

# Green Capital Needs Assessment and Replacement Reserve Analysis

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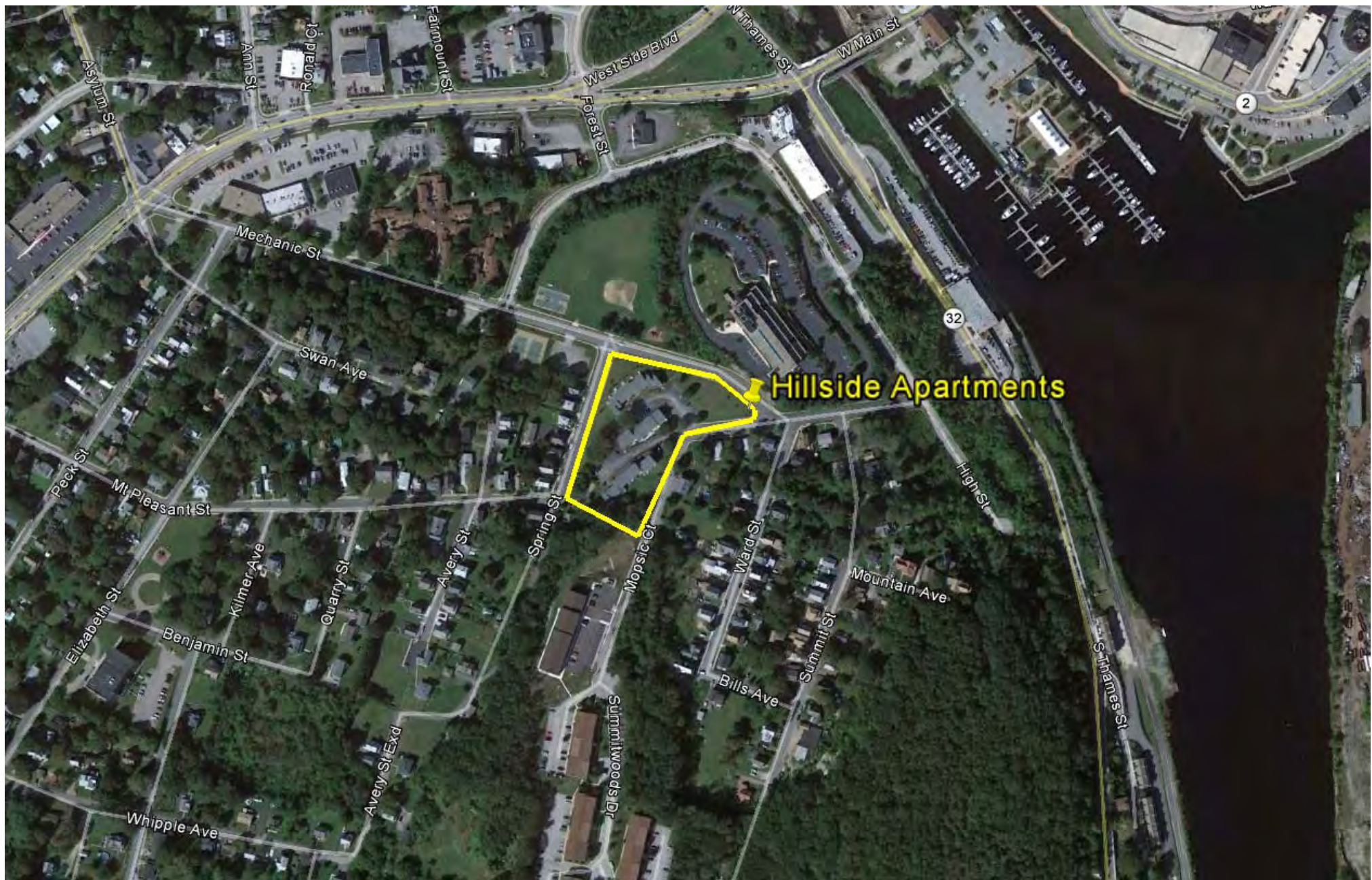
## Hillside Apartments

CHFA # 85144D

DeMarco Management Corp.  
Norwich, CT

**April 30, 2013**

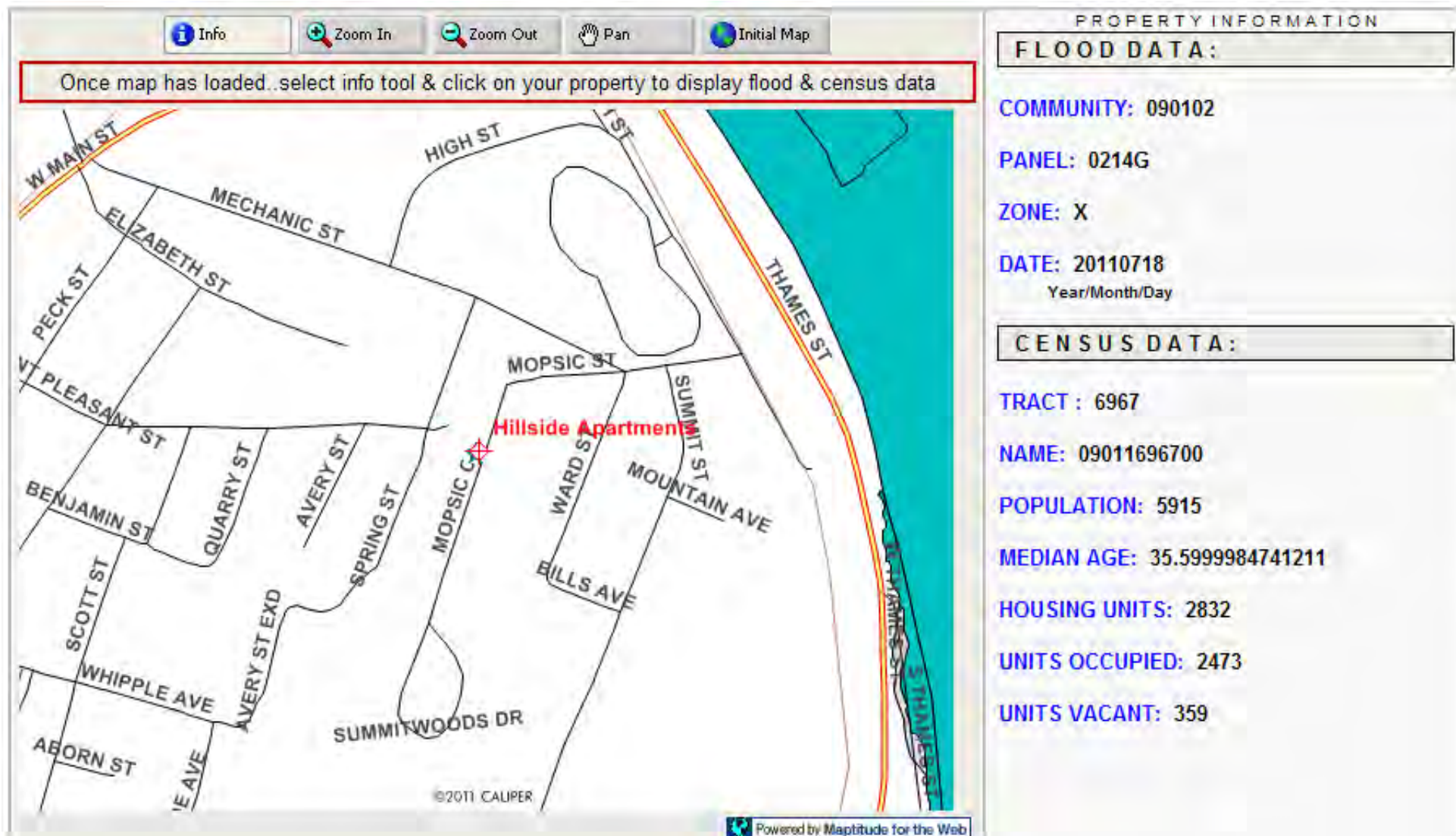
*Final Report*



## Hillside Apartments

27 Mopsis Court  
Norwich, CT 06360





## Hillside Apartments

27 Mopsic Street  
Norwich, CT 06360

Zone X = Outside the 500-year floodplain and  
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) has been undertaken on behalf of Hillside Apartments 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 \$822,344 in current dollars (\$31,629/unit), or \$1,060,925 (\$40,805/unit) in inflated dollars. Current reserves would be outpaced throughout the entire plan. However an infusion of \$550,000 in Year 1, coupled with contribution increases of \$120 per apartment in Years 2 through 4 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 Green plan total \$1,016,289 in current dollars (\$39,088/unit), or \$1,237,703 (\$47,604/unit) in inflated dollars. Current reserves would be outpaced throughout the entire plan. However an infusion of \$750,000 in Year 1, coupled with contribution increases of \$120 per apartment in Years 2 through 4 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 this report, 3 energy conservation and water measures (EWCMs) have been included to show some saving potential. Additional measures are discussed within the report, but not shown with calculated savings due to the limited amount of utility and cost information.

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

The report identifies 6 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.

# Executive Summary

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.

## Building Modeling Methodology

A computer energy model was not generated for Hillside Apartments, due solely to limited utility data. Portions of the electricity billing were provided, but a reliable energy model requires at least 12 consecutive months of utility data (electricity and water/sewer). Energy savings were calculated manually to show potential savings for exterior lighting, toilets, and refrigerators. Other measures such as building envelope and HVAC improvements are discussed within this report.

## 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.

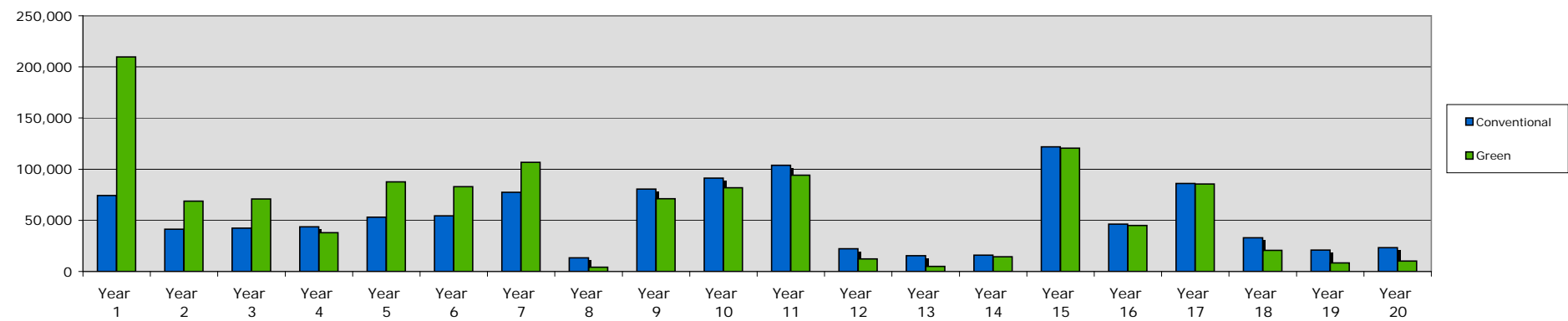
# Executive Summary

## Dashboard

### Property Data

Location:	Norwich, CT
Year Built:	1982
Number of Units:	26
Number of Buildings:	3

Comparison of Capital Needs - Conventional vs. Green



### Environmental Impact

(Total Carbon Release Based on Current Annual Energy Usage)

Building Square Footage:	26,100
Resident Population (estimated):	91

	BTUs/yr	Conversion	lbs CO <sub>2</sub>	lbs CO <sub>2</sub> / Res
Gas	0	x 11.023100	0	0
Oil	0	x 11.023100	0	0
Electricity	91,021,924	x 1.582917	42,215	464
<b>Total</b>	<b>91,021,924</b>		<b>42,215</b>	<b>464</b>

### Replacement Reserve Analysis

#### Conventional

- Plan #1: Capital costs exceed reserves throughout the entire plan.
- Plan #2: Infusion of \$550K in Yr 1; increase contributions \$120/unit/year in Years 2-4.

#### Green

- Plan #1: Capital costs exceed reserves in each year of the plan.
- Plan #2: Infusion of \$750K in Yr 1; increase contributions \$120/unit/year in Years 2-4.

### Health and Safety

#### Hazardous Materials

	Identified	Location / Notes
Lead Based Paint (LBP):	None	n/a
Asbestos Containing Materials (ACMs):	None	n/a
Mold:	Suspected	Apt A1

#### Indoor Ventilation

0

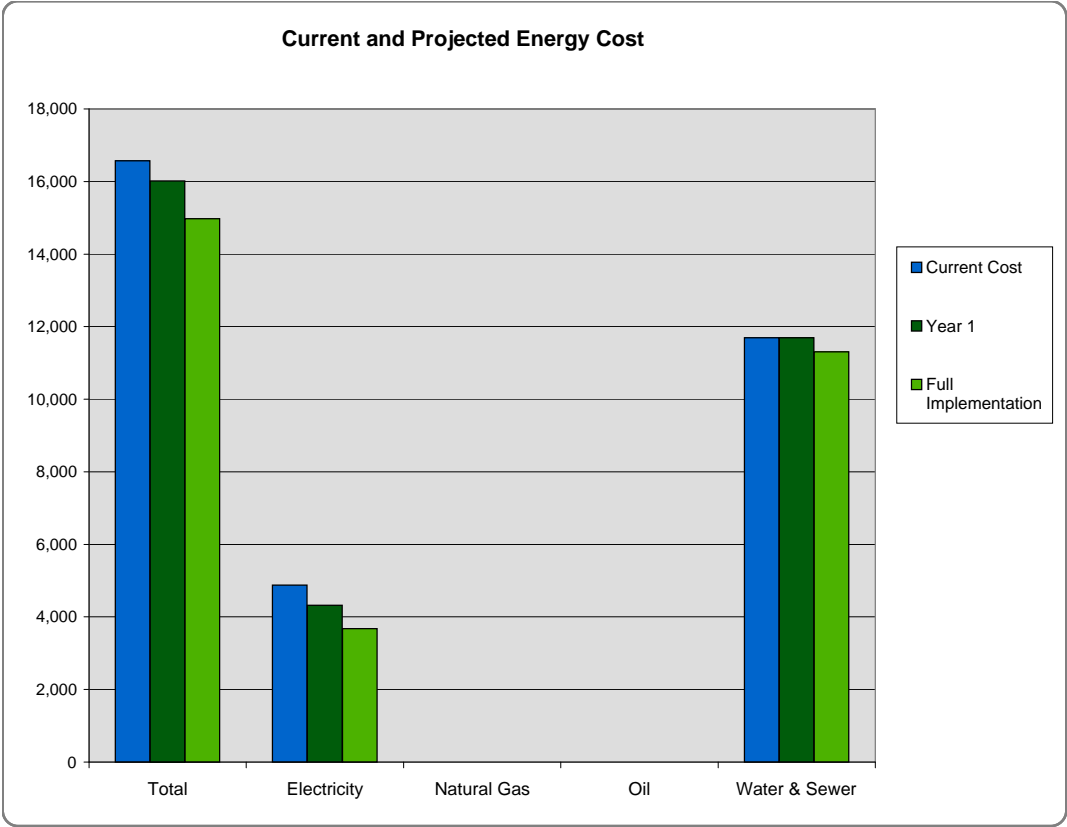
#### Indoor Air Quality (IAQ)

	Design Specification	Actual Read	Notes
Air Flow Rate	400 cfm/apt	not measured	Operable windows
Thermal Comfort	68-77F	64.8-70.4F	One vacant unit
Carbon Monoxide	0	0	No combustible systems
Carbon Dioxide	<1000	1415-1496	Closed windows



# Executive Summary

## Energy Savings



### Energy Intensity / Benchmarking Data

Building Square Footage: **26,100**

Heating Degree Days: 5,443

	Amount	Units	BTUs/yr	Energy Intensity (BTUs/(HDDs x SF))
Heating	0	kWh	0	0
Cooling	0	kWh	0	0
DHW	0	therms	0	0
Electricity	26,677	kWh	91,021,924	1
<b>Total</b>			<b>91,021,924</b>	<b>1</b>

	Gallons/yr	Gallons/sf/yr
Water	804,902	31

### Energy Usage Summary

#### Billing Data

Utility	Current Usage	Current Cost	Projected Usage	Projected Cost	% Savings
Electricity	26,677 kWh	\$4,879	20,095 kWh	\$3,675	24.7%
Natural Gas	0 therms	\$0	0 therms	\$0	n/a
Oil	0 gallons	\$0	0 gallons	\$0	n/a
Water & Sewer	804,902 gallons	\$11,696	777,921 gallons	\$11,304	3.4%
<b>Total</b>		<b>\$16,575</b>		<b>\$14,979</b>	<b>9.6%</b>

# Executive Summary

## Green Improvement Plan

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

### Recommended EWCMs (Based on Financial Analysis)

EWCM 1 Exterior Lighting Upgrade	1,485	30	11.35	1,485	7,721	3,071	562							562	Immediate
EWCM 2 High Efficient Toilets	14,545	30	0.81	1,015	5,411							26,981	392	392	Year 15
EWCM 3 Energy Star Refrigerators	18,727	15	0.51	1,307	5,749	3,510	642							642	Year 15
<b>EWCM Subtotal</b>	<b>34,756</b>			<b>3,806</b>		<b>6,582</b>	<b>1,204</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>26,981</b>	<b>392</b>	<b>1,596</b>	

### Recommended GMs (Based on Financial Analysis)

GM 3 Linoleum in Living Areas	72,157	25		32,799	644	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Immediate
GM 4 Linoleum in Baths/Kitchens	24,519	25		2,229	6,337	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Immediate
GM 5 FSC Wood Cabinets/Vanities	88,688	25		6,188	5,946	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Year 5
<b>GM Subtotal</b>	<b>185,364</b>			<b>41,216</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>220,120</b>			<b>45,022</b>		<b>6,582</b>	<b>1,204</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>26,981</b>	<b>392</b>	<b>1,596</b>	
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### Optional Actions

GM 1 Cement Fiberboard Siding	206,550	50		48,600	(36,493)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Year 9
GM 2 Metal Roofs	118,296	40		57,240	(33,581)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Year 15
GM 6 Stone Countertops	25,350	30		13,007	(541)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Year 15

### 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

**Hillside Apartments** is an affordable housing development for families. This development has three direct-entry buildings (Buildings A, B, and C), and a total of 26 apartments. There are 3 accessible one-bedroom units, as well as 16 two-bedroom, 5 three-bedroom, and a pair of four-bedroom townhouse apartments. Interior common space is limited to a small maintenance and storage section attached to Building B; a section of the maintenance area has also been designated as an on-site office space, but is only used during an extended site visit by staff.

## Site & Handicap Accessibility

### Site Surface

Hillside Apartments is located on a large, sloped parcel of land in a residential neighborhood of Norwich, CT. The site includes asphalt-paved driveways, parking areas, and walkways that encompass the building, pole-mounted high intensity discharge (HID) lighting along the driveways and parking areas, and surrounding lawns with flowerbeds, bushes, and trees.

Driveways, Parking Areas, and Walkways		
Existing conditions	Capital needs	Green alternative
Cracks and some potholes were observed in sections of the asphalt paving. There are also signs of recent paving repairs.	The costs to resurface the driveways, parking areas, and walkways are shown in the first year of the plan. Future repairs (crackfilling, sealcoating, and parking lot re-striping) are shown every five years beginning in Year 6.	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.

## Narrative

Existing conditions	Capital needs	Green alternative
		<p>Using a porous asphalt material also helps to reduce the heat island effect; and similar to open pavers (proposed for the parking areas), it 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>

## Handrails

Existing conditions	Capital needs	Green alternative
Metal handrails are located along portions of the walkways at this site, serving as a barrier at areas of significant elevation changes, and also to assist residents at some of the exterior steps.	The handrails are in good condition. The cost for periodic repainting is shown in Years 5 and 20.	Using paints with low volatile organic compounds (VOC) are recommended as the green alternative. No cost premium and no appreciable difference in useful life are anticipated for the low VOC paint.

## Narrative

### Exterior Lighting

Existing conditions	Capital needs	Green alternative
There are pole-mounted HID (CFLs), used to provide lighting throughout this site, appear to be in good condition.	The lamps and ballasts are to be replaced using existing operating accounts	The green alternative would be to replace the HID lighting with comparably-sized induction lighting. It provides a cost-effective lighting alternative. (See EWCM 1).

### Landscaping

Existing conditions	Capital needs	Green alternative
The site features a well-maintained surrounding lawn and garden beds. The landscaping was recently upgraded.	The plan includes an allowance for replanting and pruning in Year 17.	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

### Handicap Accessibility / Section 504 Analysis

As part of this assessment, the exterior 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). One of the 3 designated units was included in the inspection sample.

#### Circulation

Existing conditions	Capital needs	Green alternative
Designated parking spaces should be located in close proximity to the accessible units, and on an accessible path.	The spaces exist, however each space should be re-striped to include an access aisle. This effort is included as part of the parking area resurfacing (as discussed in the Site report section.	No green alternative shown.

#### Dwelling Units

Existing conditions	Capital needs	Green alternative
Each of the three accessible units is located in Building B. In addition to a direct-entry main entrance, each unit has a deck with a ramp to provide an accessible second means of egress.	The bathroom sink drain line insulation sleeves were missing at the time of the assessment; these are to be re-installed using existing operating accounts.	No green alternative shown.

## **Narrative**

### **Mechanical Room**

There are no central mechanical rooms at this development. Each unit has its own heating, cooling and domestic hot water (DHW) equipment. Common systems are discussed in the Building Mechanical and Electrical report section. Residential-based systems are discussed in the Dwelling Units report section.

## **Narrative**

### **Building Mechanical and Electrical Systems**

There are no common building systems (i.e. intercom panels, air handlers, elevators, etc.) at this site. Common elements such as exterior lighting are discussed in the Site and Building Architecture report sections. Additionally, any systems that may also impact the dwelling units are discussed in the Dwelling Units report section.

## Narrative

### Building Architectural Systems

#### Building Exterior

Hillside Apartments consists of three townhouse-style apartment buildings. Each building is constructed on a poured concrete foundation, has vinyl clad exterior walls, and a pitched roof covered with asphalt shingles. Also, each building has aluminum-framed double glazed windows and sliding glass doors. Exterior doors are insulated metal and all unit entry doors also have a storm door.

Doors		
Existing conditions	Capital needs	Green alternative
Most of the unit doors appear to be original and in fair-to-good condition. Rust and deteriorated door trim was observed on the service doors.	The plan includes the cost to replace the service doors in Year 1. The surrounding wood trim at each door is also shown being replaced in Year 1. The unit doors, which are in better condition are to be replaced starting in Year 10, and storm door replacement is shown concurrent with the unit doors.	The green option would be to replace the unit doors with fiberglass models. Fiberglass doors are more durable to metal or wood doors since they are resistant to rusting, impact-related damage, and deterioration associated with wood or metal options. Not only are they more durable, but they also lower operations costs since they don't require periodic painting, and therefore have a lower life cycle cost than the traditional alternatives.

## Narrative

Existing conditions	Capital needs	Green alternative
		<p>Insulated fiberglass doors often have higher insulating qualities compared to conventional flush wood or metal models, and therefore reduce heat loss.</p> <p>An alternative wood product is shown as a replacement for traditional wood door trim. Products such as PVC and cement fiberboard, are insect and water resistant, and will provide a longer useful life.</p>

### Windows and Sliding Glass Doors

Existing conditions	Capital needs	Green alternative
<p>The windows and sliding glass doors are approaching the end of their useful life. Several fogged windows were observed at the time of the assessment, which indicates a failure of the window seal, trapping moisture in between the layers of glazing.</p>	<p>The replacement costs for the windows and the sliding glass doors are shown over a three-year period starting in Year 2.</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.</p>



**Narrative**

Existing conditions	Capital needs	Green alternative
		<p>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 also keep radiant infrared energy from escaping the building during the heating months.</p> <p>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

### Siding

Existing conditions	Capital needs	Green alternative
There are sections of the vinyl siding that have been discolored (possibly due to removal of graffiti) and damaged (holes and cracks). There are also areas that have dirt and vegetation growth.	The plan includes the cost to initially power wash the vinyl siding in Year 1. Replacement of the vinyl siding is shown over a three-year period starting in Year 9. Future cleaning of the vinyl is also shown toward the end of the plan in Year 18.	Cement fiberboard is shown as a possible green alternative to vinyl siding. This product has more of a wood-like appearance, and is also resistant to water, fire, and insects, and as well, has a long useful life. However, this opportunity, evaluated in GM 1, does not appear to be a cost-effective alternative to the vinyl siding.

### Roof

Existing conditions	Capital needs	Green alternative
Each building has a pitched roof, recently upgraded with architectural asphalt shingles and has gutters and downspouts for roof drainage.	Future replacement of the existing roof covering is shown toward the end of the plan in Year 15.	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 2)

## **Narrative**

### **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

### 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 are carpeted; bathrooms and kitchens have VCT flooring. Most of these finishes were found to be in good condition, an indication of some of the continuing upgrades that have occurred.	Apartment repainting and any interior or closet door replacement are to be addressed as operating concerns. Carpet replacement is shown over a ten-year period beginning in Years 1 and 11; VCT replacement is shown over a 15-year period starting in Years 1 and 16.	<p>A linoleum flooring product is shown as an alternative for carpeting and VCT. Linoleum offers 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</p> <p>(See GMs 3 and 4).</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). Most bathrooms have a wood-base vanity; the exceptions are found in the accessible units, where each of the accessible bathrooms has a wall-hung sink.</p>	<p>The plan includes annual allowances starting in Year 1 for anticipated bathtub repairs and replacement of general bathroom accessories. Vanity replacement is shown starting in Year 5 and the wall-hung sink replacement is shown in Year 10. Exhaust fans are shown being replaced in Year 6.</p>	<p>The existing 1.6 gpf toilets with high efficiency 1.28 gpf toilets, shown starting in Year 6. (See EWCM 2).</p> <p>Replacing the vanities with a Forest Stewardship Council certified wood product provides a longer lasting vanity that also reduces the amount of possible off-gassing (due to less use of formaldehyde). See GM 5.</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 should be discussed at the client review meeting.</p>



## Narrative

### Kitchens

Existing conditions	Capital needs	Green alternative
Kitchens have a mix of plywood and solid wood cabinets, laminated particleboard countertops, frost-free refrigerators, ceiling exhaust fans, and 30-inch electric ranges.	The plan shows range and refrigerator replacement starting in Year 1, with a second cycle for refrigerators starting in Year 16. Cabinet and countertop replacement is shown starting in Year 5 with a future countertop replacement shown starting in Year 15. The exhaust fans are to be replaced in Year 5.	<p>The refrigerators could also be replaced with comparable Energy Star rated units, which significantly reduce energy consumption. See EWCM 3 (which shows the savings potential, however since these buildings are individually metered, the residents would receive the savings benefit).</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. See GM 5.</p> <p>Stone countertops were considered as the green alternative to the existing countertops, primarily because of a longer useful life. However this opportunity was not shown to be cost-effective. (See GM 6).</p>

## Narrative

### Unit Mechanical and Electrical

Existing conditions	Capital needs	Green alternative
<p>Electric-heated baseboard sections are used throughout the apartments, each controlled by a wall-mounted thermostat (one per floor). 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 on each floor.</p>	<p>The plan includes the costs to start replacing the DHW tanks annually starting in Years 1 and 14, and baseboard sections starting in Year 5. The existing thermostats are to be replaced in Year 5.</p> <p>Also, smoke detectors are to be added to all bedrooms and existing apartment smoke detectors replaced in Year 7. Future replacement of all apartment smoke detectors is shown in Year 17.</p>	<p>The green plan includes the cost to upgrade each apartment with a programmable thermostat to govern electric 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>Also, electric heat pumps are shown as a possible green alternative for heating and cooling the apartments. The proposed heat pumps would be ductless and contain an outdoor pad-mounted condensing unit and terminal units within the apartment living areas (i.e. living rooms and bedrooms). The cost also includes an allowance to remove the existing air conditioner wall sleeves. The electric baseboard heat would remain in place to augment the proposed heat pumps. This item should be discussed.</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 (Apartments):*

Each building has operable windows to provide fresh air. Kitchen and bathrooms have ducted ceiling fans to remove stale air; each exhaust fan is operated by a wall switch.

##### *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.

## Narrative

### *Mold and airborne concerns:*

Suspected mold was observed in one apartment; this was in one of the bathrooms above the bathtub.

### *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
Apartment	No measurement		N/A Operable windows

Table B. Carbon Dioxide:

Space	Actual Read	Design Specification	Notes
Apartment A1	1,415 ppm	< 1,000 ppm	Conditioned space, windows closed
Apartment C23	1,496 ppm	< 1,000 ppm	Conditioned space, windows closed

Table C. Carbon Monoxide:

Conditioned Space	Actual Read	Design Specification	Notes
Apartment A1	0 ppm	≈0 ppm	Conditioned space
Apartment C23	0 ppm	≈0 ppm	Conditioned space

## 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 \$822,344 in current dollars (\$31,629/unit), or \$1,060,925 (\$40,805/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 \$36,511 on December 31, 2012. Annual contributions are currently \$6,182 per year, or \$238 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 in each year of the plan.

**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 \$550,000 in outside capital in Year 1 to help fund near term capital needs, and an increase in annual contributions of \$120/unit (\$10/unit/month) in Years 2 through 4. 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 Green plan total \$1,016,289 in current dollars (\$39,088/unit), or \$1,237,703 (\$47,604/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 \$36,511 on December 31, 2012. Annual contributions are currently \$6,182 per year, or \$238 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 in each year of the plan.

**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 \$750,000 in outside capital in Year 1 to help fund near term capital needs, and an increase in annual contributions of \$120/unit (\$10/unit/month) in Years 2 through 4. 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 28<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.



A view of the driveway between Building C (left) and Building B.



A parking lot at the end of one of the driveways.



A close-up view of a cracked section of asphalt paving.



The mailboxes are located at the main entrance to the development.





An elevation view of Building A.



This is a rear elevation view of Building A.



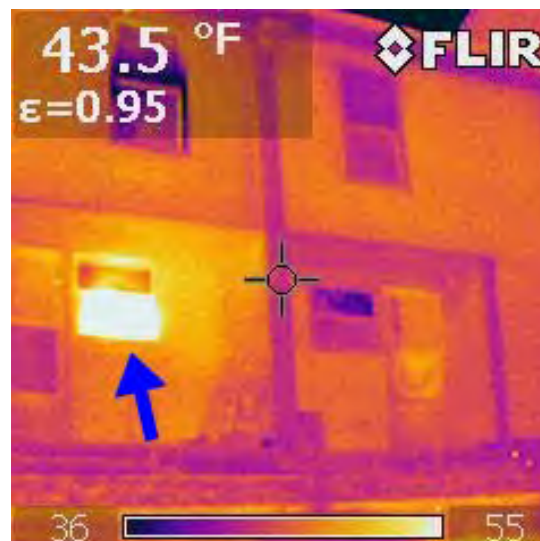
A ramp at the rear entrance at one of the accessible apartments in Building B.



The roof coverings have been recently replaced with architectural shingles.



This infra-red elevation image shows heat loss at the window frames. The roofs appear to be a warmer surface due to solar gain (sun warm-up).



In this infra-red image, the bright white image is a window fan apparently losing heat.



A section of the vinyl siding that needs to be cleaned.



A kitchen recently upgraded with wood cabinets and vinyl flooring.

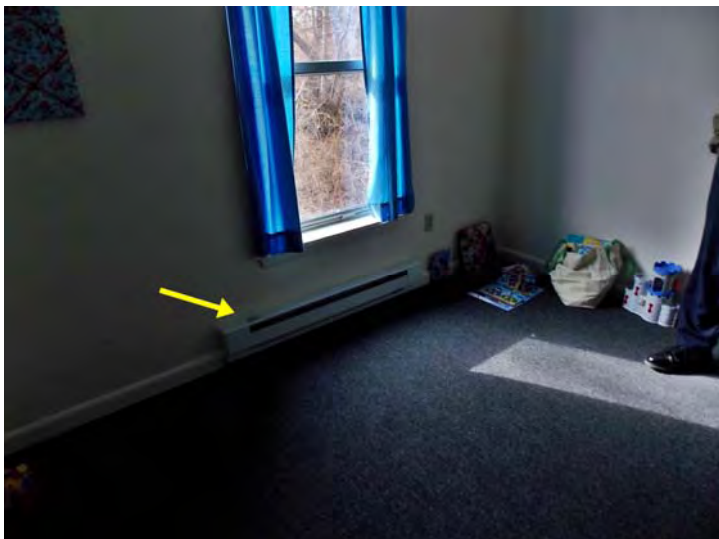




A view of one of the accessible kitchens.



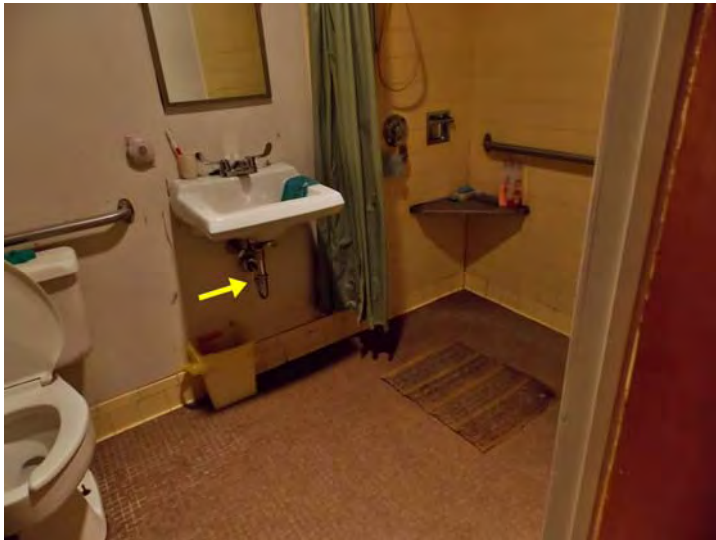
This is the kitchen exhaust fan.



Each unit has electric baseboard heat (arrow).



The fogged window indicates possible window seal failure.



This accessible bathroom should be upgraded with a drain pipe insulation sleeve (arrow).



One of the standard bathrooms with a vanity (left), fiberglass bathtub and surround, and vinyl flooring.

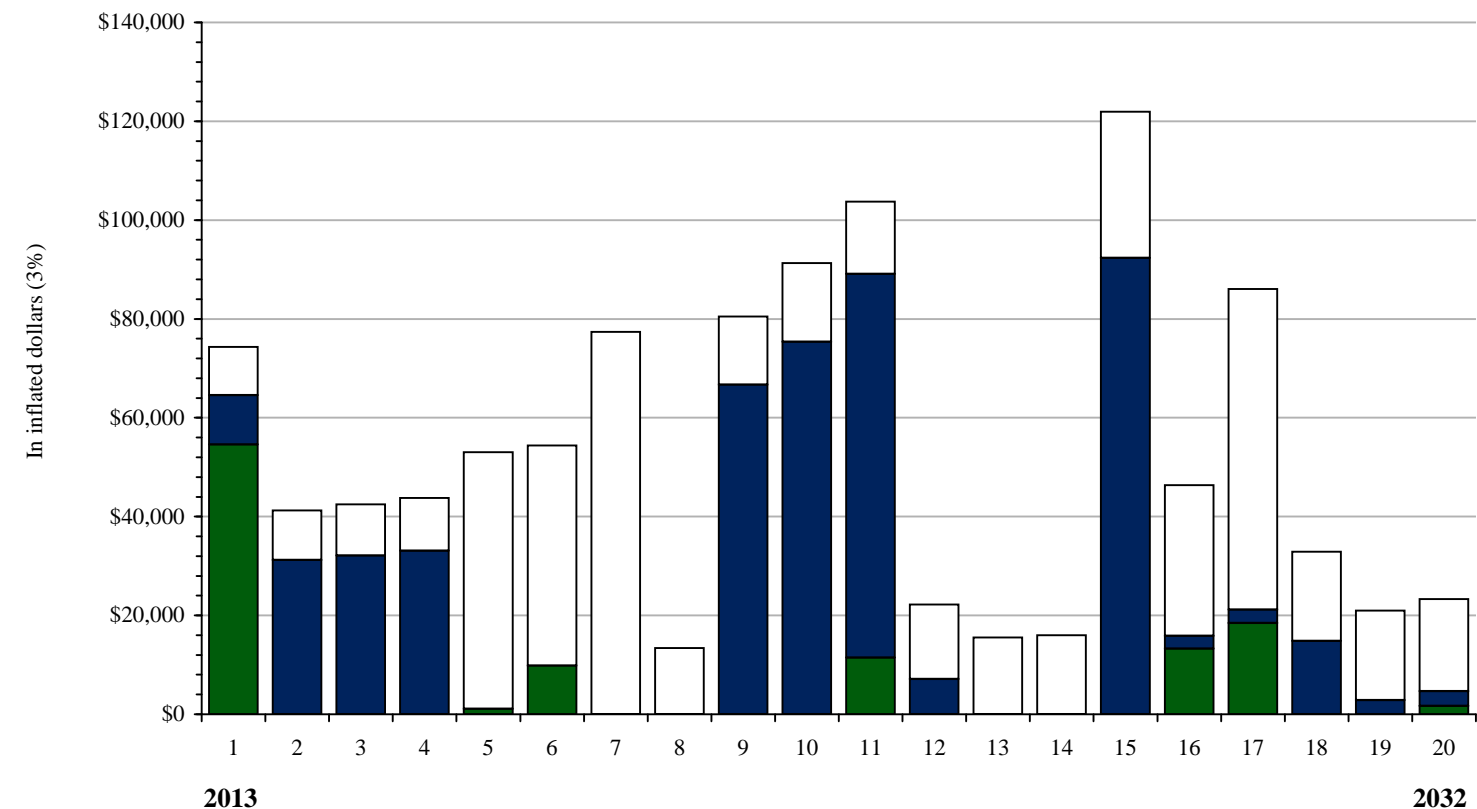


Suspected mold in one of the bathrooms.

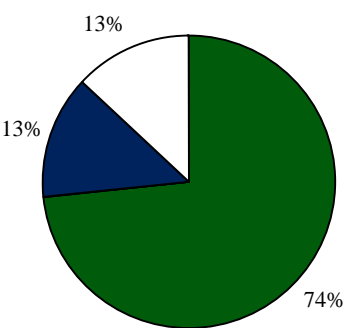


Each apartment has its own circuit breaker panel.

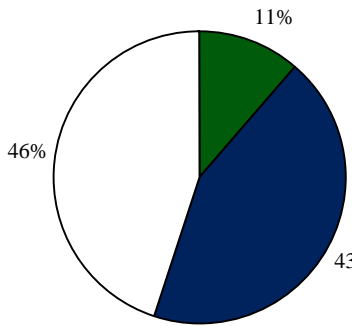
Capital Needs Summary - Conventional



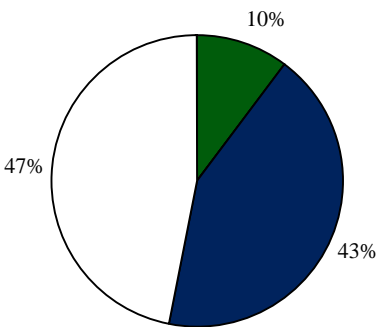
Hillside Apartments



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	\$54,573 or \$2,099/unit	\$65,539 or \$2,521/unit	\$110,404 or \$4,246/unit
Mechanical Room			
Building Mech. & Elec.			
Building Architectural	\$9,990 or \$384/unit	\$248,484 or \$9,557/unit	\$451,619 or \$17,370/unit
Dwelling Units	\$9,771 or \$376/unit	\$257,880 or \$9,918/unit	\$498,902 or \$19,189/unit
In inflated dollars:	\$74,334 or \$2,859/unit	\$571,903 or \$21,996/unit	\$1,060,925 or \$40,805/unit
In current dollars:	\$74,334 or \$2,859/unit	\$497,795 or \$19,146/unit	\$822,344 or \$31,629/unit

## Capital Needs Summary - *Conventional*

OSI Ref: **13209**  
 Property Age: **31 Years**  
 Financing: **CHFA**

Residential Buildings: **3**  
 Total Number of Units: **26**  
 Occupancy: **Family**

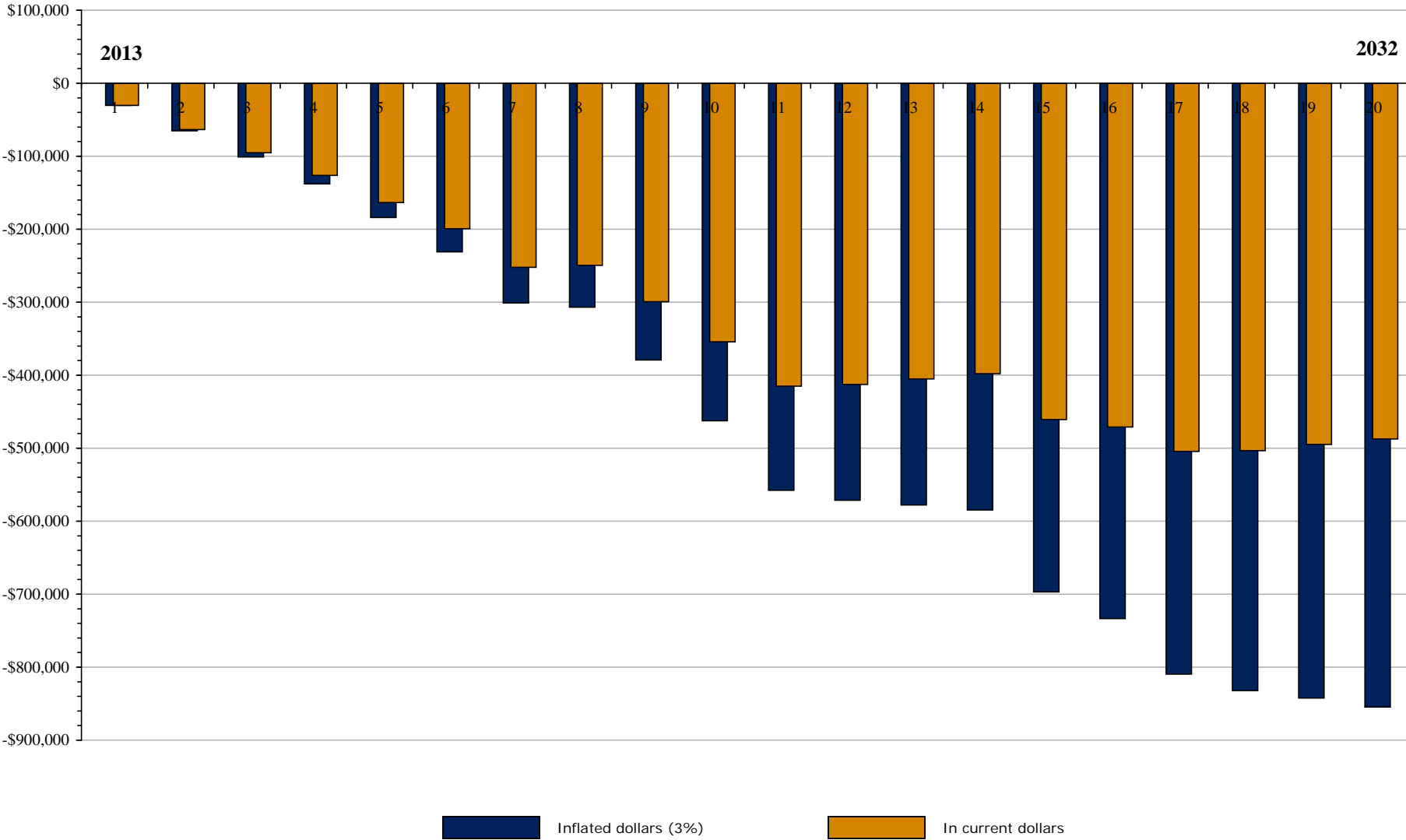
	2013 Year 1	2014 Year 2	2015 Year 3	2016 Year 4	2017 Year 5	2018 Year 6	2019 Year 7	2020 Year 8	2021 Year 9	2022 Year 10
<b>Site Systems &amp; Accessibility</b>										
Surface	\$54,573	\$0	\$0	\$0	\$1,097	\$9,868	\$0	\$0	\$0	\$0
Accessibility	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Site Sub-Total	<b>\$54,573</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$1,097</b>	<b>\$9,868</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>Mechanical Room</b>										
Boilers	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boiler Room Systems	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Mechanical Sub-Total	<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>
<b>Building Mech. &amp; Electrical</b>										
Mechanical	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Electrical	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$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>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>Building Architectural</b>										
Structural and Exterior	\$9,990	\$31,191	\$32,127	\$33,091	\$0	\$0	\$0	\$0	\$66,695	\$75,391
Roof Systems	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Halls, Stairs, Lobbies	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Community Spaces	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building Architectural Sub-Total	<b>\$9,990</b>	<b>\$31,191</b>	<b>\$32,127</b>	<b>\$33,091</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$66,695</b>	<b>\$75,391</b>
<b>Dwelling Units</b>										
Living Areas	\$3,936	\$4,054	\$4,176	\$4,301	\$4,430	\$4,563	\$4,700	\$4,841	\$4,986	\$5,135
Bathrooms	\$1,362	\$1,403	\$1,445	\$1,488	\$6,147	\$6,655	\$6,855	\$2,018	\$2,079	\$3,785
Kitchens	\$2,774	\$2,857	\$2,942	\$3,031	\$32,677	\$30,342	\$31,253	\$3,411	\$3,513	\$3,619
Mechanical & Electrical	\$1,700	\$1,751	\$1,804	\$1,858	\$8,675	\$2,971	\$34,607	\$3,152	\$3,246	\$3,343
Dwelling Units Sub-Total	<b>\$9,771</b>	<b>\$10,064</b>	<b>\$10,366</b>	<b>\$10,677</b>	<b>\$51,929</b>	<b>\$44,531</b>	<b>\$77,414</b>	<b>\$13,421</b>	<b>\$13,824</b>	<b>\$15,883</b>
<b>Total Capital Costs</b>	<b>\$74,334</b>	<b>\$41,255</b>	<b>\$42,493</b>	<b>\$43,768</b>	<b>\$53,027</b>	<b>\$54,399</b>	<b>\$77,414</b>	<b>\$13,421</b>	<b>\$80,519</b>	<b>\$91,273</b>

# Hillside Apartments

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	
\$11,440	\$0	\$0	\$0	\$0	\$13,262	\$18,454	\$0	\$0	\$1,710	<b>Site Systems &amp; Accessibility</b> Surface Accessibility
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
<b>\$11,440</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$13,262</b>	<b>\$18,454</b>	<b>\$0</b>	<b>\$0</b>	<b>\$1,710</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	\$0	\$0	\$0	<b>Building Mech. &amp; Electrical</b> Mechanical Electrical Elevators
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
\$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 & Electrical Sub-Total
\$77,652	\$7,102	\$0	\$0	\$0	\$2,633	\$2,712	\$14,843	\$2,877	\$2,963	<b>Building Architectural</b> Structural and Exterior Roof Systems Halls, Stairs, Lobbies Community Spaces
\$0	\$0	\$0	\$0	\$92,353	\$0	\$0	\$0	\$0	\$0	
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
<b>\$77,652</b>	<b>\$7,102</b>	<b>\$0</b>	<b>\$0</b>	<b>\$92,353</b>	<b>\$2,633</b>	<b>\$2,712</b>	<b>\$14,843</b>	<b>\$2,877</b>	<b>\$2,963</b>	Building Architectural Sub-Total
\$5,289	\$5,448	\$5,612	\$5,780	\$5,953	\$6,132	\$6,316	\$6,505	\$6,701	\$6,902	<b>Dwelling Units</b> Living Areas Bathrooms Kitchens Mechanical & Electrical
\$2,205	\$2,271	\$2,340	\$2,410	\$9,304	\$9,583	\$9,870	\$2,712	\$2,318	\$2,388	
\$3,727	\$3,839	\$3,954	\$4,073	\$10,418	\$10,731	\$11,053	\$4,584	\$4,722	\$4,863	
\$3,444	\$3,547	\$3,654	\$3,763	\$3,876	\$3,992	\$37,650	\$4,235	\$4,362	\$4,493	
<b>\$14,666</b>	<b>\$15,106</b>	<b>\$15,559</b>	<b>\$16,026</b>	<b>\$29,551</b>	<b>\$30,438</b>	<b>\$64,890</b>	<b>\$18,037</b>	<b>\$18,103</b>	<b>\$18,646</b>	Dwelling Units Sub-Total
<b>\$103,758</b>	<b>\$22,208</b>	<b>\$15,559</b>	<b>\$16,026</b>	<b>\$121,904</b>	<b>\$46,333</b>	<b>\$86,056</b>	<b>\$32,880</b>	<b>\$20,980</b>	<b>\$23,319</b>	<b>Total Capital Costs</b>

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



Current Replacement Reserve Balance: **\$36,511**  
Adjusted Replacement Reserve Balance: **\$36,511**  
Current annual contributions to reserve accounts: **\$6,182**

At the end of Year One, Reserve Balances are projected to be: **(\$30,453)**  
At the end of Year 20, Reserve Balances are projected to be: **(\$854,704)**  
Unmet needs projected in most years of the plan



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

Reserve Funding In Year 1										
Starting Balance:		\$36,511 or \$1,404/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:		\$6,182 or \$238/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	\$36,511	(\$30,453)	(\$65,245)	(\$101,080)	(\$137,991)	(\$183,955)	(\$231,079)	(\$301,000)	(\$306,704)	(\$379,274)
<b>(B) Annual Funding</b>										
Contributions Indexed at 3%	\$238	\$245	\$252	\$260	\$268	\$276	\$284	\$292	\$301	\$310
<b>(C) Additional Unit Contributions</b>										
<b>(D) Total Annual Reserve Funding</b>	\$6,182	\$6,368	\$6,559	\$6,756	\$6,958	\$7,167	\$7,382	\$7,604	\$7,832	\$8,067
<b>(E) Interest on Reserves at 3%</b>	\$1,188	\$96	\$98	\$101	\$104	\$108	\$111	\$114	\$117	\$121
<b>Total Funds Available</b>	<b>\$43,881</b>	<b>(\$23,989)</b>	<b>(\$58,587)</b>	<b>(\$94,223)</b>	<b>(\$130,928)</b>	<b>(\$176,680)</b>	<b>(\$223,586)</b>	<b>(\$293,282)</b>	<b>(\$298,754)</b>	<b>(\$371,086)</b>
<b>(F) Total Capital Cost</b>	\$74,334	\$41,255	\$42,493	\$43,768	\$53,027	\$54,399	\$77,414	\$13,421	\$80,519	\$91,273
<b>(G) Reserve Balances</b>	<b>(\$30,453)</b>	<b>(\$65,245)</b>	<b>(\$101,080)</b>	<b>(\$137,991)</b>	<b>(\$183,955)</b>	<b>(\$231,079)</b>	<b>(\$301,000)</b>	<b>(\$306,704)</b>	<b>(\$379,274)</b>	<b>(\$462,360)</b>
Outside Capital:										
Adjusted Reserve Balances	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

### Notes:

1. Starting reserve balance is \$36,511.
2. Annual contribution \$6,182.
3. Capital costs outpace reserves throughout entire plan.

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

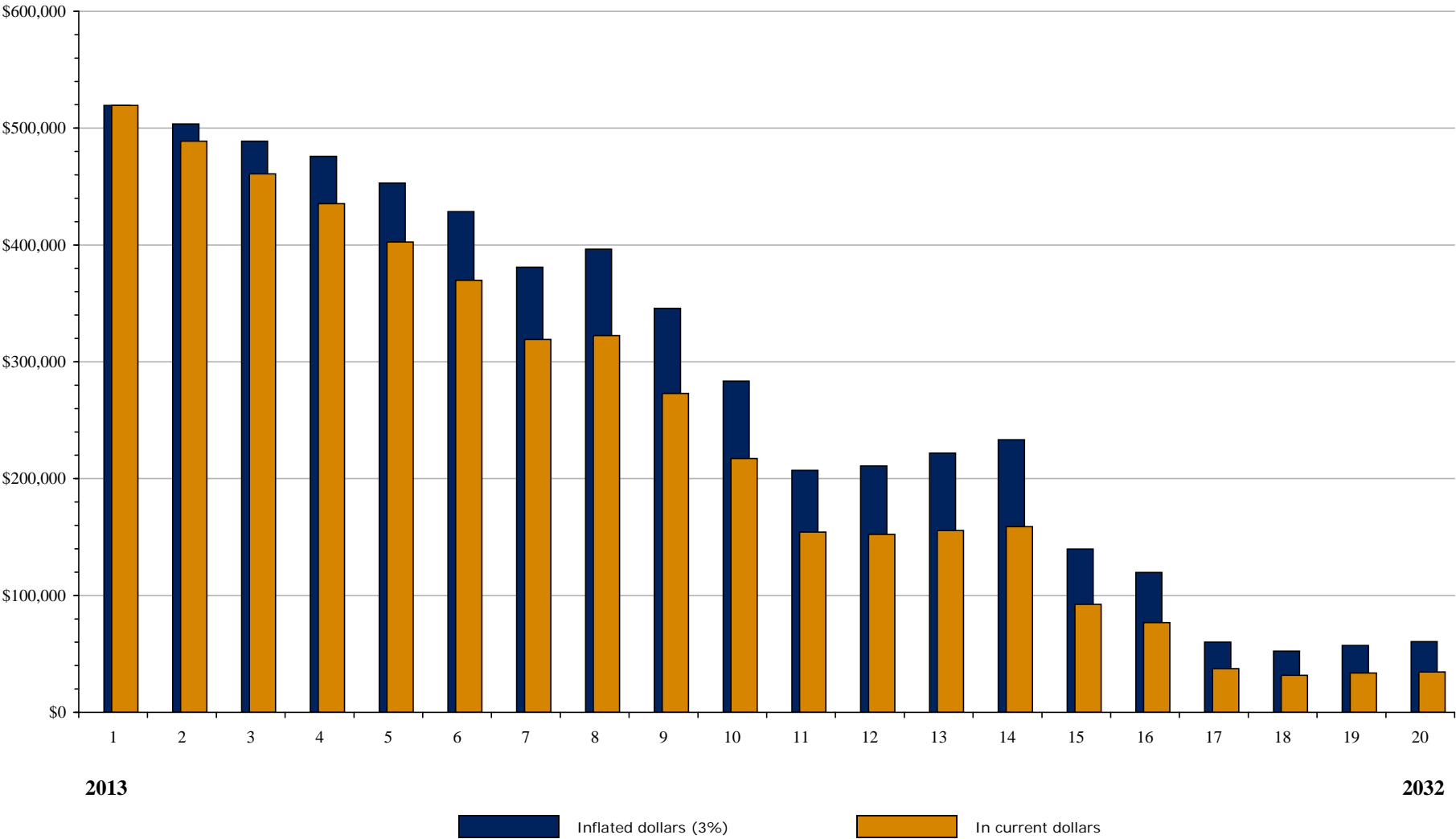
Line C, Additional Contributions allows for material adjustments in annual RR funding that would enable the property to meet all projected needs out of reserves through Year 20.

\*\*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>(\$854,704)</b>					This is (\$32,873)per unit in inflated dollars or (\$18,747) per unit in uninflated dollars						
Projected annual funding to reserves is <b>\$10,841</b>					This is \$417 per unit in inflated dollars or \$238 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>	
(\$462,360)	(\$557,684)	(\$571,206)	(\$577,818)	(\$584,629)	(\$697,041)	(\$733,597)	(\$809,583)	(\$832,091)	(\$842,388)	Starting Replacement Reserves	
										<b>Annual Funding (B)</b>	
\$320	\$329	\$339	\$349	\$360	\$370	\$382	\$393	\$405	\$417	Contributions Indexed at 3%	
										Additional Unit Contributions <b>(C)</b>	
\$8,309	\$8,558	\$8,815	\$9,079	\$9,351	\$9,632	\$9,921	\$10,219	\$10,525	\$10,841	Total Annual Reserve Funding <b>(D)</b>	
\$125	\$128	\$132	\$136	\$140	\$144	\$149	\$153	\$158	\$163	Interest on Reserves at 3% <b>(E)</b>	
<b>(\$453,926)</b>	<b>(\$548,998)</b>	<b>(\$562,259)</b>	<b>(\$568,603)</b>	<b>(\$575,137)</b>	<b>(\$687,265)</b>	<b>(\$723,528)</b>	<b>(\$799,212)</b>	<b>(\$821,408)</b>	<b>(\$831,385)</b>	<b>Total Funds Available</b>	
\$103,758	\$22,208	\$15,559	\$16,026	\$121,904	\$46,333	\$86,056	\$32,880	\$20,980	\$23,319	Total Capital Cost <b>(F)</b>	
<b>(\$557,684)</b>	<b>(\$571,206)</b>	<b>(\$577,818)</b>	<b>(\$584,629)</b>	<b>(\$697,041)</b>	<b>(\$733,597)</b>	<b>(\$809,583)</b>	<b>(\$832,091)</b>	<b>(\$842,388)</b>	<b>(\$854,704)</b>	<b>Reserve Balances (G)</b>	
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0		

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



Current Replacement Reserve Balance: **\$36,511**  
Adjusted Replacement Reserve Balance: **\$36,511**  
Current annual contributions to reserve accounts: **\$6,182**

At the end of Year One, Reserve Balances are projected to be: **\$519,547**  
At the end of Year 20, Reserve Balances are projected to be: **\$60,490**  
All projected capital needs are met throughout the plan

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

		Reserve Funding In Year 1									
		Starting Balance:		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:									
		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
(A) Reserve Balances											
	Starting Replacement Reserves	\$36,511	\$519,547	\$503,509	\$488,918	\$475,782	\$452,992	\$428,626	\$381,007	\$396,460	\$345,802
(B) Annual Funding											
	Contributions Indexed at 3%	\$238	\$245	\$365	\$485	\$605	\$623	\$642	\$661	\$681	\$701
(C) Additional Unit Contributions											
(D) Total Annual Reserve Funding		\$6,182	\$9,488	\$12,608	\$15,728	\$15,728	\$16,200	\$16,686	\$17,186	\$17,702	\$18,233
(E) Interest on Reserves at 3%		\$1,188	\$15,729	\$15,294	\$14,903	\$14,509	\$13,833	\$13,109	\$11,688	\$12,159	\$10,648
Total Funds Available		\$43,881	\$544,764	\$531,411	\$519,549	\$506,019	\$483,025	\$458,421	\$409,881	\$426,321	\$374,682
(F) Total Capital Cost		\$74,334	\$41,255	\$42,493	\$43,768	\$53,027	\$54,399	\$77,414	\$13,421	\$80,519	\$91,273
(G) Reserve Balances		(\$30,453)	\$503,509	\$488,918	\$475,782	\$452,992	\$428,626	\$381,007	\$396,460	\$345,802	\$283,409
	Outside Capital:	\$550,000									
	Adjusted Reserve Balances	\$519,547	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

### Notes:

1. Same starting reserve balance and annual contribution as shown in Plan 1.
2. In Year 1, \$550K is added as outside capital.
3. Annual contributions increased in Years 2-4 by \$120/apt (\$10/month).
4. Plan is fully funded.

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

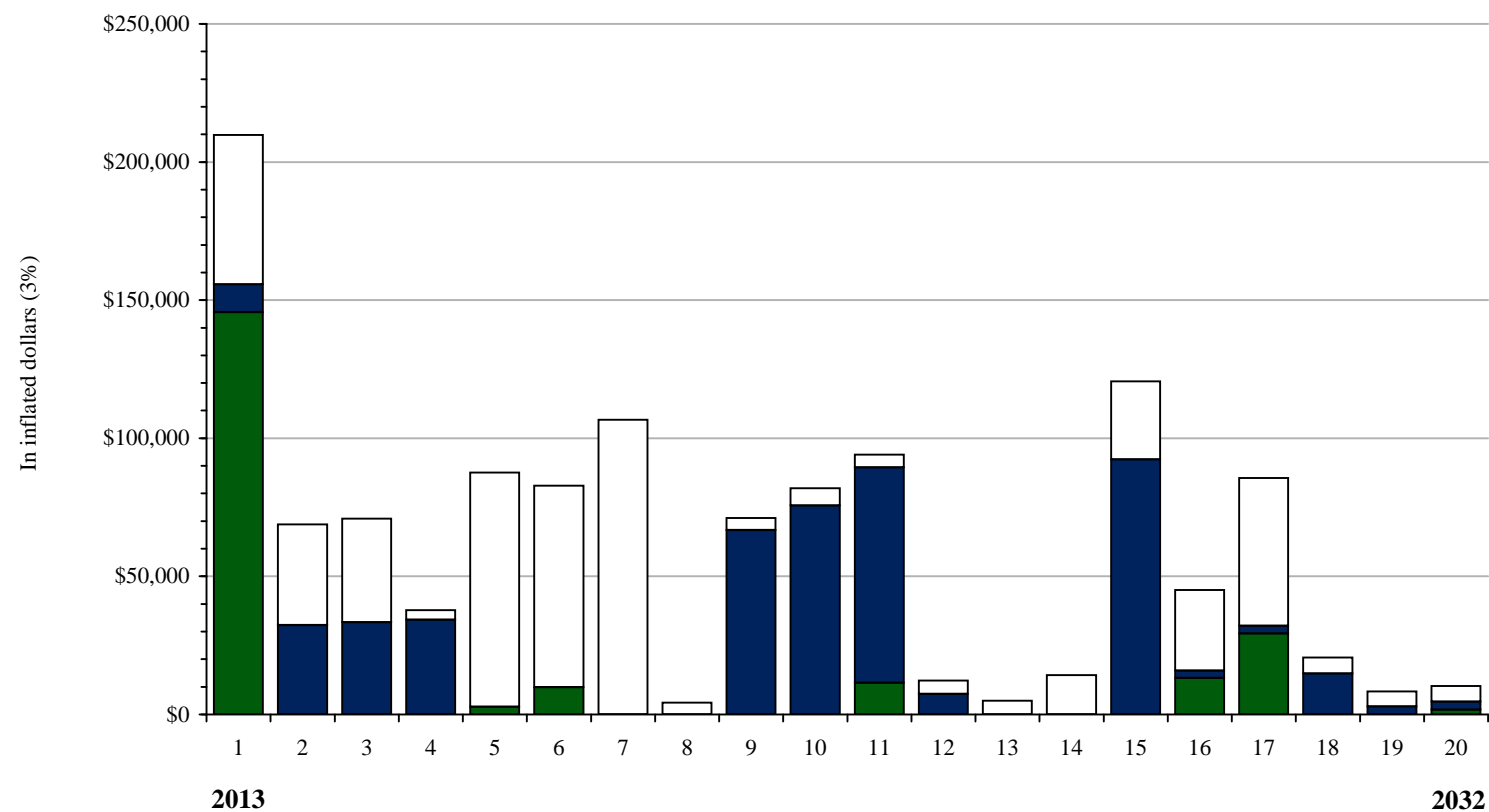
Line C, Additional Contributions allows for material adjustments in annual RR funding that would enable the property to meet all projected needs out of reserves through Year 20.

\*\*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

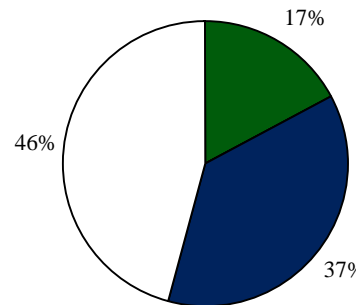
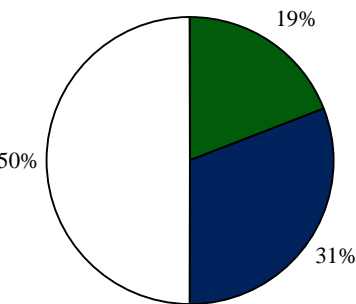
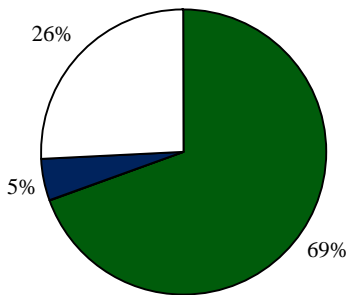
Replacement Reserve (RR) Analysis: *Plan Two - Conventional*

Reserve Funding In Year 20										
Projected replacement reserve balance is <b>\$60,490</b>					This is \$2,327 per unit in inflated dollars or \$1,327 per unit in uninflated dollars					
Projected annual funding to reserves is <b>\$24,503</b>					This is \$942 per unit in inflated dollars or \$537 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	
										Reserve Balances (A)
										Annual Funding (B)
										Additional Unit Contributions (C)
										Total Annual Reserve Funding (D)
										Total Funds Available
										Reserve Balances (G)
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	

Capital Needs Summary - Green



Hillside Apartments



Total Costs by Building System (inflated dollars)

	Year 1	Years 1-10	Years 1-20
Site Systems & Accessibility	\$145,648 or \$5,602/unit	\$158,285 or \$6,088/unit	\$214,062 or \$8,233/unit
Mechanical Room			
Building Mech. & Elec.			
Building Architectural	\$10,038 or \$386/unit	\$252,434 or \$9,709/unit	\$456,181 or \$17,545/unit
Dwelling Units	\$54,140 or \$2,082/unit	\$410,984 or \$15,807/unit	\$567,459 or \$21,825/unit
In inflated dollars:	\$209,826 or \$8,070/unit	\$821,703 or \$31,604/unit	\$1,237,703 or \$47,604/unit
In current dollars:	\$209,826 or \$8,070/unit	\$739,040 or \$28,425/unit	\$1,016,289 or \$39,088/unit

Twenty Year Distribution

## Capital Needs Summary - Green

OSI Ref: **13209**  
 Property Age: **31 Years**  
 Financing: **CHFA**

Residential Buildings: **3**  
 Total Number of Units: **26**  
 Occupancy: **Family**

	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	\$145,648	\$0	\$0	\$0	\$2,769	\$9,868	\$0	\$0	\$0	\$0
Accessibility	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Site Sub-Total	<b>\$145,648</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$2,769</b>	<b>\$9,868</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>Mechanical Room</b>										
Boilers	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boiler Room Systems	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Mechanical Sub-Total	<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>
<b>Building Mech. &amp; Electrical</b>										
Mechanical	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Electrical	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$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>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>Building Architectural</b>										
Structural and Exterior	\$10,038	\$32,359	\$33,329	\$34,329	\$0	\$0	\$0	\$0	\$66,695	\$75,683
Roof Systems	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Halls, Stairs, Lobbies	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Community Spaces	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building Architectural Sub-Total	<b>\$10,038</b>	<b>\$32,359</b>	<b>\$33,329</b>	<b>\$34,329</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$66,695</b>	<b>\$75,683</b>
<b>Dwelling Units</b>										
Living Areas	\$24,052	\$24,774	\$25,517	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathrooms	\$3,339	\$3,439	\$3,542	\$1,008	\$5,999	\$6,527	\$6,723	\$1,504	\$1,549	\$3,239
Kitchens	\$25,049	\$6,512	\$6,707	\$618	\$32,168	\$29,817	\$30,712	\$695	\$716	\$738
Mechanical & Electrical	\$1,700	\$1,751	\$1,804	\$1,858	\$46,658	\$36,583	\$69,227	\$2,091	\$2,154	\$2,218
Dwelling Units Sub-Total	<b>\$54,140</b>	<b>\$36,476</b>	<b>\$37,570</b>	<b>\$3,483</b>	<b>\$84,824</b>	<b>\$72,927</b>	<b>\$106,661</b>	<b>\$4,290</b>	<b>\$4,419</b>	<b>\$6,195</b>
<b>Total Capital Costs</b>	<b>\$209,826</b>	<b>\$68,834</b>	<b>\$70,899</b>	<b>\$37,813</b>	<b>\$87,593</b>	<b>\$82,795</b>	<b>\$106,661</b>	<b>\$4,290</b>	<b>\$71,114</b>	<b>\$81,878</b>

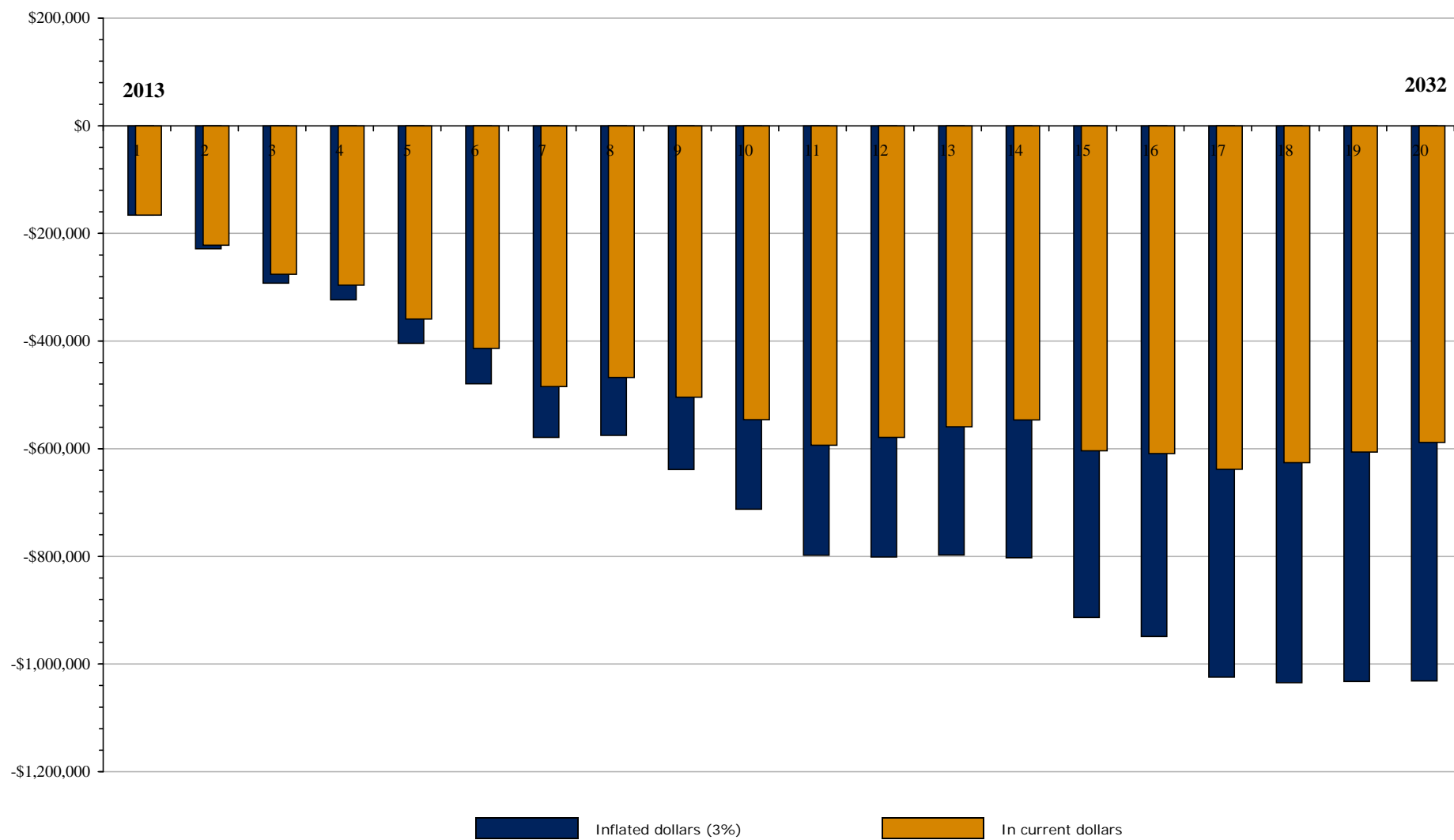
# Hillside Apartments

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	
\$11,440	\$0	\$0	\$0	\$0	\$13,262	\$29,366	\$0	\$0	\$1,710	<b>Site Systems &amp; Accessibility</b>
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Surface
										Accessibility
<b>\$11,440</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$13,262</b>	<b>\$29,366</b>	<b>\$0</b>	<b>\$0</b>	<b>\$1,710</b>	Site Sub-Total
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	<b>Mechanical Room</b>
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Boilers
										Boiler Room Systems
<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	\$0	\$0	\$0	<b>Building Mech. &amp; Electrical</b>
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Mechanical
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Electrical
										Elevators
<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 & Electrical Sub-Total
\$77,954	\$7,412	\$0	\$0	\$0	\$2,633	\$2,712	\$14,843	\$2,877	\$2,963	<b>Building Architectural</b>
\$0	\$0	\$0	\$0	\$92,353	\$0	\$0	\$0	\$0	\$0	Structural and Exterior
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Roof Systems
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Halls, Stairs, Lobbies
										Community Spaces
<b>\$77,954</b>	<b>\$7,412</b>	<b>\$0</b>	<b>\$0</b>	<b>\$92,353</b>	<b>\$2,633</b>	<b>\$2,712</b>	<b>\$14,843</b>	<b>\$2,877</b>	<b>\$2,963</b>	Building Architectural Sub-Total
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	<b>Dwelling Units</b>
\$1,643	\$1,692	\$1,743	\$1,795	\$9,183	\$9,458	\$9,742	\$2,021	\$1,570	\$1,617	Living Areas
\$760	\$783	\$806	\$9,997	\$16,520	\$17,016	\$7,510	\$935	\$963	\$992	Bathrooms
\$2,285	\$2,353	\$2,424	\$2,497	\$2,571	\$2,649	\$36,266	\$2,810	\$2,894	\$2,981	Kitchens
										Mechanical & Electrical
<b>\$4,688</b>	<b>\$4,828</b>	<b>\$4,973</b>	<b>\$14,289</b>	<b>\$28,274</b>	<b>\$29,123</b>	<b>\$53,518</b>	<b>\$5,765</b>	<b>\$5,427</b>	<b>\$5,590</b>	Dwelling Units Sub-Total
<b>\$94,081</b>	<b>\$12,241</b>	<b>\$4,973</b>	<b>\$14,289</b>	<b>\$120,627</b>	<b>\$45,017</b>	<b>\$85,596</b>	<b>\$20,608</b>	<b>\$8,304</b>	<b>\$10,263</b>	<b>Total Capital Costs</b>



Replacement Reserve (RR) Analysis: Plan One - Green



Current Replacement Reserve Balance: **\$36,511**  
Adjusted Replacement Reserve Balance: **\$36,511**  
Current annual contributions to reserve accounts: **\$6,182**

At the end of Year One, Reserve Balances are projected to be: **(\$165,945)**  
At the end of Year 20, Reserve Balances are projected to be: **(\$1,031,482)**  
Unmet needs projected in most years of the plan

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

Reserve Funding In Year 1										
Starting Balance:		\$36,511 or \$1,404/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:		\$6,182 or \$238/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	\$36,511	(\$165,945)	(\$228,316)	(\$292,558)	(\$323,513)	(\$404,044)	(\$479,564)	(\$578,732)	(\$575,304)	(\$638,469)
<b>(B) Annual Funding</b>										
Contributions Indexed at 3%	\$238	\$245	\$252	\$260	\$268	\$276	\$284	\$292	\$301	\$310
<b>(C) Additional Unit Contributions</b>										
<b>(D) Total Annual Reserve Funding</b>	\$6,182	\$6,368	\$6,559	\$6,756	\$6,958	\$7,167	\$7,382	\$7,604	\$7,832	\$8,067
<b>(E) Interest on Reserves at 3%</b>	\$1,188	\$96	\$98	\$101	\$104	\$108	\$111	\$114	\$117	\$121
<b>Total Funds Available</b>	<b>\$43,881</b>	<b>(\$159,481)</b>	<b>(\$221,658)</b>	<b>(\$285,701)</b>	<b>(\$316,451)</b>	<b>(\$396,769)</b>	<b>(\$472,071)</b>	<b>(\$571,015)</b>	<b>(\$567,355)</b>	<b>(\$630,282)</b>
<b>(F) Total Capital Cost</b>	\$209,826	\$68,834	\$70,899	\$37,813	\$87,593	\$82,795	\$106,661	\$4,290	\$71,114	\$81,878
<b>(G) Reserve Balances</b>	<b>(\$165,945)</b>	<b>(\$228,316)</b>	<b>(\$292,558)</b>	<b>(\$323,513)</b>	<b>(\$404,044)</b>	<b>(\$479,564)</b>	<b>(\$578,732)</b>	<b>(\$575,304)</b>	<b>(\$638,469)</b>	<b>(\$712,160)</b>
Outside Capital:										
Adjusted Reserve Balances	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

### Notes:

1. Starting reserve balance is \$36,511.
2. Annual contribution \$6,182.
3. Capital costs outpace reserves throughout entire plan.

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

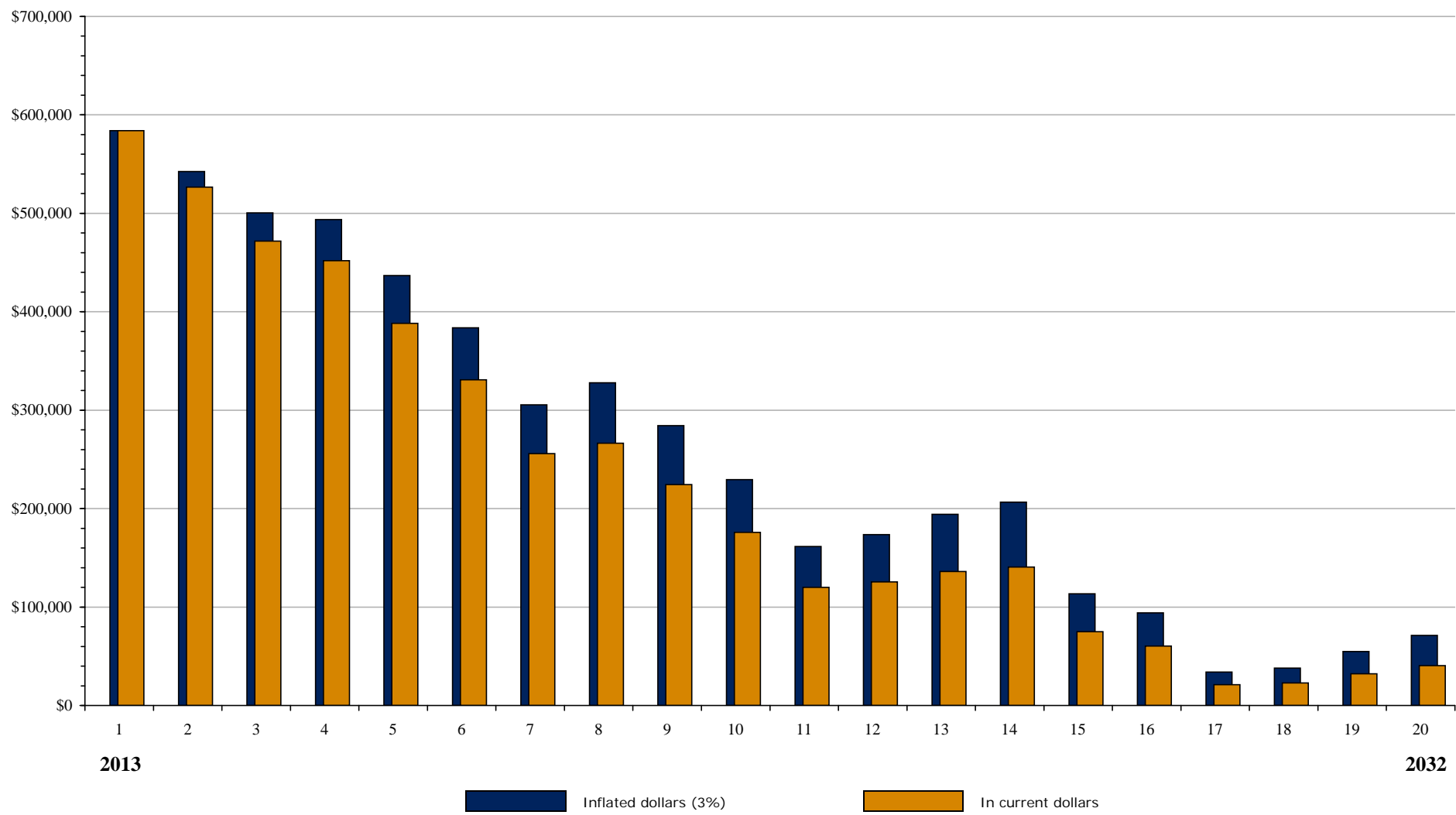
Line C, Additional Contributions allows for material adjustments in annual RR funding that would enable the property to meet all projected needs out of reserves through Year 20.

\*\*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 <b>(\$1,031,482)</b>					This is (\$39,672)per unit in inflated dollars or (\$22,625) per unit in uninflated dollars					
Projected annual funding to reserves is <b>\$10,841</b>					This is \$417 per unit in inflated dollars or \$238 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	
										<b>Reserve Balances (A)</b>
(\$712,160)	(\$797,808)	(\$801,362)	(\$797,389)	(\$802,462)	(\$913,598)	(\$948,839)	(\$1,024,365)	(\$1,034,601)	(\$1,032,222)	Starting Replacement Reserves
										<b>Annual Funding (B)</b>
\$320	\$329	\$339	\$349	\$360	\$370	\$382	\$393	\$405	\$417	Contributions Indexed at 3%
										Additional Unit Contributions <b>(C)</b>
\$8,309	\$8,558	\$8,815	\$9,079	\$9,351	\$9,632	\$9,921	\$10,219	\$10,525	\$10,841	Total Annual Reserve Funding <b>(D)</b>
\$125	\$128	\$132	\$136	\$140	\$144	\$149	\$153	\$158	\$163	Interest on Reserves at 3% <b>(E)</b>
<b>(\$703,727)</b>	<b>(\$789,122)</b>	<b>(\$792,415)</b>	<b>(\$788,173)</b>	<b>(\$792,971)</b>	<b>(\$903,821)</b>	<b>(\$938,769)</b>	<b>(\$1,013,993)</b>	<b>(\$1,023,918)</b>	<b>(\$1,021,218)</b>	<b>Total Funds Available</b>
\$94,081	\$12,241	\$4,973	\$14,289	\$120,627	\$45,017	\$85,596	\$20,608	\$8,304	\$10,263	Total Capital Cost <b>(F)</b>
<b>(\$797,808)</b>	<b>(\$801,362)</b>	<b>(\$797,389)</b>	<b>(\$802,462)</b>	<b>(\$913,598)</b>	<b>(\$948,839)</b>	<b>(\$1,024,365)</b>	<b>(\$1,034,601)</b>	<b>(\$1,032,222)</b>	<b>(\$1,031,482)</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: **\$36,511**  
Adjusted Replacement Reserve Balance: **\$36,511**  
Current annual contributions to reserve accounts: **\$6,182**

At the end of Year One, Reserve Balances are projected to be: **\$584,055**  
At the end of Year 20, Reserve Balances are projected to be: **\$71,107**  
All projected capital needs are met throughout the plan

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

		Reserve Funding In Year 1									
		Starting Balance:		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:									
		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
(A) Reserve Balances											
	Starting Replacement Reserves	\$36,511	\$584,055	\$542,373	\$500,542	\$493,709	\$436,891	\$383,646	\$305,430	\$327,747	\$284,433
(B) Annual Funding											
	Contributions Indexed at 3%	\$238	\$245	\$365	\$485	\$605	\$623	\$642	\$661	\$681	\$701
(C)	Additional Unit Contributions		\$120	\$120	\$120						
(D)	Total Annual Reserve Funding	\$6,182	\$9,488	\$12,608	\$15,728	\$15,728	\$16,200	\$16,686	\$17,186	\$17,702	\$18,233
(E)	Interest on Reserves at 3%	\$1,188	\$17,664	\$16,460	\$15,252	\$15,047	\$13,350	\$11,760	\$9,421	\$10,098	\$8,806
Total Funds Available		\$43,881	\$611,207	\$571,441	\$531,522	\$524,484	\$466,441	\$412,091	\$332,037	\$355,547	\$311,472
(F)	Total Capital Cost	\$209,826	\$68,834	\$70,899	\$37,813	\$87,593	\$82,795	\$106,661	\$4,290	\$71,114	\$81,878
(G)	Reserve Balances	(\$165,945)	\$542,373	\$500,542	\$493,709	\$436,891	\$383,646	\$305,430	\$327,747	\$284,433	\$229,594
	Outside Capital:	\$750,000									
	Adjusted Reserve Balances	\$584,055	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

### Notes:

1. Same starting reserve balance and annual contribution as shown in Plan 1.
2. In Year 1, \$750K is added as outside capital.
3. Annual contributions increased in Years 2-4 by \$120/apt (\$10/month).
4. 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 <b>\$71,107</b>					This is \$2,735 per unit in inflated dollars or \$1,560 per unit in uninflated dollars					
Projected annual funding to reserves is <b>\$24,503</b>					This is \$942 per unit in inflated dollars or \$537 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	
										Reserve Balances (A)
\$229,594	\$161,462	\$173,699	\$194,159	\$206,524	\$113,547	\$94,033	\$34,019	\$37,875	\$54,854	Starting Replacement Reserves
										Annual Funding (B)
\$722	\$744	\$766	\$789	\$813	\$837	\$862	\$888	\$915	\$942	Contributions Indexed at 3%
										Additional Unit Contributions (C)
\$18,780	\$19,343	\$19,924	\$20,521	\$21,137	\$21,771	\$22,424	\$23,097	\$23,790	\$24,503	Total Annual Reserve Funding (D)
\$7,170	\$5,134	\$5,510	\$6,133	\$6,513	\$3,733	\$3,157	\$1,367	\$1,493	\$2,013	Interest on Reserves at 3% (E)
\$255,543	\$185,940	\$199,132	\$220,813	\$234,174	\$139,051	\$119,615	\$58,483	\$63,158	\$81,370	Total Funds Available
\$94,081	\$12,241	\$4,973	\$14,289	\$120,627	\$45,017	\$85,596	\$20,608	\$8,304	\$10,263	Total Capital Cost (F)
\$161,462	\$173,699	\$194,159	\$206,524	\$113,547	\$94,033	\$34,019	\$37,875	\$54,854	\$71,107	Reserve Balances (G)
\$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										
Driveways/Parking Lot	19,711 sf	2.10	\$41,392		31	20	1	in	1 Year	Asphalt paved, cracks and repaired sections observed. Resurface in Year 1
Driveways/Parking Lot (Green)	19,711 sf	5.75	\$113,336	\$71,944	31	20	1	in	1 Year	Resurface using porous asphalt
Walkways	4,610 sf	2.10	\$9,681		31	20	1	in	1 Year	Asphalt paved, cracks and repaired sections observed. Resurface in Year 1
Walkways (Green)	4,610 sf	6.25	\$28,813	\$19,132	31	20	1	in	1 Year	Resurface using open pavers
Crack-Fill and Sealcoat	24,321 sf	0.35	\$8,512		31	5	6 /11 /16	in	1 Year	Future surface repairs, includes parking lot re-stripping in Years 6, 11, and 16
Dumpsters	2 ea				31	20				Leased; on pad in parking lots - no enclosures
Dumpsters (Green)	sf									Maintain out of Operating
Metal Handrails	385 lf 1 ls	975.00	\$975		31	15	5 /20	in	1 Year	Painted
Metal Handrails (Green)	1 ls	975.00	\$975	\$0	31	15	5 /20	in	1 Year	Repainting allowance
Site Lighting	9 ea				≈10	15				Repaint using low VOC paints
Site Lighting (Green)	9 ea	165.00	\$1,485		≈10	30	5	in	1 Year	Pole-mounted HID (150w to 250w each)
Site Amenities	1 ls	3500.00	\$3,500		31	20	1	in	1 Year	Maintain out of Operating
Landscaping	1 ls	11500.00	\$11,500		5	40	17	in	1 Year	Replace existing with 65 w induction lighting
Landscaping (Green)	1 ls	18300.00	\$18,300	\$6,800	5	40	17	in	1 Year	Energy savings, longevity EWCM 1
ACCESSIBILITY										
Circulation	1 ls				31	10				Poured concrete retaining walls - Operating
Circulation (Green)	ls									Allowance to add development sign in Year 1
Common Areas	ea									Recent upgrade
Common Areas (Green)	ea									Allowance to replant and prune
Dwelling Units	3 ea				31	20				Replace existing w/Xeriscape (local plantings)
Dwelling Units (Green)	ea									Minimum maintenance and water use. <b>Discuss</b>
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
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SURFACE

Driveways/Parking Lot	\$41,392	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Driveways/Parking Lot (Green)	\$113,336	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Walkways	\$9,681	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Walkways (Green)	\$28,813	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Crack-Fill and Sealcoat	\$0	\$0	\$0	\$0	\$0	\$9,868	\$0	\$0	\$0	\$0	\$11,440	\$0	\$0	\$0	\$0	\$13,262	\$0	\$0	\$0	\$0
Dumpsters	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Dumpsters (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Metal Handrails	\$0	\$0	\$0	\$0	\$1,097	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,710
Metal Handrails (Green)	\$0	\$0	\$0	\$0	\$1,097	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,710
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	\$1,671	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Site Amenities	\$3,500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Landscaping	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$18,454	\$0	\$0	\$0
Landscaping (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$29,366	\$0	\$0	\$0

ACCESSIBILITY

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

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	1,280 lf				31	50				Concrete slab on grade Monitor
Framing	ls									
Slab	sf									
Miscellaneous	ea									
BUILDING EXTERIOR										
Exterior Common Doors	ea									
Exterior Common Doors (Green)	ea									
Exterior Unit Doors - 2	26 ea	345.00	\$8,970		31	35	10	over	3 Years	Insulated metal doors Replace starting in Year 10
Exterior Unit Doors - 2 (Green)	26 ea	370.88	\$9,643	\$673	31	35	10	over	3 Years	Consider replacing with fiberglass doors, improved energy performance, less maintenance.
Glass Sliding Doors	26 ea	1750.00	\$45,500		31	35	2	over	3 Years	Aluminum framed, problematic Replace starting in Year 2
Glass Sliding Doors (Green)	ea									
Service Doors	4 ea	515.00	\$2,060		31	30	1	in	1 Year	Metal doors, rust/corrosion observed. Includes door at small office area. Replace all in Year 1
Storm Doors	26 ea	247.00	\$6,422		Varies	15	10	over	3 Years	Replace starting in Year 10
Exterior Walls -Cleaning/Repair	24,300 sf	0.30	\$7,290		31	40	1 18	in	1 Year	Vinyl siding, some discoloration and damaged sections. Power wash in Years 1 and 18
Exterior Walls -Cleaning/Repair (Green)	sf									
Exterior Walls - 2	24,300 sf	6.50	\$157,950		31	40	9	over	3 Years	Vinyl siding, isolated damaged sections Replace starting in Year 9
Exterior Walls - 2 (Green)	24,300 sf	8.50	\$206,550	\$48,600	31	50		over	3 Years	Replace with cement fiberboard, longevity and durability. Not cost-effective. GM 1. <b>Discuss</b>
Exterior Walls - 3	sf									
Trim, Soffit, Fascia	1 ls	640.00	\$640		31	20	1	in	1 Year	Damaged wood door trim, at service doors Replacement allowance
Trim, Soffit, Fascia (Green)	1 ls	688.00	\$688	\$48	31	35	1	in	1 Year	Replace wood door trim with alternative material Longevity, insect/water resistant
Exterior Ceilings	sf									
Miscellaneous	ea									
Miscellaneous (Green)	ea									

Hillside Apartments																				
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	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Common Doors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Unit Doors - 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3,901	\$4,018	\$4,139	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Unit Doors - 2 (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4,194	\$4,320	\$4,449	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Glass Sliding Doors	\$0	\$15,622	\$16,090	\$16,573	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Glass Sliding Doors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Service Doors	\$2,060	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Storm Doors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,793	\$2,877	\$2,963	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Walls -Cleaning/Repair	\$7,290	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$12,049	\$0	\$0
Exterior Walls -Cleaning/Repair (G	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Walls - 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$66,695	\$68,696	\$70,757	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Walls - 2 (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	\$640	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Trim, Soffit, Fascia (Green)	\$688	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Ceilings	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Projected Capital Needs Over Twenty Years

BUILDING ARCHITECTURE--continued

Replacement Items	Quantity	Cost / Unit in 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	97 ea	467.50	\$45,348		31	35	2	over	3 Years	Aluminum framed double glazed windows, some fogged. Replace starting in Year 2
Windows - 1 (Green)	97 ea	502.56	\$48,749	\$3,401	31	30	2	over	3 Years	Replace existing w/fiberglass framed insulated glass windows.
Windows - 2	ea									
Windows - 2 (Green)	ea									
Window Glazing	ea									
Window Glazing (Green)	ea									
Window Lintels	ea									
Unit Balconies	ea									
Unit Balconies (Green)	ea									
Unit Patios	26 ea	650.00	\$16,900		31	20	16	over	10 Years	Recently upgraded with alternative wood decking and new rails. Future repair allowance starts in Yr 16
Unit Patios (Green)	ea									
Building Mounted Lighting	ea									
Building Mounted Lighting (Green)	ea									
ROOF SYSTEMS										
Structure	15,264 sf				31	50				Wood framed, wood decking Monitor
Roof Covering - 1	15,264 sf	4.00	\$61,056		5	20	15	in	1 Year	Architectural shingles, in good condition Replace in Year 15
Roof Covering - 1 (Green)	15,264 sf	7.75	\$118,296	\$57,240	5	40			Years	Replace existing w/metal roof (longevity LCC? Not cost-effective, see GM 2.
Roof Covering - 2	0 sf									
Roof Covering - 2 (Green)	sf									
Roof Covering - 3	0 sf									
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
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BUILDING EXTERIORS (cont.)

Windows - 1	\$0	\$15,569	\$16,036	\$16,517	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Windows - 1 (Green)	\$0	\$16,737	\$17,239	\$17,756	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$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	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$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	\$0	\$0	\$0	\$0	\$0
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	\$2,633	\$2,712	\$2,793	\$2,877	\$2,963
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	\$0	\$0	\$0	\$0

ROOF SYSTEMS

Structure	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Roof Covering - 1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$92,353	\$0	\$0	\$0	\$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	\$0	\$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
Roof Covering - 3	\$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

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
LIVING AREA FINISHES										
Unit Hallway Doors	_____ ea	_____	_____		_____	_____	_____	_____	_____	All direct entry units See Building Architecture section
Unit Interior Doors	_____ 79 ea	_____	_____		31	25	_____	_____	_____	Wood hollow core doors Maintain out of Operating
Unit Closet Doors	_____ 98 ea	_____	_____		31	25	_____	_____	_____	Hollow core doors Maintain out of Operating
Unit Walls and Ceilings	_____ 75,611 sf	_____	_____		31	10	_____	_____	_____	Painted ceilings and walls Maintain out of Operating
Unit Walls and Ceilings (Green)	_____ 75,611 sf	_____	_____		31	5	_____	_____	_____	Use Low VOC paints
Living Area Floors - 1	_____ 13,120 sf	3.00	\$39,359		Varies	10	1 11	_____	over 10 Years	Carpeting, in varying conditions Replace starting in Years 1 and 11
Living Area Floors - 1 (Green)	_____ 13,120 sf	5.50	\$72,157	\$32,799	Varies	25	1	_____	over 3 Years	Replace existing with faux wood linoleum starting in Year 1. GM 3
Living Area Floors - 2	_____ sf	_____	_____		_____	_____	_____	_____	_____	
Living Area Floors - 2 (Green)	_____ sf	_____	_____		_____	_____	_____	_____	_____	
BATHROOMS										
Bathroom Floors	_____ 1,318 sf	5.00	\$6,590		Varies	15	1 16	_____	over 15 Years	Vinyl sheet Replace starting in Years 1 and 16
Bathroom Floors (Green)	_____ 1,318 sf	5.50	\$7,249	\$659	Varies	25	1	_____	over 3 Years	Replace existing with faux wood linoleum starting in Year 1. GM 4
Bathtub and Shower	_____ 33 ea	375.00	\$12,375		Varies	20	1	_____	over 20 Years	Fiberglass tubs and surrounds, ceramic tile showers at accessible units. Repair allowance
Bathtub and Shower (Green)	_____ ea	_____	_____		_____	_____	_____	_____	_____	
Bathroom Vanity	_____ 30 ea	410.00	\$12,300		Varies	20	5	_____	over 3 Years	Wood-base, in varying conditions Replace starting in Year 5
Bathroom Vanity (Green)	_____ 30 ea	440.75	\$13,223	\$923	Varies	25	5	_____	over 3 Years	Replace existing w/FSC-certified wood cabinet Environmental benefit. GM 5
Bathroom Sinks	_____ 3 ea	420.00	\$1,260		31	35	10	_____	in 1 Year	Wall-hung sinks in accessible units Replace
Bathroom Toilets	_____ 33 ea	410.00	\$13,530		Varies	15	15	_____	over 3 Years	Low flush toilets (1.6 gpf) Replace starting in Year 15
Bathroom Toilets (Green)	_____ 33 ea	440.75	\$14,545	\$1,015	Varies	15	15	_____	over 3 Years	Replace existing with high efficiency toilets (1.28 gpf) Water/sewer savings EWCM 2
Ventilation & Exhaust	_____ 33 ea	110.00	\$3,630		Varies	20	6	_____	over 13 Years	Ceiling mounted fans Replace in Year 6
Ventilation & Exhaust (Green)	_____ 33 ea	118.25	\$3,902	\$272	Varies	20	6	_____	over 13 Years	Replace existing with humidistat controlled variable speed exhaust fans. Discuss
Accessories	_____ 33 ea	184.00	\$6,072		31	20	1	_____	over 20 Years	Towel bars, mirrors, etc. 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 - 1	\$3,936	\$4,054	\$4,176	\$4,301	\$4,430	\$4,563	\$4,700	\$4,841	\$4,986	\$5,135	\$5,289	\$5,448	\$5,612	\$5,780	\$5,953	\$6,132	\$6,316	\$6,505	\$6,701	\$6,902
Living Area Floors - 1 (Green)	\$24,052	\$24,774	\$25,517	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Living Area Floors - 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Living Area Floors - 2 (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
BATHROOMS																				
Bathroom Floors	\$439	\$453	\$466	\$480	\$494	\$509	\$525	\$540	\$557	\$573	\$590	\$608	\$626	\$645	\$665	\$684	\$705	\$726	\$748	\$770
Bathroom Floors (Green)	\$2,416	\$2,489	\$2,563	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathtub and Shower	\$619	\$637	\$656	\$676	\$696	\$717	\$739	\$761	\$784	\$807	\$832	\$856	\$882	\$909	\$936	\$964	\$993	\$1,023	\$1,053	\$1,085
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	\$4,615	\$4,753	\$4,896	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathroom Vanity (Green)	\$0	\$0	\$0	\$0	\$4,961	\$5,110	\$5,263	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathroom Sinks	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,644	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathroom Toilets	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$6,822	\$7,026	\$7,237	\$0	\$0	\$0
Bathroom Toilets (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$7,333	\$7,553	\$7,780	\$0	\$0	\$0
Ventilation & Exhaust	\$0	\$0	\$0	\$0	\$0	\$324	\$333	\$343	\$354	\$364	\$375	\$387	\$398	\$410	\$422	\$435	\$448	\$462	\$0	\$0
Ventilation & Exhaust (Green)	\$0	\$0	\$0	\$0	\$0	\$348	\$358	\$369	\$380	\$392	\$403	\$416	\$428	\$441	\$454	\$468	\$482	\$496	\$0	\$0
Accessories	\$304	\$313	\$322	\$332	\$342	\$352	\$363	\$373	\$385	\$396	\$408	\$420	\$433	\$446	\$459	\$473	\$487	\$502	\$517	\$532

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	3,140 sf	5.00	15,700		31	15	1	16	over	15	Years	Vinyl sheet Replace starting in Years 1 and 16
Kitchen Floors (Green)	3,140 sf	5.50	17,270	\$1,570	31	25	1		over	3	Years	Replace existing with faux wood linoleum starting in Year 1. GM 4
Kitchen Cabinets	26 ea	2700.00	70,200		Varies	20	5		over	3	Years	Mix of plywood and wood cabinets, varying conditons Replace starting in Year 5
Kitchen Cabinets (Green)	26 ea	2902.50	75,465	\$5,265	Varies	25	5		over	3	Years	Replace existing with FSC-certified wood cabinets Longevity GM 5. <b>Discuss</b>
Kitchen Cabinets	ea											
Kitchen Cabinets (Green)	ea											
Kitchen Countertops	26 ea	474.72	12,343		31	10	15		over	3	Years	Laminated particleboard counters, initially replaced w/cabinets; future cycle starts in Yr 15
Kitchen Countertops (Green)	26 ea	975.00	25,350	\$13,007	31	30					Years	Replace existing with solid stone countertops Longevity. Not cost-effective. GM 6
Range	26 ea	435.00	11,310		Varies	20	1		over	20	Years	30-inch electric ranges Replace
Range (Green)	ea											
Range	ea											
Range (Green)	ea											
Refrigerator	26 ea	670.00	17,420		Varies	15	1	16	over	15	Years	Frost-free Replace
Refrigerator (Green)	26 ea	720.25	18,727	\$1,307	Varies	15	14		over	3	Years	Replace existing with Energy Star refrigerators
Refrigerator (Green)	26 ea	720.25	18,727		Varies	15	1		in	1	Year	Energy savings EWCM 3
Refrigerator	ea											
Refrigerator (Green)	ea											
Dishwasher	ea											
Dishwasher (Green)	ea											
Rangehood and Vent	26 ea	110.00	2,860		Varies	20	5		in	1	Year	Ceiling exhaust fans Replace in Year 5
Exhaust Fans	ea											Ceiling exhaust fans
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
KITCHENS																				
Kitchen Floors	\$1,047	\$1,078	\$1,110	\$1,144	\$1,178	\$1,213	\$1,250	\$1,287	\$1,326	\$1,366	\$1,407	\$1,449	\$1,492	\$1,537	\$1,583	\$1,631	\$1,680	\$1,730	\$1,782	\$1,835
Kitchen Floors (Green)	\$5,757	\$5,929	\$6,107	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Kitchen Cabinets	\$0	\$0	\$0	\$0	\$26,337	\$27,127	\$27,941	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Kitchen Cabinets (Green)	\$0	\$0	\$0	\$0	\$28,312	\$29,162	\$30,036	\$0	\$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	\$6,223	\$6,410	\$6,602	\$0	\$0	\$0
Kitchen Countertops (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Range	\$566	\$582	\$600	\$618	\$636	\$656	\$675	\$695	\$716	\$738	\$760	\$783	\$806	\$830	\$855	\$881	\$907	\$935	\$963	\$992
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	\$1,161	\$1,196	\$1,232	\$1,269	\$1,307	\$1,346	\$1,387	\$1,428	\$1,471	\$1,515	\$1,561	\$1,608	\$1,656	\$1,705	\$1,757	\$1,809	\$1,864	\$1,920	\$1,977	\$2,036
Refrigerator (Green)	\$18,727	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$9,167	\$9,442	\$9,725	\$0	\$0	\$0	\$0
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	\$3,219	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exhaust Fans	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$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	49 ea	105.00	\$5,145		Varies	20	5	in	1 Year	Wall-mounted thermostat on each apt level Replace
Unit Thermostats (Green)	49 ea	202.00	\$9,898	\$4,753	Varies	20	5	in	1 Year	Replace with programmable thermostats
Unit Air Conditioning	26 un				31	15				Through-wall A/C sleeves. Air conditioners are resident owned.
Unit Air Conditioning (Green)	If									
Unit Radiation	26 un	663.46	\$17,250		Varies	35	5	over	20 Years	Electric baseboard heat in each unit. Replacement allowance starting in Year 5
Unit Radiation (Green)	26 un	3445.00	\$89,570	\$72,320	NEW	30	5	over	3 Years	Add ductless heat pumps starting in Yr 5; heat/cool cost includes A/C removal. <b>Discuss</b>
Unit Domestic Hot Water	26 ea	850.00	\$22,100		31	13	1 14	over	13 Years	Electric-heated DHW tanks, one per apartment Replace starting in Years 1 and 14
Unit Domestic Hot Water (Green)	ea									
Miscellaneous	ea									
Miscellaneous (Green)	ea									

IN-UNIT ELECTRICAL

Unit Electrical Panel	26 ea				31	50				Circuit breaker panels: no exposed wires or missing breakers. Maintain out of Operating
Unit Wiring	26 ea				31	50				Maintain out of Operating
Unit Security Call System	ea									
	26	803.85	\$20,900		31	10	17	in	1 Year	Replace existing hardwired smokes & add bdrm
Unit Smoke/Fire Detection	26 ea	1016.15	\$26,420		Varies	10	7	in	1 Year	smokes in Yr 7; replace all smokes in Yr 17
Unit Lighting	If									
Unit Lighting (Green)	If									
Unit Lighting	ea									
Unit Lighting (Green)	ea									
Miscellaneous	ea									

Hillside Apartments																				
Costs projected at 3%																	DWELLING UNITS--continued			
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	\$5,791	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Thermostats (Green)	\$0	\$0	\$0	\$0	\$11,140	\$0	\$0	\$0	\$0	\$0	\$0	\$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	\$971	\$1,000	\$1,030	\$1,061	\$1,093	\$1,125	\$1,159	\$1,194	\$1,230	\$1,267	\$1,305	\$1,344	\$1,384	\$1,426	\$1,468	\$1,512
Unit Radiation (Green)	\$0	\$0	\$0	\$0	\$33,604	\$34,612	\$35,650	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Domestic Hot Water	\$1,700	\$1,751	\$1,804	\$1,858	\$1,913	\$1,971	\$2,030	\$2,091	\$2,154	\$2,218	\$2,285	\$2,353	\$2,424	\$2,497	\$2,571	\$2,649	\$2,728	\$2,810	\$2,894	\$2,981
Unit Domestic Hot Water (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
IN-UNIT ELECTRICAL																				
Unit Electrical Panel	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Wiring	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Security Call System	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Smoke/Fire Detection	\$0	\$0	\$0	\$0	\$0	\$0	\$31,547	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$33,538	\$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

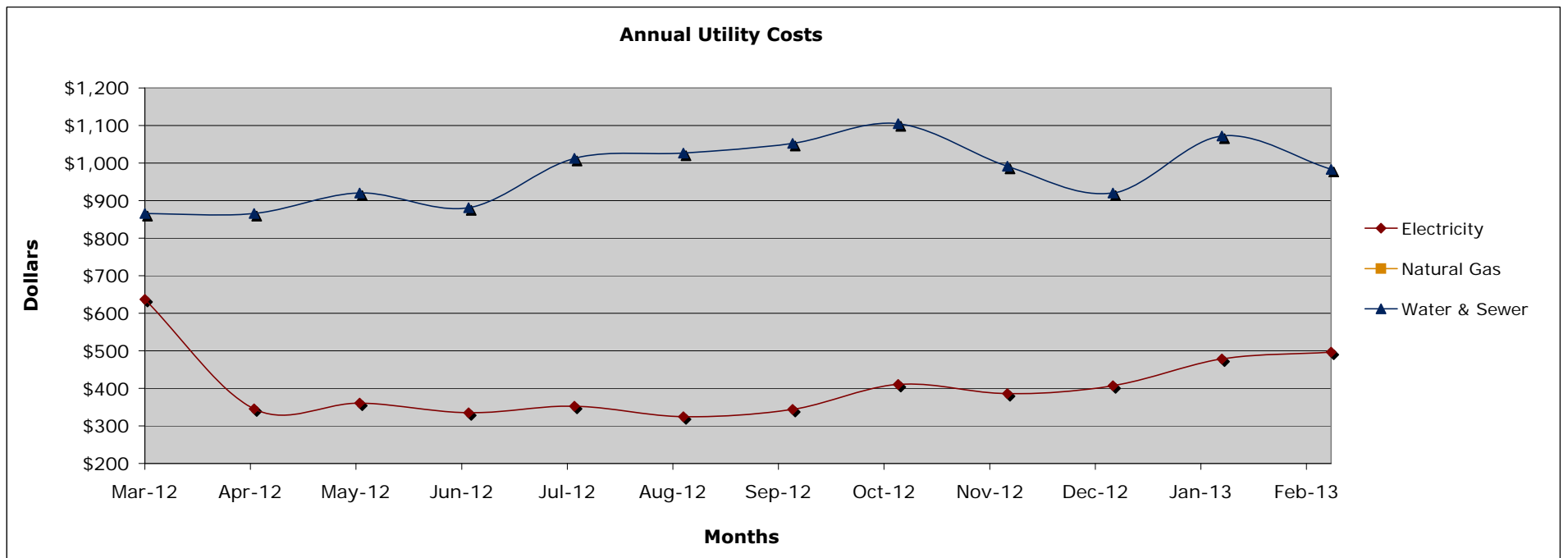
# Energy Analysis

## Utility Usage

### Hillside Apartments

The energy analysis portion of this GCNA examines utility bills for the most recent 12 months to summarize at electricity and water/sewer use. The following table and charts show the utility information by utility source and month for the master-metered services only.

	ELECTRICITY		NATURAL GAS		WATER / SEWER			OIL		TOTAL
	kWh	\$	Therms	\$	Gallons	Water \$	Sewer \$	Total \$	Gallons	\$
Feb-13	3,018	\$497			59,844	\$494	\$489	\$983		<b>\$1,480</b>
Jan-13	2,908	\$478			66,576	\$529	\$543	\$1,072		<b>\$1,550</b>
Dec-12	2,459	\$407			60,592	\$425	\$496	\$920		<b>\$1,327</b>
Nov-12	2,327	\$386			66,576	\$449	\$543	\$992		<b>\$1,378</b>
Oct-12	2,110	\$410			74,057	\$485	\$620	\$1,105		<b>\$1,515</b>
Sep-12	1,755	\$344			71,813	\$468	\$584	\$1,052		<b>\$1,397</b>
Aug-12	1,650	\$325			69,569	\$460	\$566	\$1,026		<b>\$1,351</b>
Jul-12	1,801	\$353			68,821	\$452	\$561	\$1,013		<b>\$1,365</b>
Jun-12	1,710	\$335			66,576	\$381	\$499	\$881		<b>\$1,216</b>
May-12	1,848	\$361			70,317	\$394	\$527	\$920		<b>\$1,281</b>
Apr-12	1,763	\$346			65,080	\$377	\$488	\$866		<b>\$1,211</b>
Mar-12	3,328	\$637			65,080	\$377	\$488	\$866		<b>\$1,503</b>
<b>Total</b>	<b>26,677</b>	<b>\$4,879</b>			<b>804,902</b>	<b>\$5,292</b>	<b>\$6,404</b>	<b>\$11,696</b>		<b>\$16,575</b>
<i>Unit Cost</i>		<i>\$0.183</i>						<i>\$0.01453</i>		



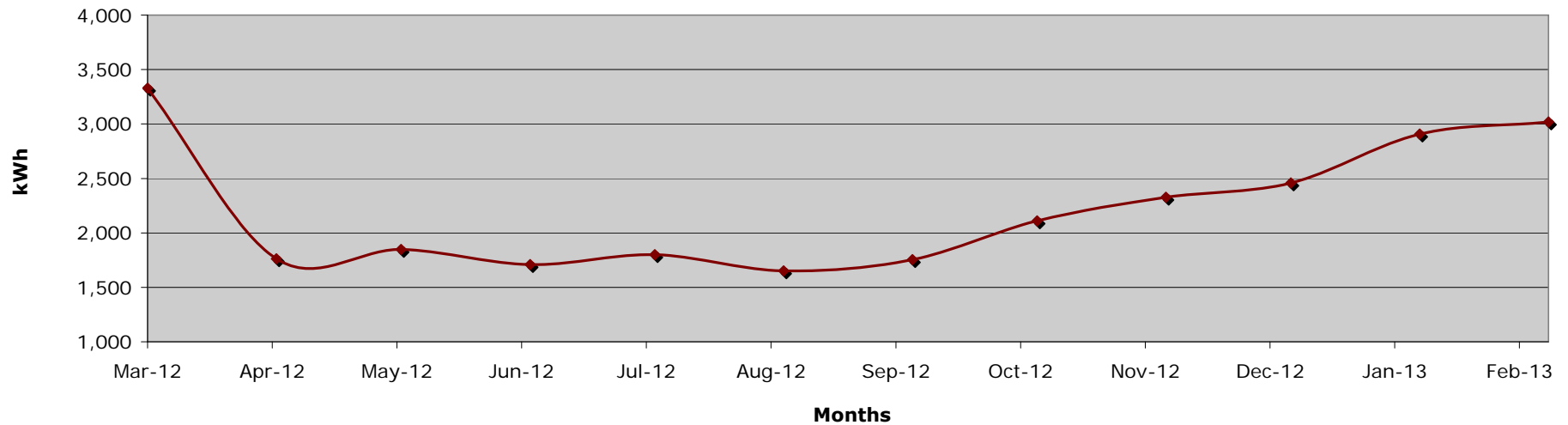
# Energy Analysis

## Utility Usage, By Type

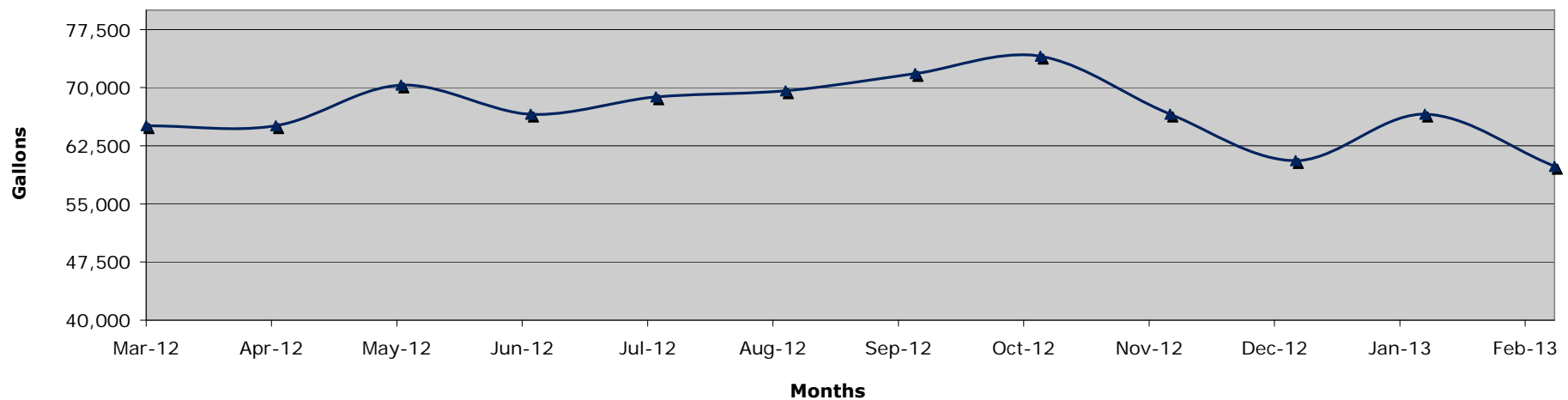
### Hillside Apartments

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

**Electricity**



**Water & Sewer**



# Energy Analysis

## Notes

### Hillside Apartments

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 water and sewer, and common area electricity (exterior). The dwelling units are individually metered for electricity consumption.

#### Natural Gas

No Natural Gas at this development.

#### Electricity

Electrical usage is only for common use (exterior lighting). Annual electric costs were also provided for the apartments (individually meter), but this information was not used because the monthly cost and usage was not available.

#### Water and Sewer

Water and sewer is billed monthly. Generally, water and sewer usage remains steady for the 12-month period, since the property does not have any water consuming systems that may cause seasonal shifts in usage, such as a swimming pool or site 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): **Family**  
Resident Population Persons: **91**

## Space Types

Units, Common Areas	Square Footage:	<b>45,644</b>	Conditioned:	<b>Yes</b>
Basement	Square Footage:	<b>6,178</b>	Conditioned:	<b>No</b>
Basement	Square Footage:	<b>6,250</b>	Conditioned:	<b>Yes</b>

## Utility Metering

Common	Utility Type:	<b>Electricity</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>Individual</b>

## Infiltration

Infiltration Condition	Tight, Leaky:	<b>Average</b>
Infiltration Rate	ACH:	<b>0.6</b>

## Architectural

Wall Insulation	Type:	<b>None</b>	R-Value:	<b>R-15</b>
Roof Insulation	Type:	<b>Cellulose</b>	R-Value:	<b>R-30</b>
Exterior Doors 1	Type:	<b>Flush Metal</b>	R-Value:	<b>&lt; R-3</b>
Exterior Doors 2	Type:	<b>Wood/Glass</b>	R-Value:	<b>&lt; R-3</b>
Windows 1	Type:	<b>Aluminum</b>	U-Factor:	<b>0.6</b>
Windows 2	Type:	<b>Wood</b>	U-Factor:	<b>0.6</b>

## Heating and Cooling

### Temperature Control:

Occupied Heating Temp	Degrees F:	<b>72</b>
Occupied Cooling Temp	Degrees F:	<b>N/A</b>
Unoccupied <sup>1</sup> Heating Temp	Degrees F:	<b>68</b>
Unoccupied <sup>1</sup> Heating Time	Hours / Day:	<b>4-6</b>

### Boilers / DHW Generation:

Domestic Hot Water 1	Type:	<b>Electric</b>	Capacity:	<b>30717</b>	Efficiency:	<b>74%</b>
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<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>25</b>
DHW Delivery Temp	Degrees F:	<b>120</b>

### Domestic Cold Water:

Showerheads	Gallons / Minute:	<b>&lt;2.0</b>
Toilets	Gallons / Flush:	<b>1.6</b>
Irrigation	Gallons / Year:	<b>None</b>

## Lighting Loads

Storage	Type:	<b>T8</b>	Wattage:	<b>32</b>	hours per Day:	<b>1</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>2400 kWh</b>
Refrigerator	Energy Star (Y/N):	<b>No</b>	Usage per Year:	<b>650 kWh</b>
Miscellaneous Load			Usage per Year:	<b>6920 kWh</b>

# Simple Payback Analysis

**EWCM** #1 Convert Lighting - Common Area

## Replacement Costs

A. Total cost to upgrade existing HID fixtures with induction lamps.

\$1,485.00

## Utility Cost

Electricity: \$0.18  
Natural Gas: \$0.00

## 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 HID tixture	150	9	11	365	5,420	\$991.27
Type 2:						0	\$0.00
Type 3:						0	\$0.00
Type 4:						0	\$0.00
Type 5:						0	\$0.00
Total:						5,420	\$991.27

## Proposed Green Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage \$/Year
Type 1:	Induction Lighting Retrof	65	9	11	365	2,349	\$429.55
Type 2:						0	\$0.00
Type 3:						0	\$0.00
Type 4:						0	\$0.00
Type 5:						0	\$0.00
Total:						2,349	\$429.55

## Annual Electric Savings

10,479,873 BTUs

3,071.48 kWh

Savings = 3,071.48 x \$0.18 = \$561.72/yr

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

0 BTUs

0.00 therms

Savings = 0.00 x \$0.00 = \$0.00/yr

## Annual Net Cost Savings

\$561.72 + \$0.00 = \$561.72

## 5. Simple Payback

\$1,485.00 / \$561.72 = 2.64 yrs

## Additional Notes/Comments:

<sup>1</sup>Exterior fixtures, no heating impact



# Simple Payback Analysis

**EWCM** #2 Replace Toilets - Dwelling Units

## Replacement Costs

A. Proposed Conventional	\$13,530.00
B. Proposed Green	\$14,544.75
C. Incremental Cost Between Proposed Conventional and Proposed Green	\$1,014.75

## Existing Conditions

A. Total number of existing toilets	33	
B. Average gallons per flush:	1.6	
C. Estimated total number of flushes per day:	7.0	
D. Estimated total daily usage per toilet:	11	gal/day
E. Estimated number of days per year facility in use:	365	
F. Cost of water and sewer:	\$0.0145	(\$/gal)

## Proposed Conditions: Conventional Models

A. Total number of toilets	33	
B. Average gallons per flush:	1.6	
C. Estimated total number of flushes per day:	7.0	
D. Estimated total daily usage per toilet:	11	gal/day
E. Estimated number of days per year facility in use:	365	
F. Cost of water and sewer:	\$0.0145	(\$/gal)

## Proposed Conditions: Green Models

A. Total number of toilets	33	
B. Average gallons per flush:	1.28	
C. Estimated total number of flushes per day:	7.0	
D. Estimated total daily usage per toilet:	9	gal/day
E. Estimated number of days per year facility in use:	365	
F. Cost of water and sewer:	\$0.0145	(\$/gal)

## Annual Water Use: Existing Models

$$33 \times 11 \times 365 = 134,904 \text{ gal/yr}$$

## Annual Water Use: Proposed Conventional Models

$$33 \times 11 \times 365 = 134,904 \text{ gal/yr}$$

## Annual Water Use: Proposed Green Models

$$33 \times 9 \times 365 = 107,923 \text{ gal/yr}$$

## Annual Savings: Existing to Proposed Conventional Models

$$134,904 - 134,904 \times \$0.01 = \$0.00 \text{ \$/yr}$$

## Annual Savings: Proposed Conventional to Proposed Green Models

$$134,904 - 107,923 \times \$0.01 = \$392.07 \text{ \$/yr}$$

## Annual Savings: Existing to Proposed Green Models

$$\$0.00 + \$392.07 = \$392.07 \text{ \$/yr}$$

## Simple Payback: Conventional

$$\frac{\$13,530.00}{\$0.00} = \text{n/a} \text{ yrs}$$

## Simple Payback: Green

$$\frac{\$14,544.75}{\$392.07} = 37.10 \text{ yrs}$$

## Incremental Payback: Proposed Conventional to Proposed Green Models

$$\frac{\$1,014.75}{\$392.07} = 2.59 \text{ yrs}$$

## Additional Notes/Comments:

## Simple Payback Analysis

**EWCM #3 Energy Star Refrigerators - Dwelling Units**

### Replacement Costs

A. Proposed Conventional	\$17,420.00
B. Proposed Green	\$18,726.50
C. Incremental Cost Between Proposed Conventional and Proposed Green	\$1,306.50

Electricity:	\$0.18
Natural Gas:	\$0.00

### Existing Conditions

A. Existing refrigerator type	Frost-free
B. Number of refrigerators	26
C. Average annual energy use per refrigerator	650 kWh / Year
D. Total annual energy use	16,900.00 kWh / Year
E. Total annual operational cost	\$3,090.71 \$ / Year

### Proposed Conventional Conditions

A. Proposed standard refrigerator type	Frost-free
B. Number of refrigerators	26
C. Average annual energy use per refrigerator	650 kWh / Year
D. Total annual energy use	16,900.00 kWh / Year
E. Total annual operational cost	\$3,090.71 \$ / Year

### Proposed Green Conditions

A. Proposed green refrigerator type	Energy Star FF
B. Number of refrigerators	26
C. Average annual energy use per refrigerator	515 kWh / Year
D. Total annual energy use	13,390.00 kWh / Year
E. Total annual operational cost	\$2,448.79 \$ / Year

### Annual Savings: Existing to Proposed Conventional

Electricity:	\$0.18	x	0.00	=	\$0.00	\$ / Year
Natural Gas <sup>1</sup> :	\$0.00	x		=	\$0.00	\$ / Year
Total:				=	\$0.00	\$ / Year

### Annual Savings: Proposed Conventional to Proposed Green

Electricity:	\$0.18	x	3,510.00	=	\$641.92	\$ / Year
Natural Gas <sup>1</sup> :	\$0.00	x		=	\$0.00	\$ / Year
Total:				=	\$641.92	\$ / Year

### Annual Savings: Existing to Proposed Green

Electricity:	\$0.18	x	3,510.00	=	\$641.92	\$ / Year
Natural Gas <sup>1</sup> :	\$0.00	x	0.00	=	\$0.00	\$ / Year
Total:				=	\$641.92	\$ / Year

### Simple Payback: Conventional

1B	10			
\$17,420.00	/	\$0.00	=	n/a yrs

### Simple Payback: Green

\$18,726.50	\$641.92	=	29.17	yrs
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### Incremental Payback: Proposed Conventional to Proposed Green

\$1,306.50	\$641.92	=	2.04	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.

# Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 1

Exterior Lighting Upgrade

High Intensity Discharge (HID) Lighting

vs.

Induction Lighting

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

30

Conventional Product:

High Intensity Discharge (HID) 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-mounted HID's	9	ea	\$0.00		20	1	1.5		
Maintain	Electric Usage	5,420	kWh	\$0.18	\$991	1	1	30.0	\$47,160	\$16,247
Total Life Cycle Cost									\$47,160	\$16,247

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$47,160	\$16,247

Green Product:

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	Induction Lamp Retrofit	9	ea	\$165.00	\$1,485	30	1	1.0	\$1,485	\$1,485
Utility Cost	Electric Usage	2,349	kWh	\$0.18	\$430	1	1	30.0	\$20,436	\$7,040
Total Life Cycle Cost									\$21,921	\$8,525

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$21,921	\$8,525

## ECONOMIC RETURN ANALYSIS

Green NPV	\$7,721
Green IRR	65.7%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Induction Lighting

Override with Green Product? No

Final Product Choice

Green Product: 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  
Replacement Year

4
5

Final Product Choice

Green Product: 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	Induction Lamp Retrofit	9	ea	\$165.00	\$1,485	30	1	1.0	\$1,485	\$1,485
Utility Cost	Electric Usage	2,349	kWh	\$0.18	\$430	1	1	30.0	\$20,436	\$7,040
Total Life Cycle Cost									\$21,921	\$8,525

Energy Savings

Net Life Cycle Cost after Energy Savings									\$21,921	\$8,525

**Replacement at End of Remaining Useful Life**

Year

5

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Induction Lamp Retrofit	9	ea	\$165.00	\$1,485	30	5	0.9	\$1,205	\$1,178
Utility Cost	Electric Usage	2,349	kWh	\$0.18	\$430	1	5	26.0	\$18,639	\$5,438

Expenses for Current Product Through Useful Life

Utility Cost	Current Electric Usage	5,420	kWh	\$0.18	\$991	1	1	4.0	\$4,147	\$3,698
Total Life Cycle Cost									\$23,991	\$10,314

Energy Savings

Net Life Cycle Cost after Energy Savings									\$23,991	\$10,314

**ECONOMIC RETURN ANALYSIS**

Timing NPV	\$1,789
Timing IRR	65.66%

**TIMING RECOMMENDATION**

Replacement Year: 1

Notes:

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

# Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 2

High Efficiency Toilets (1.28 gpf)

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	Low Flush Toilets	33	ea	\$410.00	\$13,530	30	1	1.0	\$13,530	\$13,530
Utility Cost	Water/Sewer Usage	134,904	gallons	\$0.0145	\$1,960	1	1	30.0	\$93,264	\$32,130
Total Life Cycle Cost									\$106,794	\$45,660

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$106,794	\$45,660

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	High Eff Toilets	33	ea	\$440.75	\$14,545	30	1	1.0	\$14,545	\$14,545
Utility Cost	Water/Sewer Usage	107,923	gallons	\$0.0145	\$1,568	1	1	30.0	\$74,611	\$25,704
Total Life Cycle Cost									\$89,156	\$40,248

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$89,156	\$40,248

## ECONOMIC RETURN ANALYSIS

Green NPV	\$5,411
Green IRR	67.9%

## 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): # 2**
**High Efficiency Toilets (1.28 gpf)**
**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product	<b>14</b>
Replacement Year	<b>15</b>

<b>Final Product Choice</b>	
<b>Green Product:</b>	<b>High Efficiency Toilets (1.28 gpf)</b>

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	High Eff Toilets	33	ea	\$440.75	\$14,545	30	1	1.0	\$14,545	\$14,545		
Utility Cost	Water/Sewer Usage	107,923	gallons	\$0.01	\$1,568	1	1	30.0	\$74,611	\$25,704		
Total Life Cycle Cost										<b>\$89,156</b>	<b>\$40,248</b>	
<i>Energy Savings</i>												
Net Life Cycle Cost after Energy Savings										<b>\$89,156</b>	<b>\$40,248</b>	

Replacement at End of Remaining Useful Life				Year	15							
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted		
Install/Replace	High Eff Toilets	33	ea	\$440.75	\$14,545	30	15	0.5	\$6,005	\$5,773		
Utility Cost	Water/Sewer Usage	107,923	gallons	\$0.01	\$1,568	1	15	16.0	\$47,815	\$9,274		
Total Life Cycle Cost										<b>\$87,315</b>	<b>\$35,585</b>	
<i>Expenses for Current Product Through Useful Life</i>												
Utility Cost	Current Water/Sewer	134,904	gallons	\$0.01	\$1,960	1	1	14.0	\$33,495	\$20,538		
Total Life Cycle Cost										<b>\$87,315</b>	<b>\$35,585</b>	
<i>Energy Savings</i>												
Net Life Cycle Cost after Energy Savings										<b>\$87,315</b>	<b>\$35,585</b>	

**ECONOMIC RETURN ANALYSIS**

Timing NPV	<b>(\$4,664)</b>
Timing IRR	n/a

**TIMING RECOMMENDATION**

Replacement Year:	<b>15</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 (EWCN): # 3

Energy Star Refrigerators

Frost-free Refrigerators

vs.

Energy Star Frost-free 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	26	ea	\$670.00	\$17,420	15	1	1.0	\$17,420	\$17,420
Utility Cost	Electric Usage	16,900	kWh	\$0.18	\$3,091	1	1	15.0	\$57,484	\$33,971
Total Life Cycle Cost									\$74,904	\$51,391

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$74,904	\$51,391

Green Product:

Energy Star 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	Energy Star Refrigerators	26	ea	\$720.25	\$18,727	15	1	1.0	\$18,727	\$18,727
Utility Cost	Electric Usage	13,390	kWh	\$0.18	\$2,449	1	1	15.0	\$45,545	\$26,916
Total Life Cycle Cost									\$64,271	\$45,642

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$64,271	\$45,642

## ECONOMIC RETURN ANALYSIS

Green NPV	\$5,749
Green IRR	102.5%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Energy Star Frost-free Refrigerators

Override with Green Product? No

Final Product Choice

Green Product: Energy Star Frost-free 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): # 3

Energy Star Refrigerators

**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product

**Final Product Choice**

**Green Product:** Energy Star Frost-free Refrigerators

**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	26	ea	\$720.25	\$18,727	15	1	1.0	\$18,727	\$18,727
Utility Cost	Electric Usage	13,390	kWh	\$0.18	\$2,449	1	1	15.0	\$45,545	\$26,916
<b>Total Life Cycle Cost</b>									<b>\$64,271</b>	<b>\$45,642</b>
<i>Energy Savings</i>										
<b>Net Life Cycle Cost after Energy Savings</b>									<b>\$64,271</b>	<b>\$45,642</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

Green Measure (GM):

# 1

Cement Fiberboard Siding

Vinyl Siding

vs.

Cement Fiberboard Siding

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

50

Conventional Product:

Vinyl Siding

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	Vinyl Siding	24,300	sf	\$6.50	\$157,950	40	1	1.3	\$168,986	\$170,057
Total Life Cycle Cost									\$168,986	\$170,057

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$168,986	\$170,057

Green Product:

Cement Fiberboard Siding

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	Cement Fiberboard Siding	24,300	sf	\$8.50	\$206,550	50	1	1.0	\$206,550	\$206,550
Total Life Cycle Cost									\$206,550	\$206,550

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$206,550	\$206,550

## ECONOMIC RETURN ANALYSIS

Green NPV	(\$36,493)
Green IRR	n/a

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Conventional Product: Vinyl Siding

Override with Green Product? No

Final Product Choice

Conventional Product: Vinyl Siding

### Notes:

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

Green Measure (GM):

# 1

Cement Fiberboard Siding

**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product  
Replacement Year

8  
9

Final Product Choice

Conventional Product: Vinyl Siding

**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	Vinyl Siding	24,300	sf	\$6.50	\$157,950	40	1	1.3	\$168,986	\$170,057
Total Life Cycle Cost									\$168,986	\$170,057

Energy Savings

Net Life Cycle Cost after Energy Savings									\$168,986	\$170,057

**Replacement at End of Remaining Useful Life**

Year

9

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Vinyl Siding	24,300	sf	\$6.50	\$157,950	40	9	1.1	\$214,119	\$109,626

Expenses for Current Product Through Useful Life

Total Life Cycle Cost									\$214,119	\$109,626

Energy Savings

Net Life Cycle Cost after Energy Savings									\$214,119	\$109,626

**ECONOMIC RETURN ANALYSIS**

Timing NPV (\$60,431)  
Timing IRR 1.10%

**TIMING RECOMMENDATION**

Replacement Year: 9

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

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
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### Life Cycle Costs

Install/Replace	Arch Asphalt Shingles	15,264	sf	\$4.00	\$61,056	20	1	2.0	\$171,330	\$84,715
Total Life Cycle Cost									\$171,330	\$84,715

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$171,330	\$84,715

Green Product:

Metal Roof

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 Roof	15,264	sf	\$7.75	\$118,296	40	1	1.0	\$118,296	\$118,296
Total Life Cycle Cost									\$118,296	\$118,296

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$118,296	\$118,296

## ECONOMIC RETURN ANALYSIS

Green NPV	(\$33,581)
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):

# 2

Metal Roof

**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product  
Replacement Year

**14**  
**15**

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	15,264	sf	\$4.00	\$61,056	20	1	2.0	\$171,330	\$84,715
Total Life Cycle Cost									<b>\$171,330</b>	<b>\$84,715</b>

*Energy Savings*

Net Life Cycle Cost after Energy Savings									<b>\$171,330</b>	<b>\$84,715</b>

**Replacement at End of Remaining Useful Life**

Year

**15**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Arch Asphalt Shingles	15,264	sf	\$4.00	\$61,056	20	15	1.3	\$123,796	\$36,897

*Expenses for Current Product Through Useful Life*

Total Life Cycle Cost									<b>\$123,796</b>	<b>\$36,897</b>

*Energy Savings*

Net Life Cycle Cost after Energy Savings									<b>\$123,796</b>	<b>\$36,897</b>

**ECONOMIC RETURN ANALYSIS**

Timing NPV	<b>(\$47,818)</b>
Timing IRR	n/a

**TIMING RECOMMENDATION**

Replacement Year: **15**

*Notes:*

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

# Life Cycle Cost Analysis

Green Measure (GM):

# 3

Replace Carpeting with Linoleum

Carpeting

vs.

Linoleum

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

25

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	Carpeting	13,120	sf	\$3.00	\$39,359	10	1	2.5	\$123,335	\$72,802
Total Life Cycle Cost									\$123,335	\$72,802

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$123,335	\$72,802

Green Product:

Linoleum

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	13,120	sf	\$5.50	\$72,157	25	1	1.0	\$72,157	\$72,157
Total Life Cycle Cost									\$72,157	\$72,157

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$72,157	\$72,157

## ECONOMIC RETURN ANALYSIS

Green NPV	\$644
Green IRR	8.2%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Linoleum

Override with Green Product? No

Final Product Choice

Green Product: Linoleum

### Notes:

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

Green Measure (GM):

# 3

Replace Carpeting with Linoleum

## STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

0

Final Product Choice

Green Product:

Linoleum

### Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Linoleum	13,120	sf	\$5.50	\$72,157	25	1	1.0	\$72,157	\$72,157
Total Life Cycle Cost									\$72,157	\$72,157
<i>Energy Savings</i>										
Net Life Cycle Cost after Energy Savings									\$72,157	\$72,157

## 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

Replace Vinyl Flooring with Linoleum

Vinyl Flooring

vs.

Linoleum

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

25

Conventional Product:

Vinyl Flooring

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	Bathroom Vinyl	1,318	sf	\$5.00	\$6,590	15	1	1.7	\$12,392	\$9,122
Install/Replace	Kitchen Vinyl	3,140	sf	\$5.00	\$15,700	15	1	1.7	\$29,522	\$21,733

Total Life Cycle Cost

\$41,913

\$30,856

### Energy Savings

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Net Life Cycle Cost after Energy Savings

\$41,913

\$30,856

Green Product:

Linoleum

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	Bathroom Linoleum	1,318	sf	\$5.50	\$7,249	25	1	1.0	\$7,249	\$7,249
Install/Replace	Kitchen Linoleum	3,140	sf	\$5.50	\$17,270	25	1	1.0	\$17,270	\$17,270

Total Life Cycle Cost

\$24,519

\$24,519

### Energy Savings

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Net Life Cycle Cost after Energy Savings

\$24,519

\$24,519

## ECONOMIC RETURN ANALYSIS

Green NPV	\$6,337
Green IRR	19.3%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product:	Linoleum
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Override with Green Product?

No

Final Product Choice

Green Product:	Linoleum
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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. Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.

Green Measure (GM):

# 4

Replace Vinyl Flooring with Linoleum

## STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

0

Final Product Choice

Green Product:

Linoleum

### Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Bathroom Linoleum	1,318	sf	\$5.50	\$7,249	25	1	1.0	\$7,249	\$7,249
Install/Replace	Kitchen Linoleum	3,140	sf	\$5.50	\$17,270	25	1	1.0	\$17,270	\$17,270
Total Life Cycle Cost									\$24,519	\$24,519
Energy Savings										
Net Life Cycle Cost after Energy Savings									\$24,519	\$24,519

## 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):

# 5

FSC-Certified Wood Cabinets and Vanities

Plywood and solid Wood Cabinets and Vanities

vs.

FSC-Certified Wood Cabinets and Vanities

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

25

Conventional Product:

Plywood and solid Wood Cabinets and Vanities

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	Cabinets	26	ea	\$2,700.00	\$70,200	20	1	1.3	\$89,962	\$80,524
Install/Replace	Vanities	30	ea	\$410.00	\$12,300	20	1	1.3	\$15,763	\$14,109

Total Life Cycle Cost

\$105,725

\$94,633

### Energy Savings

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Net Life Cycle Cost after Energy Savings

\$105,725

\$94,633

Green Product:

FSC-Certified Wood Cabinets and Vanities

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	Cabinets	26	ea	\$2,902.50	\$75,465	25	1	1.0	\$75,465	\$75,465
Install/Replace	Vanities	30	ea	\$440.75	\$13,223	25	1	1.0	\$13,223	\$13,223

Total Life Cycle Cost

\$88,688

\$88,688

### Energy Savings

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Net Life Cycle Cost after Energy Savings

\$88,688

\$88,688

## ECONOMIC RETURN ANALYSIS

Green NPV	\$5,946
Green IRR	13.1%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: FSC-Certified Wood Cabinets and Vanities

Override with Green Product?

No

Final Product Choice

Green Product: FSC-Certified Wood Cabinets and Vanities

### 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

FSC-Certified Wood Cabinets and Vanities

**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product  
Replacement Year

4
5

Final Product Choice

Green Product: FSC-Certified Wood Cabinets and Vanities

**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	Cabinets	26	ea	\$2,902.50	\$75,465	25	1	1.0	\$75,465	\$75,465
Install/Replace	Vanities	30	ea	\$440.75	\$13,223	25	1	1.0	\$13,223	\$13,223
Total Life Cycle Cost									\$88,688	\$88,688

Energy Savings

Net Life Cycle Cost after Energy Savings									\$88,688	\$88,688

**Replacement at End of Remaining Useful Life**

Year

5

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Cabinets	26	ea	\$2,902.50	\$75,465	25	5	0.8	\$60,392	\$58,560
Install/Replace	Vanities	30	ea	\$440.75	\$13,223	25	5	0.8	\$10,581	\$10,261

Expenses for Current Product Through Useful Life

Total Life Cycle Cost									\$70,973	\$68,821

Energy Savings

Net Life Cycle Cost after Energy Savings									\$70,973	\$68,821

**ECONOMIC RETURN ANALYSIS**

Timing NPV	(\$19,867)
Timing IRR	n/a

**TIMING RECOMMENDATION**

Replacement Year:	5
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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):

# 6

Solid Stone Countertops

Laminated Particleboard Countertops

vs.

Solid Stone Countertops

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

30

Conventional Product:

Laminated Particleboard 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	26	ea	\$474.72	\$12,343	10	1	3.0	\$51,223	\$24,809
Total Life Cycle Cost									\$51,223	\$24,809

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$51,223	\$24,809

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	26	ea	\$975.00	\$25,350	30	1	1.0	\$25,350	\$25,350
Total Life Cycle Cost									\$25,350	\$25,350

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$25,350	\$25,350

## ECONOMIC RETURN ANALYSIS

Green NPV	(\$541)
Green IRR	7.7%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Conventional Product: Laminated Particleboard Countertops

Override with Green Product? No

Final Product Choice

Conventional Product: Laminated Particleboard 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):

# 6

Solid Stone Countertops

**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product  
Replacement Year

**14**  
**15**

Final Product Choice

Conventional Product: Laminated Particleboard 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	26	ea	\$474.72	\$12,343	10	1	3.0	\$51,223	\$24,809
Total Life Cycle Cost									<b>\$51,223</b>	<b>\$24,809</b>

*Energy Savings*

Net Life Cycle Cost after Energy Savings									<b>\$51,223</b>	<b>\$24,809</b>

**Replacement at End of Remaining Useful Life**

Year

**15**

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	LPB Countertops	26	ea	\$474.72	\$12,343	10	15	1.6	\$32,125	\$9,064

*Expenses for Current Product Through Useful Life*

Total Life Cycle Cost									<b>\$32,125</b>	<b>\$9,064</b>

*Energy Savings*

Net Life Cycle Cost after Energy Savings									<b>\$32,125</b>	<b>\$9,064</b>

**ECONOMIC RETURN ANALYSIS**

Timing NPV	<b>(\$15,745)</b>
Timing IRR	n/a

**TIMING RECOMMENDATION**

Replacement Year:	<b>15</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.

## **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