6.0	
D. Estimated total daily usage per toilet:	8	gal/day
E. Estimated number of days per year facility in use:	365	
F. Cost of water and sewer:	\$0.0124	(\$/gal)

## Annual Water Use: Existing Models

$$54 \times 10 \times 365 = 189,216 \text{ gal/yr}$$

## Annual Water Use: Proposed Conventional Models

$$54 \times 10 \times 365 = 189,216 \text{ gal/yr}$$

## Annual Water Use: Proposed Green Models

$$54 \times 8 \times 365 = 151,373 \text{ gal/yr}$$

## Annual Savings: Existing to Proposed Conventional Models

$$189,216 - 189,216 \times \$0.01 = \$0.00 \text{ \$/yr}$$

## Annual Savings: Proposed Conventional to Proposed Green Models

$$189,216 - 151,373 \times \$0.01 = \$468.81 \text{ \$/yr}$$

## Annual Savings: Existing to Proposed Green Models

$$\$0.00 + \$468.81 = \$468.81 \text{ \$/yr}$$

## Simple Payback: Conventional

$$\frac{\$22,140.00}{\$0.00} = \text{n/a} \text{ yrs}$$

## Simple Payback: Green

$$\frac{\$23,800.50}{\$468.81} = 50.77 \text{ yrs}$$

## Incremental Payback: Proposed Conventional to Proposed Green Models

$$\frac{\$1,660.50}{\$468.81} = 3.54 \text{ yrs}$$

**Additional Notes/Comments:** This worksheet assumes an average of 6 flushes per day for all toilets. There are 51 apartment toilets and 3 common toilets

## Simple Payback Analysis

**EWCM** #9 Replace Refrigerators - Dwelling Units

### Replacement Costs

A. Proposed Conventional	\$34,170.00
B. Proposed Green	\$36,732.75
C. Incremental Cost Between Proposed Conventional and Proposed Green	\$2,562.75

Electricity:	\$0.15
Natural Gas:	\$1.30

### Existing Conditions

A. Existing refrigerator type	Frost-free
B. Number of refrigerators	51
C. Average annual energy use per refrigerator	884 kWh / Year
D. Total annual energy use	45,084.00 kWh / Year
E. Total annual operational cost	\$6,847.84 \$ / Year

### Proposed Conventional Conditions

A. Proposed standard refrigerator type	Frost-free
B. Number of refrigerators	51
C. Average annual energy use per refrigerator	884 kWh / Year
D. Total annual energy use	45,084.00 kWh / Year
E. Total annual operational cost	\$6,847.84 \$ / Year

### Proposed Green Conditions

A. Proposed green refrigerator type	Energy Star FF
B. Number of refrigerators	51
C. Average annual energy use per refrigerator	515 kWh / Year
D. Total annual energy use	26,265.00 kWh / Year
E. Total annual operational cost	\$3,989.41 \$ / Year

### Annual Savings: Existing to Proposed Conventional

Electricity:	\$0.15	x	0.00	=	\$0.00	\$ / Year
Natural Gas <sup>1</sup> :	\$1.30	x	-247.00	=	-\$320.65	\$ / Year
Total:				=	-\$320.65	\$ / Year

### Annual Savings: Proposed Conventional to Proposed Green

Electricity:	\$0.15	x	18,819.00	=	\$2,858.43	\$ / Year
Natural Gas <sup>1</sup> :	\$1.30	x		=	\$0.00	\$ / Year
Total:				=	\$2,858.43	\$ / Year

### Annual Savings: Existing to Proposed Green

Electricity:	\$0.15	x	18,819.00	=	\$2,858.43	\$ / Year
Natural Gas <sup>1</sup> :	\$1.30	x	-247.00	=	-\$320.65	\$ / Year
Total:				=	\$2,537.78	\$ / Year

### Simple Payback: Conventional

1B		10			
\$34,170.00	/	-\$320.65	=	n/a	yrs

### Simple Payback: Green

\$36,732.75	/	\$2,537.78	=	14.47	yrs
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### Incremental Payback: Proposed Conventional to Proposed Green

\$2,562.75	/	\$2,858.43	=	0.90	yrs
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### Additional Notes/Comments:

<sup>1</sup>Negative natural gas savings attributed to decrease in heating gain from the reduced refrigerator wattage; therefore, additional natural gas required for space heating in these areas.



# Simple Payback Analysis

**EWCM** #10 Install Programmable Thermostats - Dwelling Units

## Installation Costs

A. Proposed Conventional	Manual Thermostats	\$5,355.00
B. Proposed Green	Programmable Thermostats	\$10,302.00
C. Incremental Cost Between Proposed Conventional and Proposed Green		\$4,947.00

## Utility Costs

Natural Gas: \$1.30

## Existing Conditions

A. Occupied heating temperature	73°F
B. Unoccupied (setback) heating temperature	73°F
C. Unoccupied (setback) time	0 hrs / day

## Proposed Conventional Conditions

A. Occupied heating temperature	73°F
B. Unoccupied (setback) heating temperature	73°F
C. Unoccupied (setback) time	0 hrs / day

## Proposed Green Condition

A. Occupied heating temperature	73°F
B. Unoccupied (setback) heating temperature	68°F
C. Unoccupied (setback) time	8 hrs / day

## Annual Savings: Existing to Proposed Conventio

Savings = 0 btus  
0.00 therms  
\$1.30 x 0.00 = \$0.00 /yr

## Annual Savings: Conventional to Proposed Gree

165,900,000 btus  
1659.00 therms  
\$1.30 x 1659.00 = \$2,153.71 /yr

## Annual Net Cost Savings

\$0.00 + \$2,153.71 = \$2,153.71

## Simple Payback: Conventional

\$5,355.00 / \$0.00 = n/a yrs

## Simple Payback: Green

\$10,302.00 / \$2,153.71 = 4.78 yrs

## Incremental Payback: Proposed Conventional to Proposed Green Models

\$4,947.00 / \$2,153.71 = 2.30 yrs

## Additional Notes/Comments:

1. The worksheet estimates that the facility is in use 365 days/year
2. Unoccupied (setback) temperatures and times are subject to proper resident usage.

# Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 1

Exterior Lighting Upgrade

Compact Fluorescent and Metal Halide Lighting

vs.

LED and Induction Lighting

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

30

Conventional Product:

Compact Fluorescent and Metal Halide Lighting

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Maintain	Pole-mtd CFLs	7	ea	\$0.00		20	1	1.5		
Maintain	Bldg-mtd MH Floods	6	ea	\$0.00		20	1	1.5		
Utility Cost	Electric Usage	4,344	kWh	\$0.15	\$660	1	1	30.0	\$31,393	\$10,815
Total Life Cycle Cost									\$31,393	\$10,815

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$31,393	\$10,815
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Green Product:

LED and Induction Lighting

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	Pole-mtd LEDs	7	ea	\$45.00	\$315	30	1	1.0	\$315	\$315
Install/Replace	Bldg-mtd Induction	6	ea	\$126.00	\$756	30	1	1.0	\$756	\$756
Utility Cost	Electric Usage	2,044	kWh	\$0.15	\$310	1	1	30.0	\$14,768	\$5,088
Total Life Cycle Cost									\$15,839	\$6,159

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$15,839	\$6,159
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## ECONOMIC RETURN ANALYSIS

Green NPV	\$4,656
Green IRR	52.9%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: LED and Induction Lighting

Override with Green Product? No

Final Product Choice

Green Product: LED and Induction 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**
**Exterior Lighting Upgrade**
**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product

**16**

Replacement Year

**17**

Final Product Choice

Green Product:

**LED and Induction Lighting**
**Immediate Replacement**

Year

**1**

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Pole-mtd LEDs	7	ea	\$45.00	\$315	30	1	1.0	\$315	\$315
Install/Replace	Bldg-mtd Induction	6	ea	\$126.00	\$756	30	1	1.0	\$756	\$756
Utility Cost	Electric Usage	2,044	kWh	\$0.15	\$310	1	1	30.0	\$14,768	\$5,088
Total Life Cycle Cost									<b>\$15,839</b>	<b>\$6,159</b>

*Energy Savings*

Net Life Cycle Cost after Energy Savings									<b>\$15,839</b>	<b>\$6,159</b>

**Replacement at End of Remaining Useful Life**

Year

**17**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Pole-mtd LEDs	7	ea	\$45.00	\$315	30	17	0.5	\$110	\$105
Install/Replace	Bldg-mtd Induction	6	ea	\$126.00	\$756	30	17	0.5	\$263	\$252
Utility Cost	Electric Usage	2,044	kWh	\$0.15	\$310	1	17	14.0	\$8,511	\$1,523

*Expenses for Current Product Through Useful Life*

Utility Cost	Current Electric Usage	4,344	kWh	\$0.15	\$660	1	1	16.0	\$13,300	\$7,577
Total Life Cycle Cost									<b>\$22,184</b>	<b>\$9,457</b>

*Energy Savings*

Net Life Cycle Cost after Energy Savings									<b>\$22,184</b>	<b>\$9,457</b>

**ECONOMIC RETURN ANALYSIS**

Timing NPV	<b>\$3,299</b>
Timing IRR	<b>52.88%</b>

**TIMING RECOMMENDATION**

Replacement Year:	<b>1</b>
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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

Condensing Boiler Plant

Atmospheric Boiler Plant

vs.

Condensing Boiler Plant

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

25

Conventional Product:

Atmospheric Boiler Plant

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	Atmospheric Boilers	5	ea	6,480	\$32,400	25	1	1.0	\$32,400	\$32,400
Utility Cost	Natural Gas Usage	17226.74	therms	\$1.30	\$22,364	1	1	25.0	\$815,363	\$335,371
Total Life Cycle Cost									\$847,763	\$367,771

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$847,763	\$367,771

Green Product:

Condensing Boiler Plant

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	Condensing Boilers	5	ea	9,900	\$49,500	20	1	1.3	\$63,435	\$56,780
Utility Cost	Natural Gas Usage	15084.43	therms	\$1.30	\$19,583	1	1	25.0	\$713,965	\$293,665
Total Life Cycle Cost									\$777,400	\$350,445

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$777,400	\$350,445

## ECONOMIC RETURN ANALYSIS

Green NPV	\$17,327
Green IRR	21.1%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Condensing Boiler Plant

Override with Green Product? No

Final Product Choice

Green Product: Condensing 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**
**Condensing Boiler Plant**
**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product  
Replacement Year

**5**  
**6**

Final Product Choice

Green Product: **Condensing Boiler Plant**

**Immediate Replacement**

Year

**1**

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Condensing Boilers	5	ea	\$9,900.00	\$49,500	20	1	1.3	\$63,435	\$56,780
Utility Cost	Natural Gas Usage	15,084	therms	\$1.30	\$19,583	1	1	25.0	\$713,965	\$293,665
Total Life Cycle Cost									<b>\$777,400</b>	<b>\$350,445</b>

Energy Savings

Net Life Cycle Cost after Energy Savings									<b>\$777,400</b>	<b>\$350,445</b>

**Replacement at End of Remaining Useful Life**

Year

**6**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Condensing Boilers	5	ea	\$9,900.00	\$49,500	20	6	1.0	\$57,384	\$39,055
Utility Cost	Natural Gas Usage	15,084	therms	\$1.30	\$19,583	1	6	20.0	\$609,998	\$204,408

Expenses for Current Product Through Useful Life

Utility Cost	Current Gas Usage	18976.52	therms	\$1.30	\$24,635	1	1	5.0	\$130,792	\$112,287
Total Life Cycle Cost									<b>\$798,174</b>	<b>\$355,749</b>

Energy Savings

Net Life Cycle Cost after Energy Savings									<b>\$798,174</b>	<b>\$355,749</b>

**ECONOMIC RETURN ANALYSIS**

Timing NPV	<b>\$5,305</b>
Timing IRR	<b>12.23%</b>

**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

High Efficient Motors

Standard Pump Motors

vs.

High Efficient Pump Motors

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

25

Conventional Product:

Standard Pump Motors

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	Std 2hp Pump Motor	1	ea	\$3,350.00	\$3,350	25	1	1.0	\$3,350	\$3,350
Install/Replace	Std DHW Pump Motors	2	ea	\$950.00	\$1,900	20	1	1.3	\$2,435	\$2,179
Utility Cost	Electric Usage	7,891	kWh	\$0.15	\$1,199	1	1	25.0	\$43,700	\$17,975
Total Life Cycle Cost									\$49,485	\$23,504

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$49,485	\$23,504
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Green Product:

High Efficient Pump Motors

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	High Eff 2hp Pump Motor	1	ea	\$3,425.00	\$3,425	25	1	1.0	\$3,425	\$3,425
Install/Replace	High Eff DHW Pump Mtrs	2	ea	\$985.00	\$1,970	20	1	1.3	\$2,525	\$2,260
Utility Cost	Electric Usage	7,514	kWh	\$0.15	\$1,141	1	1	25.0	\$41,611	\$17,115
Total Life Cycle Cost									\$47,561	\$22,800

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$47,561	\$22,800
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## ECONOMIC RETURN ANALYSIS

Green NPV	\$704
Green IRR	70.3%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: High Efficient Pump Motors

Override with Green Product? No

Final Product Choice

Green Product: High Efficient Pump Motors

### 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**
**High Efficient Motors**
**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product

0

Final Product Choice

Green Product:

High Efficient Pump Motors

**Immediate Replacement**

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	High Eff 2hp Pump Motor	1	ea	\$3,425.00	\$3,425	25	1	1.0	\$3,425	\$3,425
Install/Replace	High Eff DHW Pump Mtrs	2	ea	\$985.00	\$1,970	20	1	1.3	\$2,525	\$2,260
Utility Cost	Electric Usage	7,514	kWh	\$0.15	\$1,141	1	1	25.0	\$41,611	\$17,115
Total Life Cycle Cost									\$47,561	\$22,800
<i>Energy Savings</i>										
Net Life Cycle Cost after Energy Savings									\$47,561	\$22,800

**ECONOMIC RETURN ANALYSIS**

Timing NPV	n/a
Timing IRR	n/a

**TIMING RECOMMENDATION**

Replacement Year:	1
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**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

Condensing DHW Boiler

Atmospheric Boiler

vs.

Condensing Boiler

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term 20

Conventional Product:

Atmospheric Boiler

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	Atmospheric DHW Boiler	1	ea	7560.00	\$7,560	20	1	1.0	\$7,560	\$7,560
Utility Cost	Natural Gas Usage	4228.14	therms	\$1.30	\$5,489	1	1	20.0	\$147,490	\$72,619
Total Life Cycle Cost									\$155,050	\$80,179

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$155,050	\$80,179

Green Product:

Condensing Boiler

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	Condensing DHW Boiler	1	ea	11550.00	\$11,550	20	1	1.0	\$11,550	\$11,550
Utility Cost	Natural Gas Usage	3394.46	therms	\$1.30	\$4,407	1	1	20.0	\$118,409	\$58,300
Total Life Cycle Cost									\$129,959	\$69,850

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$129,959	\$69,850

## ECONOMIC RETURN ANALYSIS

Green NPV	\$10,329
Green IRR	41.2%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Condensing Boiler

Override with Green Product? No

Final Product Choice

Green Product: Condensing Boiler

### 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**
**Condensing DHW Boiler**
**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product  
Replacement Year

**9**  
**10**

Final Product Choice

Green Product: **Condensing Boiler**

**Immediate Replacement**

Year

**1**

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Condensing DHW Boiler	1	ea	\$11,550.00	\$11,550	20	1	1.0	\$11,550	\$11,550
Utility Cost	Natural Gas Usage	3,394	therms	\$1.30	\$4,407	1	1	20.0	\$118,409	\$58,300
Total Life Cycle Cost									<b>\$129,959</b>	<b>\$69,850</b>

**Energy Savings**

Net Life Cycle Cost after Energy Savings									<b>\$129,959</b>	<b>\$69,850</b>

**Replacement at End of Remaining Useful Life**

Year

**10**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Condensing DHW Boiler	1	ea	\$11,550.00	\$11,550	20	10	0.6	\$5,956	\$5,427
Utility Cost	Natural Gas Usage	3,394	therms	\$1.30	\$4,407	1	10	11.0	\$73,641	\$25,244

**Expenses for Current Product Through Useful Life**

Utility Cost	Current Gas Usage	4806.49	therms	\$1.30	\$6,240	1	1	9.0	\$63,390	\$46,807
Total Life Cycle Cost									<b>\$142,988</b>	<b>\$77,478</b>

**Energy Savings**

Net Life Cycle Cost after Energy Savings									<b>\$142,988</b>	<b>\$77,478</b>

**ECONOMIC RETURN ANALYSIS**

Timing NPV	<b>\$7,628</b>
Timing IRR	<b>21.90%</b>

**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): # 5

Fiberglass-framed Glass Doors

Metal-Framed Glass Doors

vs.

Fiberglass-framed Glass Doors

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

35

Conventional Product:

Metal-Framed Glass Doors

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	Common Doors	2	ea	\$3,196.00	\$6,392	35	1	1.0	\$6,392	\$6,392
Install/Replace	Secondary Doors	5	ea	\$1,935.50	\$9,678	35	1	1.0	\$9,678	\$9,678
Install/Replace	Sliding Doors	53	ea	\$1,750.00	\$92,750	35	1	1.0	\$92,750	\$92,750

Total Life Cycle Cost

\$108,820

\$108,820

### Energy Savings

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Net Life Cycle Cost after Energy Savings

\$108,820

\$108,820

Green Product:

Fiberglass-framed Glass Doors

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	Common Doors	2	ea	\$3,435.70	\$6,871	35	1	1.0	\$6,871	\$6,871
Install/Replace	Secondary Doors	5	ea	\$2,080.66	\$10,403	35	1	1.0	\$10,403	\$10,403
Install/Replace	Sliding Doors	53	ea	\$1,881.25	\$99,706	35	1	1.0	\$99,706	\$99,706

Total Life Cycle Cost

\$116,981

\$116,981

### Energy Savings

Utility Cost	Natural Gas Savings	2,441	therms	\$1.30	(\$3,169)	1	1	35.0	(\$191,598)	(\$55,421)
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Net Life Cycle Cost after Energy Savings

(\$74,617)

\$61,560

## ECONOMIC RETURN ANALYSIS

Green NPV	\$47,260
Green IRR	68.4%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Fiberglass-framed Glass Doors

Override with Green Product? No

Final Product Choice

Green Product: Fiberglass-framed Glass 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-framed Glass Doors**
**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product  
Replacement Year

**10**  
**11**

**Final Product Choice**

**Green Product: Fiberglass-framed Glass Doors**

**Immediate Replacement**

**Year**

**1**

**Cost over Life Cycle (EUL)**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Common Doors	2	ea	\$3,435.70	\$6,871	35	1	1.0	\$6,871	\$6,871
Install/Replace	Secondary Doors	5	ea	\$2,080.66	\$10,403	35	1	1.0	\$10,403	\$10,403
Install/Replace	Sliding Doors	53	ea	\$1,881.25	\$99,706	35	1	1.0	\$99,706	\$99,706
<b>Total Life Cycle Cost</b>									<b>\$116,981</b>	<b>\$116,981</b>

**Energy Savings**

Utility Cost	Natural Gas Savings	2,441	therms	\$1.30	(\$3,169)	1	1	35.0	(\$191,598)	(\$55,421)
<b>Net Life Cycle Cost after Energy Savings</b>									<b>(\$74,617)</b>	<b>\$61,560</b>

**Replacement at End of Remaining Useful Life**

**Year**

**11**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Common Doors	2	ea	\$3,435.70	\$6,871	35	11	0.7	\$3,871	\$3,886
Install/Replace	Secondary Doors	5	ea	\$2,080.66	\$10,403	35	11	0.7	\$5,861	\$5,883
Install/Replace	Sliding Doors	53	ea	\$1,881.25	\$99,706	35	11	0.7	\$56,172	\$56,382

**Expenses for Current Product Through Useful Life**

<b>Total Life Cycle Cost</b>									<b>\$65,904</b>	<b>\$66,150</b>

**Energy Savings**

Utility Cost	Natural Gas Savings	2,441	therms	\$1.30	(\$3,169)	1	11	25.0	(\$155,270)	(\$29,582)
<b>Net Life Cycle Cost after Energy Savings</b>									<b>(\$89,366)</b>	<b>\$36,568</b>

**ECONOMIC RETURN ANALYSIS**

Timing NPV	<b>(\$24,991)</b>
Timing IRR	n/a

**TIMING RECOMMENDATION**

Replacement Year:	<b>11</b>
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**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

Fiberglass-framed Windows

Metal-framed Windows

vs.

Fiberglass-framed Windows

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term 35

Conventional Product: Metal-framed Windows

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	Metal Framed Windows	108	ea	\$476.50	\$51,462	35	1	1.0	\$51,462	\$51,462
Total Life Cycle Cost									\$51,462	\$51,462

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$51,462	\$51,462

Green Product: Fiberglass-framed Windows

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	Fiberglass Windows	108	ea	\$512.24	\$55,322	35	1	1.0	\$55,322	\$55,322
Total Life Cycle Cost									\$55,322	\$55,322

### Energy Savings

Maintain	Natural Gas Savings	1,973	therms	\$1.30	(\$2,561)	1	1	35.0	(\$154,864)	(\$44,796)
Net Life Cycle Cost after Energy Savings									(\$99,542)	\$10,526

## ECONOMIC RETURN ANALYSIS

Green NPV	\$40,936
Green IRR	206.2%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Fiberglass-framed Windows

Override with Green Product? No

Final Product Choice

Green Product: Fiberglass-framed 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**
**Fiberglass-framed Windows**
**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product  
Replacement Year

**10**  
**11**

Final Product Choice

Green Product: **Fiberglass-framed Windows**

**Immediate Replacement**

Year

**1**

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Fiberglass Windows	108	ea	\$512.24	\$55,322	35	1	1.0	\$55,322	\$55,322
Total Life Cycle Cost									<b>\$55,322</b>	<b>\$55,322</b>

**Energy Savings**

Maintain	Natural Gas Savings	1,973	therms	\$1.30	(\$2,561)	1	1	35.0	(\$154,864)	(\$44,796)
Net Life Cycle Cost after Energy Savings									<b>(\$99,542)</b>	<b>\$10,526</b>

**Replacement at End of Remaining Useful Life**

Year

**11**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Fiberglass Windows	108	ea	\$512.24	\$55,322	35	11	0.7	\$31,167	\$31,283

**Expenses for Current Product Through Useful Life**

Total Life Cycle Cost									<b>\$31,167</b>	<b>\$31,283</b>

**Energy Savings**

Maintain	Natural Gas Savings	1,973	therms	\$1.30	(\$2,561)	1	11	25.0	(\$125,501)	(\$23,910)
Net Life Cycle Cost after Energy Savings									<b>(\$94,334)</b>	<b>\$7,373</b>

**ECONOMIC RETURN ANALYSIS**

Timing NPV	<b>(\$3,153)</b>
Timing IRR	<b>6.95%</b>

**TIMING RECOMMENDATION**

Replacement Year: **11**

**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

Front Loading Washers and Gas Dryers

Top Loading Washers & Electric Dryers

vs.

Front Loading Washers & Gas Dryers

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

10

Conventional Product:

Top Loading Washers & Electric Dryers

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	Top Loading Washers	4	ea	\$650.00	\$2,600	10	1	1.0	\$2,600	\$2,600
Install/Replace	Electric Dryers	4	ea	\$740.00	\$2,960	10	1	1.0	\$2,960	\$2,960
Utility Cost	Electric Usage	10920.00	kWh	\$0.15	\$1,659	1	1	10.0	\$19,015	\$13,525
Utility Cost	Gas Usage	238.28	therms	\$1.30	\$309	1	1	10.0	\$3,546	\$2,522
Utility Cost	Water Usage	43,128.00	gallons	\$0.0124	\$534	1	1	10.0	\$6,125	\$4,357
Total Life Cycle Cost									<b>\$34,246</b>	<b>\$25,964</b>

### Energy Savings

Net Life Cycle Cost after Energy Savings									<b>\$34,246</b>	<b>\$25,964</b>

Green Product:

Front Loading Washers & Gas Dryers

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	Front Loading Washers	4	ea	\$698.75	\$2,795	10	1	1.0	\$2,795	\$2,795
Install/Replace	Gas Dryers	4	ea	\$795.50	\$3,182	10	1	1.0	\$3,182	\$3,182
Install/Replace	Laundry Rm Gas Service	1	ls	\$2,500.00	\$2,500	10	1	1.0	\$2,500	\$2,500
Utility Cost	Electric Usage	936.00	kWh	\$0.15	\$142	1	1	10.0	\$1,630	\$1,159
Utility Cost	Gas Usage	658.00	therms	\$1.30	\$854	1	1	10.0	\$9,793	\$6,965
Utility Cost	Water Usage	21,564.00	gallons	\$0.01	\$267	1	1	10.0	\$3,062	\$2,178
Total Life Cycle Cost									<b>\$22,962</b>	<b>\$18,780</b>

### Energy Savings

Net Life Cycle Cost after Energy Savings									<b>\$22,962</b>	<b>\$18,780</b>

## ECONOMIC RETURN ANALYSIS

Green NPV	<b>\$7,184</b>
Green IRR	<b>78.5%</b>

### 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.

## PRODUCT RECOMMENDATION

### Recommendation based on Economic Return Analysis

Green Product: Front Loading Washers & Gas Dryers

Override with Green Product? No

### Final Product Choice

Green Product: Front Loading Washers & Gas Dryers

**Energy and Water Conservation Measure (EWCM): # 7**

**Front Loading Washers and Gas Dryers**

**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product **0**

Final Product Choice

Green Product: **Front Loading Washers & Gas Dryers**

**Immediate Replacement**

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Front Loading Washers	4	ea	\$698.75	\$2,795	10	1	1.0	\$2,795	\$2,795
Install/Replace	Gas Dryers	4	ea	\$795.50	\$3,182	10	1	1.0	\$3,182	\$3,182
Install/Replace	Laundry Rm Gas Service	1	ls	\$2,500.00	\$2,500	10	1	1.0	\$2,500	\$2,500
Utility Cost	Electric Usage	936	kWh	\$0.15	\$142	1	1	10.0	\$1,630	\$1,159
Utility Cost	Gas Usage	658	therms	\$1.30	\$854	1	1	10.0	\$9,793	\$6,965
Utility Cost	Water Usage	21,564	gallons	\$0.01	\$267	1	1	10.0	\$3,062	\$2,178
<b>Total Life Cycle Cost</b>									<b>\$22,962</b>	<b>\$18,780</b>
<b>Energy Savings</b>										
<b>Net Life Cycle Cost after Energy Savings</b>									<b>\$22,962</b>	<b>\$18,780</b>

**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

High Efficiency Toilets

Low Flush Toilets (1.6 gpf)

vs.

High Efficiency Toilets (1.28 gpf)

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

30

Conventional Product:

Low Flush Toilets (1.6 gpf)

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	Apt Low Flush Toilets	51	ea	\$410.00	\$20,910	30	1	1.0	\$20,910	\$20,910
Install/Replace	Public Low Flush Toilets	3	ea	\$410.00	\$1,230	30	1	1.0	\$1,230	\$1,230
Utility Cost	Water/Sewer Usage	189,216	gallons	\$0.0124	\$2,344	1	1	30.0	\$111,519	\$38,418
Total Life Cycle Cost									\$133,659	\$60,558

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$133,659	\$60,558

Green Product:

High Efficiency Toilets (1.28 gpf)

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	Apt High Eff Toilets	51	ea	\$440.75	\$22,478	30	1	1.0	\$22,478	\$22,478
Install/Replace	Public High Eff Toilets	3	ea	\$440.75	\$1,322	30	1	1.0	\$1,322	\$1,322
Utility Cost	Water/Sewer Usage	151,373	gallons	\$0.0124	\$1,875	1	1	30.0	\$89,215	\$30,735
Total Life Cycle Cost									\$113,016	\$54,535

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$113,016	\$54,535

## ECONOMIC RETURN ANALYSIS

Green NPV	\$6,023
Green IRR	43.5%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: High Efficiency Toilets (1.28 gpf)

Override with Green Product? No

Final Product Choice

Green Product: High Efficiency Toilets (1.28 gpf)

### 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**
**High Efficiency Toilets**
**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product

**5**

Replacement Year

**6**
**Final Product Choice**
**Green Product:**
**High Efficiency Toilets (1.28 gpf)**
**Immediate Replacement**
**Year**
**1**
**Cost over Life Cycle (EUL)**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Apt High Eff Toilets	51	ea	\$440.75	\$22,478	30	1	1.0	\$22,478	\$22,478
Install/Replace	Public High Eff Toilets	3	ea	\$440.75	\$1,322	30	1	1.0	\$1,322	\$1,322
Utility Cost	Water/Sewer Usage	151,373	gallons	\$0.01	\$1,875	1	1	30.0	\$89,215	\$30,735
<b>Total Life Cycle Cost</b>									<b>\$113,016</b>	<b>\$54,535</b>

*Energy Savings*

<b>Net Life Cycle Cost after Energy Savings</b>									<b>\$113,016</b>	<b>\$54,535</b>

**Replacement at End of Remaining Useful Life**
**Year**
**6**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Apt High Eff Toilets	51	ea	\$440.75	\$22,478	30	6	0.8	\$17,230	\$16,787
Install/Replace	Public High Eff Toilets	3	ea	\$440.75	\$1,322	30	6	0.8	\$1,014	\$987
Utility Cost	Water/Sewer Usage	151,373	gallons	\$0.01	\$1,875	1	6	25.0	\$79,259	\$22,187

*Expenses for Current Product Through Useful Life*

Utility Cost	Current Water/Sewer	189,216	gallons	\$0.01	\$2,344	1	1	5.0	\$12,445	\$10,684
<b>Total Life Cycle Cost</b>									<b>\$109,948</b>	<b>\$50,646</b>

*Energy Savings*

<b>Net Life Cycle Cost after Energy Savings</b>									<b>\$109,948</b>	<b>\$50,646</b>

**ECONOMIC RETURN ANALYSIS**
**Timing NPV**
**(\$3,889)**
**Timing IRR**
**n/a**
**TIMING RECOMMENDATION**
**Replacement Year:**
**6**
**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

Energy Star Refrigerators

Frost-Free Refrigerators

vs.

Energy Star Refrigerators

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

15

Conventional Product:

Frost-Free Refrigerators

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	Frost-Free Refrigerators	51	ea	\$670.00	\$34,170	15	1	1.0	\$34,170	\$34,170
Utility Cost	Electric Usage	45,084	kWh	\$0.15	\$6,848	1	1	15.0	\$127,362	\$75,268
Total Life Cycle Cost									\$161,532	\$109,438

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$161,532	\$109,438

Green Product:

Energy Star Refrigerators

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	Energy Star Refrigerators	51	ea	\$720.25	\$36,733	15	1	1.0	\$36,733	\$36,733
Utility Cost	Electric Usage	26,265	kWh	\$0.15	\$3,989	1	1	15.0	\$74,199	\$43,849
Utility Cost	Gas Heat Penalty	247	therms	\$1.30	\$321	1	1	15.0	\$5,964	\$3,524
Total Life Cycle Cost									\$116,895	\$84,107

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$116,895	\$84,107

## ECONOMIC RETURN ANALYSIS

Green NPV	\$25,331
Green IRR	10470.1%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Energy Star Refrigerators

Override with Green Product? No

Final Product Choice

Green Product: Energy Star Refrigerators

### 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

Energy Star Refrigerators

**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product

Final Product Choice

Green Product:

**Immediate Replacement**

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Energy Star Refrigerators	51	ea	\$720.25	\$36,733	15	1	1.0	\$36,733	\$36,733
Utility Cost	Electric Usage	26,265	kWh	\$0.15	\$3,989	1	1	15.0	\$74,199	\$43,849
Utility Cost	Gas Heat Penalty	247	therms	\$1.30	\$321	1	1	15.0	\$5,964	\$3,524
Total Life Cycle Cost									<b>\$116,895</b>	<b>\$84,107</b>
<i>Energy Savings</i>										
Net Life Cycle Cost after Energy Savings									<b>\$116,895</b>	<b>\$84,107</b>

**ECONOMIC RETURN ANALYSIS**

Timing NPV	n/a
Timing IRR	n/a

**TIMING RECOMMENDATION**

Replacement Year:

**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): # 10

Programmable Thermostats

Manual Thermostats

vs.

Programmable Thermostats

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term 20

Conventional Product:

Manual Thermostats

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	Manual Thermostats	51	ea	\$105.00	\$5,355	20	1	1.0	\$5,355	\$5,355
Total Life Cycle Cost									\$5,355	\$5,355

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$5,355	\$5,355

Green Product:

Programmable Thermostats

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	Programmable T-Stats	51	ea	\$202.00	\$10,302	20	1	1.0	\$10,302	\$10,302
Total Life Cycle Cost									\$10,302	\$10,302

### Energy Savings

Utility Cost	Natural Gas Savings	1,659	therms	\$1.30	(\$2,154)	1	1	20.0	(\$57,871)	(\$28,494)
Net Life Cycle Cost after Energy Savings									(\$47,569)	(\$18,192)

## ECONOMIC RETURN ANALYSIS

Green NPV	\$23,547
Green IRR	82.4%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Programmable Thermostats

Override with Green Product? No

Final Product Choice

Green Product: Programmable Thermostats

### 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): # 10**
**Programmable Thermostats**
**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product

**10**

Replacement Year

**11**

Final Product Choice

Green Product:

Programmable Thermostats

**Immediate Replacement**

Year

**1**

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Programmable T-Stats	51	ea	\$202.00	\$10,302	20	1	1.0	\$10,302	\$10,302
Total Life Cycle Cost									<b>\$10,302</b>	<b>\$10,302</b>

**Energy Savings**

Utility Cost	Natural Gas Savings	1,659	therms	\$1.30	(\$2,154)	1	1	20.0	(\$57,871)	(\$28,494)
Net Life Cycle Cost after Energy Savings									<b>(\$47,569)</b>	<b>(\$18,192)</b>

**Replacement at End of Remaining Useful Life**

Year

**11**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Programmable T-Stats	51	ea	\$202.00	\$10,302	20	11	0.5	\$4,813	\$4,320

**Expenses for Current Product Through Useful Life**

Total Life Cycle Cost									<b>\$4,813</b>	<b>\$4,320</b>

**Energy Savings**

Utility Cost	Natural Gas Savings	1,659	therms	\$1.30	(\$2,154)	1	11	10.0	(\$33,181)	(\$10,932)
Net Life Cycle Cost after Energy Savings									<b>(\$28,368)</b>	<b>(\$6,612)</b>

**ECONOMIC RETURN ANALYSIS**

Timing NPV	<b>\$11,580</b>
Timing IRR	<b>30.00%</b>

**TIMING RECOMMENDATION**

Replacement Year:	<b>1</b>
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**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

Metal Roof

Architectural Asphalt Shingles

vs.

Metal Roof

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

40

Conventional Product:

Architectural Asphalt Shingles

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	Arch-Asphalt Shingles	13,903	sf	\$4.00	\$55,612	20	1	2.0	\$156,053	\$77,161
Total Life Cycle Cost									\$156,053	\$77,161

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$156,053	\$77,161

Green Product:

Metal Roof

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	Metal Roof	13,903	sf	\$7.75	\$107,748	40	1	1.0	\$107,748	\$107,748
Total Life Cycle Cost									\$107,748	\$107,748

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$107,748	\$107,748

## ECONOMIC RETURN ANALYSIS

Green NPV	(\$30,587)
Green IRR	3.3%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Conventional Product: Architectural Asphalt Shingles

Override with Green Product? No

Final Product Choice

Conventional Product: Architectural Asphalt Shingles

### 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

Metal Roof

**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product  
Replacement Year

17  
18

Final Product Choice

Conventional Product: Architectural Asphalt Shingles

**Immediate Replacement**

Year

1

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Arch-Asphalt Shingles	13,903	sf	\$4.00	\$55,612	20	1	2.0	\$156,053	\$77,161
Total Life Cycle Cost									\$156,053	\$77,161

Energy Savings

Net Life Cycle Cost after Energy Savings									\$156,053	\$77,161

**Replacement at End of Remaining Useful Life**

Year

18

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Arch-Asphalt Shingles	13,903	sf	\$4.00	\$55,612	20	18	1.2	\$108,226	\$27,027

Expenses for Current Product Through Useful Life

Total Life Cycle Cost									\$108,226	\$27,027

Energy Savings

Net Life Cycle Cost after Energy Savings									\$108,226	\$27,027

**ECONOMIC RETURN ANALYSIS**

Timing NPV	(\$50,135)
Timing IRR	n/a

**TIMING RECOMMENDATION**

Replacement Year: 18

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

Linoleum Flooring in Common Areas

**Carpeting**

vs.

**Linoleum (Faux Wood)**

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

30

**Conventional Product:**

**Carpeting**

**Cost over Life Cycle (EUL)**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	Hallway Carpeting	6,531	sf	\$3.00	\$19,593	12	1	2.5	\$64,270	\$34,490
Install/Replace	Common Area Carpeting	4,279	sf	\$3.00	\$12,836	12	1	2.5	\$42,105	\$22,595
Install/Replace	Laundry VCT	290	sf	\$5.00	\$1,450	15	1	2.0	\$3,709	\$2,162
Maintain	Restrooms Ceramic Tile	333	sf	\$0.00		30	1	1.0		

**Total Life Cycle Cost**

**\$110,085**

**\$59,247**

### Energy Savings

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**Net Life Cycle Cost after Energy Savings**

**\$110,085**

**\$59,247**

**Green Product:**

**Linoleum (Faux Wood)**

**Cost over Life Cycle (EUL)**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	Hallway Linoleum	6,531	sf	\$5.50	\$35,921	25	1	1.2	\$43,411	\$39,634
Install/Replace	Common Area Linoleum	4,279	sf	\$5.50	\$23,532	25	1	1.2	\$28,440	\$25,965
Install/Replace	Laundry Linoleum	290	sf	\$5.50	\$1,595	25	1	1.2	\$1,928	\$1,760
Maintain	Restroom Ceramic Tile	333	sf	\$0.00		30	1	1.0		

**Total Life Cycle Cost**

**\$73,778**

**\$67,360**

### Energy Savings

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**Net Life Cycle Cost after Energy Savings**

**\$73,778**

**\$67,360**

## ECONOMIC RETURN ANALYSIS

Green NPV	<b>(\$8,113)</b>
Green IRR	<b>5.3%</b>

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Conventional Product:	<b>Carpeting</b>
-----------------------	------------------

Override with Green Product?

**No**

Final Product Choice

Conventional Product:	<b>Carpeting</b>
-----------------------	------------------

### 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

Linoleum Flooring in Common Areas

**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product  
Replacement Year

7  
8

Final Product Choice

Conventional Product:

Carpeting

**Immediate Replacement**

Year

1

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Hallway Carpeting	6,531	sf	\$3.00	\$19,593	12	1	2.5	\$64,270	\$34,490
Install/Replace	Common Area Carpeting	4,279	sf	\$3.00	\$12,836	12	1	2.5	\$42,105	\$22,595
Install/Replace	Laundry VCT	290	sf	\$5.00	\$1,450	15	1	2.0	\$3,709	\$2,162
Maintain	Restrooms Ceramic Tile	333	sf			30	1	1.0		
Total Life Cycle Cost									\$110,085	\$59,247

Energy Savings

Net Life Cycle Cost after Energy Savings									\$110,085	\$59,247

**Replacement at End of Remaining Useful Life**

Year

8

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Hallway Carpeting	6,531	sf	\$3.00	\$19,593	12	8	1.9	\$54,606	\$21,608
Install/Replace	Common Area Carpeting	4,279	sf	\$3.00	\$12,836	12	8	1.9	\$35,774	\$14,156
Install/Replace	Laundry VCT	290	sf	\$5.00	\$1,450	15	8	1.5	\$2,967	\$1,380
Maintain	Restrooms Ceramic Tile	333	sf			30		1.0		

Expenses for Current Product Through Useful Life

Total Life Cycle Cost									\$93,346	\$37,145

Energy Savings

Net Life Cycle Cost after Energy Savings									\$93,346	\$37,145

**ECONOMIC RETURN ANALYSIS**

Timing NPV (\$22,102)  
Timing IRR (4.67%)

**TIMING RECOMMENDATION**

Replacement Year: 8

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

Apartment Linoleum Flooring

Vinyl Composite Tile (VCT) and Carpeting

vs.

Linoleum (faux wood)

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

25

Conventional Product:

Vinyl Composite Tile (VCT) and Carpeting

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	VCT Living Area	15,865	sf	\$5.00	\$79,327	15	1	1.7	\$149,163	\$109,810
Install/Replace	Carpeting Bsmt Units	2,115	sf	\$3.00	\$6,346	12	1	2.1	\$16,469	\$10,109
Install/Replace	Bathroom VCT	2,423	sf	\$5.00	\$12,113	15	1	1.7	\$22,776	\$16,767

Total Life Cycle Cost

\$188,408

\$136,686

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$188,408	\$136,686

Green Product:

Linoleum (faux wood)

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	Linoleum Living Areas	15,865	sf	\$5.50	\$87,259	25	1	1.0	\$87,259	\$87,259
Install/Replace	Linoleum Bsmt Units	2,115	sf	\$5.50	\$11,635	25	1	1.0	\$11,635	\$11,635
Install/Replace	Linoleum Bathrooms	2,423	sf	\$5.50	\$13,324	25	1	1.0	\$13,324	\$13,324

Total Life Cycle Cost

\$112,218

\$112,218

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$112,218	\$112,218

## ECONOMIC RETURN ANALYSIS

Green NPV	\$24,468
Green IRR	16.4%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Linoleum (faux wood)

Override with Green Product? No

Final Product Choice

Green Product: Linoleum (faux wood)

### 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

Apartment Linoleum Flooring

**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product

0

Final Product Choice

Green Product:

Linoleum (faux wood)

**Immediate Replacement**

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Linoleum Living Areas	15,865	sf	\$5.50	\$87,259	25	1	1.0	\$87,259	\$87,259
Install/Replace	Linoleum Bsmt Units	2,115	sf	\$5.50	\$11,635	25	1	1.0	\$11,635	\$11,635
Install/Replace	Linoleum Bathrooms	2,423	sf	\$5.50	\$13,324	25	1	1.0	\$13,324	\$13,324
Total Life Cycle Cost									\$112,218	\$112,218
<i>Energy Savings</i>										
Net Life Cycle Cost after Energy Savings									\$112,218	\$112,218

**ECONOMIC RETURN ANALYSIS**

Timing NPV	n/a
Timing IRR	n/a

**TIMING RECOMMENDATION**

Replacement Year:	1
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**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):

# 4

FSC Certified Wood Cabinets

Laminated Particleboard (LPB) Cabinets

vs.

FSC Certified Wood Cabinets

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

30

Conventional Product:

Laminated Particleboard (LPB) Cabinets

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	LPB Cabinets	51	ea	2475.00	\$126,225	25	1	1.2	\$152,546	\$139,275
Total Life Cycle Cost									\$152,546	\$139,275

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$152,546	\$139,275

Green Product:

FSC Certified Wood Cabinets

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	FSC Wood Cabinets	51	ea	2660.63	\$135,692	30	1	1.0	\$135,692	\$135,692
Total Life Cycle Cost									\$135,692	\$135,692

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$135,692	\$135,692

## ECONOMIC RETURN ANALYSIS

Green NPV	\$3,583
Green IRR	10.0%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: FSC Certified Wood Cabinets

Override with Green Product? No

Final Product Choice

Green Product: FSC Certified Wood Cabinets

### 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):

# 4

FSC Certified Wood Cabinets

**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product

5

Replacement Year

6

Final Product Choice

Green Product:

FSC Certified Wood Cabinets

**Immediate Replacement**

Year

1

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	FSC Wood Cabinets	51	ea	\$2,660.63	\$135,692	30	1	1.0	\$135,692	\$135,692
Total Life Cycle Cost									\$135,692	\$135,692

Energy Savings

Net Life Cycle Cost after Energy Savings									\$135,692	\$135,692

**Replacement at End of Remaining Useful Life**

Year

6

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	FSC Wood Cabinets	51	ea	\$2,660.63	\$135,692	30	6	0.8	\$104,010	\$101,339

Expenses for Current Product Through Useful Life

Total Life Cycle Cost									\$104,010	\$101,339

Energy Savings

Net Life Cycle Cost after Energy Savings									\$104,010	\$101,339

**ECONOMIC RETURN ANALYSIS**

Timing NPV

(\$34,353)

Timing IRR

n/a

**TIMING RECOMMENDATION**

Replacement Year:

6

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):

# 5

Stone Countertops

Laminated Particleboard (LPB) Countertops

vs.

Solid Stone Countertops

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

30

Conventional Product:

Laminated Particleboard (LPB) Countertops

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	LPB Countertops	51	ea	435.16	\$22,193	12	1	2.5	\$72,800	\$39,067
Total Life Cycle Cost									\$72,800	\$39,067

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$72,800	\$39,067

Green Product:

Solid Stone Countertops

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
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### Life Cycle Costs

Install/Replace	Stone Countertops	51	ea	\$925.00	\$47,175	30	1	1.0	\$47,175	\$47,175
Total Life Cycle Cost									\$47,175	\$47,175

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$47,175	\$47,175

## ECONOMIC RETURN ANALYSIS

Green NPV	(\$8,108)
Green IRR	5.1%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Conventional Product: Laminated Particleboard (LPB) Countertops

Override with Green Product?

No

Final Product Choice

Conventional Product: Laminated Particleboard (LPB) Countertops

### 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):

# 5

Stone Countertops

**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product  
Replacement Year

**17**  
**18**

Final Product Choice

Conventional Product: Laminated Particleboard (LPB) Countertops

**Immediate Replacement**

Year

**1**

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	LPB Countertops	51	ea	\$435.16	\$22,193	12	1	2.5	\$72,800	\$39,067
Total Life Cycle Cost									<b>\$72,800</b>	<b>\$39,067</b>

Energy Savings

Net Life Cycle Cost after Energy Savings									<b>\$72,800</b>	<b>\$39,067</b>

**Replacement at End of Remaining Useful Life**

Year

**18**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	LPB Countertops	51	ea	\$435.16	\$22,193	12	18	1.1	\$41,040	\$10,382

Expenses for Current Product Through Useful Life

Total Life Cycle Cost									<b>\$41,040</b>	<b>\$10,382</b>

Energy Savings

Net Life Cycle Cost after Energy Savings									<b>\$41,040</b>	<b>\$10,382</b>

**ECONOMIC RETURN ANALYSIS**

Timing NPV **(\$28,685)**  
Timing IRR **(5.96%)**

**TIMING RECOMMENDATION**Replacement Year: **18**

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