

Green Capital Needs Assessment and Replacement Reserve Analysis

FINAL REPORT

Prepared for:

River Rouge Housing Commission
180 Visgar Road
River Rouge, MI 48218

River Rouge Housing
River Rouge, MI
Monday, July 30, 2018



Table of Contents

FINDINGS AND RECOMMENDATIONS

1.0	EXECUTIVE SUMMARY.....	Pages 3-8
2.0	NARRATIVE	Pages 9-34
3.0	PHOTO PAGES	Pages 35-40

SUPPORTING DATA

1.0	CAPITAL NEEDS SUMMARY - CONVENTIONAL	Pages 41-43
3.0	CAPITAL NEEDS SUMMARY - GREEN	Pages 44-46
5.0	CAPITAL NEEDS WORKSHEETS	Pages 47-68
7.0	SIMPLE PAYBACK ANALYSES.....	Pages 69-77
8.0	LIFE CYCLE COST ANALYSES.....	Pages 78-105

HOW TO READ THIS REPORT

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

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

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

Executive Summary

Overview and Goals

This Green Capital Needs Assessment (GCNA) of River Rouge Housing has been undertaken on behalf of the River Rouge Housing Commission. 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 to:

- 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 conventional 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 presented in the Capital Needs Worksheet. Costs for the twenty-year plan total \$10,694,674 in current dollars (\$35,649/unit) or \$13,471,191 (\$44,904/unit) in inflated dollars.

Green Summary

Future green capital actions are also based on useful life expectations and assume continued effective maintenance and physical management. The timing of actions by system (including quantities and costs) is presented in the Capital Needs Worksheet. Costs for the twenty-year plan total \$9,850,282 in current dollars (\$32,834/unit) or \$12,022,282 in inflated dollars (\$32,834/unit).

Executive Summary

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

Energy and Water Conservation Measures (EWCMS):

In the report, 9 energy and water conservation measures (EWCMS) are identified. Energy and water conservation measures are upgrades and improvements to existing mechanical and electrical systems that have a direct impact on energy consumption, and therefore potential utility (electric, gas, oil, water, sewer) savings if implemented appropriately.

The energy conservation measure specifications (i.e. boiler efficiencies, R-values, U-values) presented in this plan are mostly derived from the International Energy Code and the American Society of Heating, Refrigeration and Air-Conditioning (ASHRAE) Handbook. Savings were estimated using Energy Star.org calculators as well as manual calculations. These measures represent one conceptual option; various alternatives may yield different results. It must be noted that a number of factors may affect the estimated annual energy savings and simple payback periods, and therefore the figures outlined in this report are not guaranteed.

Green Measures (GMs):

The report identifies 5 Green Measures (GMs). Green measures are replacements of existing materials and systems that do not have a direct impact on energy consumption; however, they represent opportunities to reduce capital and operational expenditures in the future due to increased durability, enhanced performance, and increased expected useful life (EUL) potential. Additionally, if implemented properly, GMs can improve indoor environmental quality and can benefit resident and staff health, safety, and well-being.

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

Full utility data was not provided for this report, rather an analysis of the utility usage and costs for future resident utility allowances was provided. OSI cannot and does not validate the accuracy of this data. The reader should be aware that assumptions on energy and water usage may not conform to actual historical documentation. No electronic energy model was generated for 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.

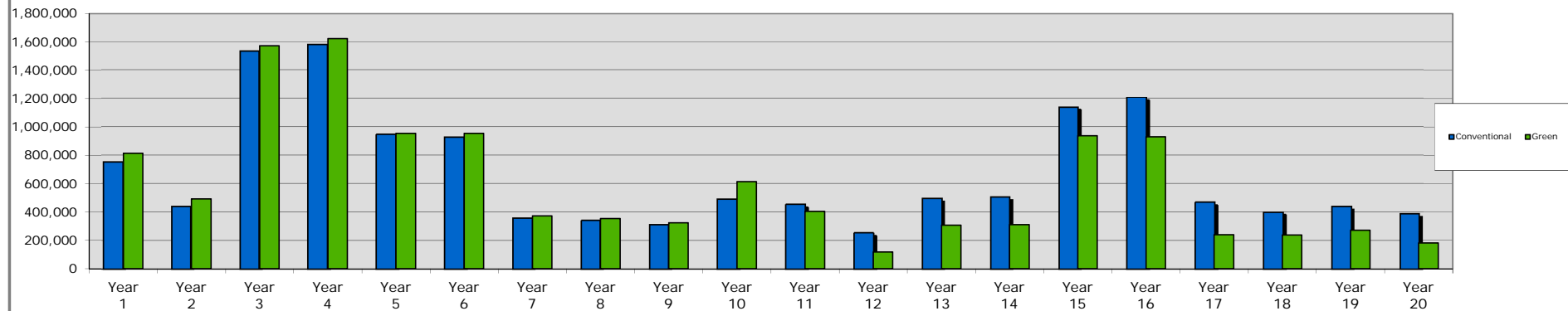
Executive Summary

Dashboard

Property Data

Location:	River Rouge, MI
Year Built:	1952
Number of Units:	300
Number of Buildings:	66

Comparison of Capital Needs - Conventional vs. Green



Environmental Impact

(Total Carbon Release Based on Current Annual Energy Usage)

Building Square Footage:	304,255
Resident Population (estimated):	750

	BTUs/yr	Conversion	lbs CO ₂	lbs CO ₂ / Res
Gas	16,848,000,000	x 11.023100	1,857,172	2,476
Oil	0	x 11.023100	0	0
Electricity	3,164,152,320	x 1.582917	1,467,504	1,957
Total	20,012,152,320		3,324,676	4,433

Health and Safety

Hazardous Materials

	Identified	Location / Notes
Lead Based Paint (LBP):	0	Not Tested
Asbestos Containing Materials (ACMs):	0	Not Tested
Mold:	0	None Observed

Indoor Ventilation

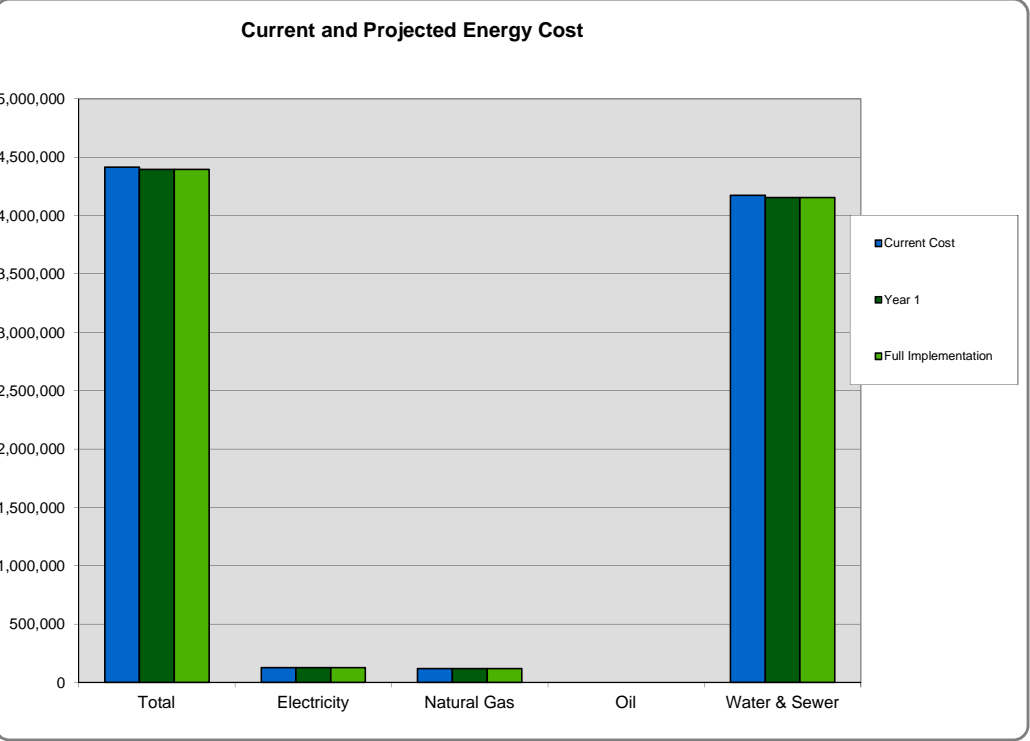
0

Indoor Air Quality (IAQ)

	Design Specification	Actual Read	Notes
Air Flow Rate	0	0	N/A
Thermal Comfort	68-72	70	Windows open
Carbon Monoxide	0	0	Not Tested
Carbon Dioxide	<1000	652	Windows open

Executive Summary

Energy Savings



Energy Intensity / Benchmarking Data

Estimated Costs

Building Square Footage: 304,255
Heating Degree Days: 6,303

Estimated Usage

	Amount	Units	BTUs/yr	Energy Intensity (BTUs/(HDDs x SF))
Heating	168,480	therms	16,848,000,000	9
Cooling	0	kWh	0	0
DHW	68,400	therms	6,840,000,000	4
Electricity	927,360	kWh	3,164,152,320	2
Total			26,852,152,320	14

	Gallons/yr	Gallons/sf/yr
Water	22,620,240	74

Energy Usage Summary

Estimated Data

Utility	Current Usage	Current Cost	Projected Usage	Projected Cost	% Savings
Electricity	927,360 kWh	\$126,797	927,360 kWh	\$126,797	0.0%
Natural Gas	168,480 therms	\$116,516	168,480 therms	\$116,516	0.0%
Oil	0 gallons	\$0	0 gallons	\$0	n/a
Water & Sewer	22,620,240 gallons	\$4,172,371	415,259,364 gallons	\$4,152,594	0.5%
Total		\$4,415,684		\$4,395,906	0.4%

Executive Summary

Green Improvement Plan

						Annual Utility Savings								
						Electric		Gas		Oil		Water & Sewer		Total
Measure	Upfront Cost	EUL	Simple SIR ¹	Incremental Cost ²	Green NPV ⁴	KWh	\$	Therms	\$	Gallons	\$	Gallons	\$	Total \$
Recommended EWCMs (Based on Financial Analysis)														
Interactive Group														
EWCM 1 Com Bldg Boiler	13,500	25	0.62	2,250	2,801			487	337					337
EWCM 2 Office HVAC (1)	3,980	20	2.26	230	4,919	3,291	450							450
EWCM 3 Office HVAC (2)	9,750	20	1.11	750	4,679	3,949	540							540
EWCM 4 Com Bldg HVAC (1)	18,000	20	2.00	3,000	17,596	13,163	1,800							1,800
EWCM 5 Com Bldg HVAC (1)	11,880	20	2.00	1,980	11,614	8,688	1,188							1,188
EWCM 6 Com Area Ext Lighting	129,000	20	6.23	46,440	503,503	293,941	40,190							40,190
EWCM 7 Com Area Int Lighting	7,920	20	3.66	1,320	19,317	10,604	1,450							1,450
EWCM 9 DU Int Lighting	194,000	20	3.45	38,800	438,295	244,827	33,475							33,475
Interactive Group Total ⁵	388,030			94,770										0
EWCM 8 DU Toilets	59,670	30	9.94	13,770	202,329							1,977,749	19,777	19,777
EWCM Subtotal	447,700			108,540		0	0	0	0	0	0	1,977,749	19,777	19,777
Recommended GMs (Based on Financial Analysis)														
GM 1 Metal Tile Roofs	354,984	100		126,780	14,338	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GM 2 Com Area Linoleum Tile	54,375	20		0	11,977	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GM 3 Carpet Tile	3,936	20		1,312	321	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GM 4 DU Linoleum Tile	893,295	20		0	556,070	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GM 5 Solid Surface Countertops	240,000	30		105,000	31,349	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GM Subtotal	1,546,590			233,092		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total	1,994,290			341,632		0	0	0	0	0	0	1,977,749	19,777	19,777

Optional Actions

Notes:

1. Simple SIR is calculated as (Total Annual Savings * Estimated Useful Life) / Upfront Cost.
2. Incremental Cost is the difference in cost between the green and conventional alternatives.
3. Green SIR (Savings to Investment Ratio) is a relative measure that reflects the ratio of total savings to total investment of Green vs. Conventional. Unlike Simple SIR, this calculation takes into account maintenance costs, inflation, discounting, and differences in expected useful life.
4. Green NPV is the net present value of installing a green vs. conventional product.
5. No Interactive totals could be generated due to lack of individual utility data. All calculations were generated using Energy Star calculators

Narrative

River Rouge Housing Commission (Seneca & Iroquois Terraces) is a scattered site development that is comprised of six-four residential buildings, one office building, and one community building. The residential buildings contain a total of 300 units. The units are accessed through a mix of interior common hallway/stairwells and direct entry doors. The unit breakdown is as follows: 44 one-bedroom, 160 two-bedroom, 70 three-bedroom, 12 four bedroom, and 14 five bedroom units. The building was originally constructed circa 1952, and underwent a substantial rehab in 1991/92.

Site

Site Surface

River Rouge Housing is scattered through the City of River Rouge, Michigan. Generally the residential building are grouped into four sections. These sections are along Goodell Street, Superior Court/Klienow Ave., Lenoir Court/Klienow Ave., and Beechwood Street/Polk Ave. All of these street are public ways and are the responsibility of the City of River Rouge. Residential site features are limited to areas surrounding the residential buildings. There are asphalt paved parking areas at several locations throughout the development. Concrete walkways provide pedestrian access to each unit and through several of the sites. Painted steel fencing has been added between buildings along Beechwood St. and Polk Ave. The Commission's office building is located at 180 Visgard Road and has an adjacent asphalt paved parking lot. The Hyacinth Court Community Center also has an adjacent asphalt paved parking lot. The site is attractively landscaped with mature lawn areas, plantings, and trees. No capital costs are carried for landscaping improvements, as they are understood to be handled from operations. If, at some future date, management contemplates re-landscaping, OSI recommends attention to sustainable design. Conventional landscaping relies on large lawns, non-native species, extensive irrigation, and heavy use of fertilizers and pesticides. This type of landscaping also tends to be labor-intensive. There are design features that can enhance soil quality, and reduce storm water run-off and pollution. Such measures can also minimize water usage, maintenance costs, and green waste.

Narrative

Parking Areas

The parking areas at the Office, Community Building, and residential sites are in poor overall condition cracking, subsidence, and in some cases badly broken up surfaces were noted. The concrete walkways vary in condition with evidence of recent repairs and replaced sections noted. The painted steel fencing was recently added and is in good condition.

Existing conditions	Capital needs	Green alternative
The residential parking areas are in the worst condition. Most are broken up and require full replacement.	Costs to rebuild these parking areas are shown starting in Year 1.	Repave the existing asphalt with a lighter colored asphalt material. The lighter asphalt material decreases heat retention associated with darker asphalt materials and therefore reduces the heat island effect and allows for a cooler, more comfortable site for residents and visitors alike. Typically, lighter-colored asphalt paving is not more expensive than dark asphalt materials, and therefore, no premium is carried in the plan for this work.
The Office and Community Building parking areas are in better condition with area of cracking and subsidence noted.	Costs to scarify and resurface these areas are shown starting in Year 1.	
The Office and Community Buildings parking areas exhibited prior cycles of crack filling, sealcoating, and repainting of the markings.	Periodic allowances to continue this preventive maintenance process are shown every five years starting in Year 6.	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.

Narrative

Walkways

Walkways are concrete paved and provide pedestrian access to each entry and throughout several interior site locations.

Existing conditions	Capital needs	Green alternative
The condition of the concrete walks is mixed, several area of recent repairs and sectional replacements were noted during the assessment.	The report shows annual allowances for as-needed repairs throughout its time horizon.	Repairs and replacements using Portland cement with at least 20% recycled-content materials is recommended. This measure increases the durability and strength of the concrete, and reduces greenhouse gas emissions associated with cement production. Where contractors are familiar with the product, there is little or no incremental cost to this option. We are uncertain about local market circumstances with regard to it. A separate cost option is not shown for this here.

Fencing

Several of the buildings along the Beechwood and Polk locations are connected by painted steel picket fencing. This fencing was recently added.

Existing conditions	Capital needs	Green alternative
The fencing is in very good condition.	No capital costs are anticipated for the fencing within the time frame of this report.	No Green alternative is suggested.

Narrative

Site Amenities

There are steel pole supported clotheslines at most building.

Existing conditions	Capital needs	Green alternative
Mix of conditions	Maintenance of the clothesline supports are seen as an operating expense	No Green alternative is suggested.

Mechanical Room

The Office building and Community building are served by central heating, domestic hot water, and cooling systems. These system will be discussed in this and following sections. The dwelling units have individual heating and DHW systems and are discussed in the Dwelling Unit section of this report.

Boilers

The Community Building is heated with hydronic heat provided by a Peerless gas-fired atmospheric boiler.

Existing conditions	Capital needs	Green alternative
The Peerless boiler has exceeded is expected service life of twenty-five years.	Costs to replace the boiler in-kind are shown in Year 1.	EWCM 1 Recommended Green Alternative: Replace the existing boiler with a high efficiency condensing boiler that has a combustion efficiency of 96%of greater to reduce energy usage and utility costs.

Narrative

Hydronic Circulating Pumps

A bell & Gossett inline pump circulates the hydronic heat to the two air handlers.

Existing conditions	Capital needs	Green alternative
No problems were observed or reported concerning this pump.	Costs to replace the pump in-kind are shown in Year 10.	No Green alternative is suggested.

Domestic Hot Water

Both The Community and Office Buildings are provided Domestic hot water (DHW) by gas-fired atmospheric storage water heaters.

Existing conditions	Capital needs	Green alternative
No problems were observed or reported with regard to the water heaters.	Future cycles of water heater replacements are shown in Years 4 and 14	No Green alternative is suggested.

Building Mechanical and Electrical Systems

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

The Office building is heated and cooled by three roof top unit (RTUs) central HVAC system. The Community building is cooled by two RTU central HVAC system in conjunction with two building internal air handlers. The air handlers each are equipped with hydronic heating coils.

The Community building also features an Onan natural gas fired emergency electric generator and a Notifier SFP-400B zone type fire alarm control panel. The development is monitored for security by a multi-camera closed circuit television (CCTV) system that was recently installed/upgraded.

Narrative

Residential Distribution Systems

Given the age of the development the distribution systems could be expected to require repairs and/or sectional replacements.

Existing conditions	Capital needs	Green alternative
Aging building infrastructure	The report includes annual allowances for as-needed distribution system repairs.	No Green alternative is suggested.

HVAC

As mentioned the office building is served by three central station RTUs and the Community building is served by two roof mounted air conditioners and two internal air handlers. No problems were observed or reported concerning this equipment and appeared to be operating as designed on the day of the assessment.

Existing conditions	Capital needs	Green alternative
Newer Office building central HVAC unit.	Future replacement costs are shown in Year 15.	EWCM 2, 3, 4, and 5 Recommended Green Alternative: When replacing insure that the replacement has the highest SEER rating available to reduce energy usage and utility costs.
The two older Office building central HVAC units.	Costs to replace the units are shown in Year 5.	
The two community building HVAC units.	Costs to replace both units are shown in Year 1.	
The two Community building air handlers.	Periodic allowances for repairs and cleaning are shown every five years starting in Year 1	No Green alternative is suggested.

Narrative

Emergency Generator

An Onan 12.5 kW natural gas fueled emergency electric power generator servers the Community building

Existing conditions	Capital needs	Green alternative
It is unknown if the generator is operating as designed. No test was possible on the day of the assessment.	Costs to replace the generator are shown in Year 15, after twenty thirty-five years of service.	No Green alternative is suggested.

Smoke/Fire Detection and Notification

There is a Notifier SFP-400B zone fire alarm control panel (FACP) serving the Community building. No other building at the development is monitored by a central fire alarm system.

Existing conditions	Capital needs	Green alternative
The Community building fire alarm system appeared to be operating as designed on the day of the assessment. However, it is believed that the FACP has exceeded its service life of twenty years.	Costs to replace the fire alarm panel and field devices are shown in Year 1	No Green alternative is suggested.

Security

As mentioned, the development is monitored by a state of the art multi-camera CCTV system. The walkup building feature video/intercom building access control panels.

Existing conditions	Capital needs	Green alternative
---------------------	---------------	-------------------

Narrative

Existing conditions	Capital needs	Green alternative
Security CCTV system	Periodic allowances for upgrades are shown every six years throughout the report.	No Green alternative is suggested.
Walk up entry door video/intercom access control panels.	Costs to replace the access control panels are shown in Year 10.	

Building Architectural Systems

Building Exterior

River Rouge Housing consists of sixty-four walk up, townhouse, combination walk up/townhouse, and garden style buildings. The buildings is constructed on a poured concrete and CMU block foundation. No issues were observed or reported with regard to the buildings foundations of framing and it should be monitored going forward.

Insect Protection

During the assessment the need for insect prevention and control was brought up by management. It was decided that a program of prevention would be started. The costs shown in the report reflect a recent bid received by management.

Existing conditions	Capital needs	Green alternative
No current preventive measures in place.	Costs to add insect prevention per building are shown in Year 1. Future maintenance of	No Green alternative is suggested.

Narrative

Existing conditions	Capital needs	Green alternative
	the program are seen as operating expenses.	

Doors

Walk up entry doors are heavy metal models with vision lights. Walk up hallway unit entry doors are flush panel metal types. Direct entry unit doors are heavy flush panel metal types. All have internal insulation. The direct entry units also feature aluminum storm doors.

Existing conditions	Capital needs	Green alternative
Door vary in condition but are fully operable.	Annual allowances are shown throughout the report for as-needed door replacements.	No Green alternative is suggested.
The storm doors vary widely in condition.	Annual allowances to replace the storm doors as-needed are shown throughout the report.	

Siding

The buildings are clad mostly in brick masonry, several building types feature upper floor sections clad in clapboard profile vinyl siding.

Existing conditions	Capital needs	Green alternative
The brick masonry was observed to be in good overall condition. However, areas of mortar loss were noted during the assessment.	The report carries allowances for as-needed repointing of 5% of the masonry surfaces every eight years starting in Year 1.	<u>No Green alternative is suggested.</u>

Narrative

Existing conditions	Capital needs	Green alternative
Given that most of the vinyl siding is located on upper floor sections, minimal deterioration was noted.	Costs to replace the vinyl siding is shown starting in Year 13, after forty years of service.	

Insulation

The drawings provided dated to the original construction and revealed that no wall insulation was included. Given that the majority of the building are masonry adding insulation now would be cost prohibited. It is recommended that as interior walls are replaced insulation be added at that time.

Windows / Curtain Walls

Windows are aluminum framed triple and double slider types with insulating double glazed glass sashes. Many sashes were noted to be fogged, an indication that the double glazing's seal had failed. This situation drastically reduces the window's insulation properties.

Existing conditions	Capital needs	Green alternative
Large triple pane slider types	Costs to replace these windows are shown starting in Year 3, after thirty years of service.	Suggested Alternative: Replace the existing windows with models that feature insulated fiberglass frames and double-glazed sashes

Narrative

Existing conditions	Capital needs	Green alternative
Smaller double pane slider types	Costs to replace these windows are shown starting in Year 3, after thirty years of service.	with a low-E (low emissivity) coating, and a gas fill between the glazing layers. The low-e coating will reflect heat from entering the building during the summer, and can reflect radiant infrared energy from escaping the building during the heating months. A gas fill (such as argon) between the glazing layers will reduce heat transfer through the glass similar to the low-e coating.
Future window failed (fogged) panel replacements	Costs are shown starting in Year 18 for the as-needed replacement of failed (fogged) window panels,	No Green alternative is suggested.

Window and Door Lintels

Painted metal lintels are located above each window and door located in the masonry siding. The lintels rust over time and require periodic removal of the rust and repainting.

Existing conditions	Capital needs	Green alternative
Steel lintel refurbishing	Costs to scrap and paint the lintels are shown concurrent with the window replacements and again starting in Year 18.	No Green alternative is suggested.

Narrative

Building Mounted Lighting

Each entryway features wall mounted incandescent courtesy lighting fixture.

Existing conditions	Capital needs	Green alternative
The lighting fixtures appeared to vary in condition. No direct observation of their operation was possible on the day of the assessment.	Costs to replace the fixtures are shown starting in Year 1.	EWCM 6 Recommended Green Alternative: Replace the existing fixtures with efficient, long-life dedicated LED fixtures to reduce energy usage as well as utility and operating costs.

Roof

Nineteen of the buildings have pitched roofs with standard three-tab asphalt shingles. The remaining forty-five buildings have flat or very low-pitched roofs covered with white EPDM membrane or tar & gravel. The shingles on the pitched roofs were replaced approximately ten years ago. The roofs with white EPDM membrane coverings average five years old. The tar & gravel roofs are over twenty years old.

Existing conditions	Capital needs	Green alternative
Asphalt shingle roofs display minor shingle blow-offs at some locations.	Costs to rip and replace the roof shingles are shown starting in Year 10. Repair of the blown-off shingles is seen as an operating concern.	GM 1 <u>Recommended Green Alternative:</u> When replacing the shingles install a metal tile roof. Metal tile roofs have a much longer useful service life and are not petroleum based, removing the need and expense involved in recycling the asphalt shingles.
White EPDM membrane roof covering.	Costs to replace the white EPDM membrane roof coverings are shown starting in Year 15.	White EPDM membrane is seen as a good alternative to black roof surfaces as the white surface reflects sunlight and reduces
Tar & gravel roof coverings.	Costs to replace the tar & gravel roof	

Narrative

Existing conditions	Capital needs	Green alternative
	coverings with white EPDM membrane are shown starting in Year 1.	building interior heat and the exterior heat island effect during the summer months.

Note:

We do not recommend a 'green vegetative roof' for existing construction. While these types of roofs reduce roof temperatures, cooling loads, and storm water run-off, the cost of the necessary engineering study to guarantee that an existing structure can carry the load of the saturated loam and plants as well as any structural reinforcing that may be needed makes retrofitting these roofs on to existing structures non-cost effective.

Building Interior Common Areas

The common area at River Rouge are limited to the housing commission's office building, community building, and the central stairwells at the walk up buildings. Wall and ceiling surfaces are generally painted drywall throughout; the office building has suspended acoustical ceilings. Allowances are shown throughout the plan for as-needed repairs and painting. As a green measure, the plan specifies low-VOC or recycled-content paint for painting cycles at no additional premium.

Flooring

The office building floors are covered in carpet except for the kitchenette and restrooms, these are covered with vinyl composite tile (VCT). The community building floors are covered with VCT, as are the walk up buildings' hall/stairwell landings.

Existing conditions	Capital needs	Green alternative
The vinyl covered floors are in good condition.	Future VCT replacement costs are shown starting in Year 5.	GM 2 Recommended Green Alternative: Replace the VCT with natural linoleum tile. Linoleum is a natural product (containing linseed oil, powdered wood or cork, ground

Narrative

Existing conditions	Capital needs	Green alternative
		limestone, resin binders, natural jute backing), which has been found to be more durable than its vinyl tile counterpart. Linoleum tile hardens over time, and therefore becomes less susceptible to scratching and cracking. Installation of linoleum has a lower annual life cycle cost than vinyl and keeps the vinyl product out of our landfills in the future.
The carpet floor covering is showing signs of age and wear.	Costs to replace the carpet are shown in Years 1 and 11.	GM 3 Recommended Green Alternative: Replace the existing carpet with carpet tile which because of the ability to replaced damage or stained tiles in-house provides a longer useful live than standard carpet.

Community Building Commercial Kitchen

The community building features a small kitchen with all commercial grade equipment.

Existing conditions	Capital needs	Green alternative
All of the equipment was observed to be in good condition.	The report shows allowances every five years for as-needed repairs or replacement of kitchen items.	No Green alternative is suggested.

Narrative

Restrooms

There are two restrooms at the office building and a single all gender restroom at the community building.

Existing conditions	Capital needs	Green alternative
Three toilets, wall hung sinks, and accessories.	Costs to replace the restroom fixtures are shown in Year 10.	No Green alternative is suggested.

Interior lighting

Interior common area lighting is a mix of incandescent and fluorescent fixtures.

Existing conditions	Capital needs	Green alternative
Common area lighting.	Costs to replace the fixtures are shown starting in Years 1 and 16.	EWCM 7 <u>Recommended Green Alternative</u>: Replace the existing fixtures with efficient, long-life dedicated LED fixtures to reduce energy usage as well as utility and operating costs.

Dwelling Units

During the course of the assessment, OSI was given access to 30 units accounting for 10% of the total. These were distributed among all unit types. 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 and management during the assessment.

As mentioned the dwelling unit are a mix of walk-up flats, two story townhouses, and ground level garden style unit. Dwelling unit walls and ceilings are painted. Dwelling unit painting costs are not included in this report as they are considered unit turn-over expenses. However, it is recommended that when repainting, a low or no VOC paint be used to reduce volatile organic compounds in the air and improve indoor air quality. Floors are generally covered with VCT. There are some unit floors that maintain the original hardwood strip

Narrative

flooring. Management, however did not have the total hardwood square footage for this report. The report assumes therefore that at some future time all floors will be covered with VCT.

Bathrooms feature enameled steel tubs with ceramic tile surround, all wood HUD severe use vanity cabinets with plastic laminate countertops and in-set sink, and low-flow (1.6-GPF) toilets. Kitchens feature all wood HUD severe use cabinets with plastic laminate countertops and stainless steel sinks, 30-inch gas-ranges with rangehoods, and frost free top freezer Energy Star rated refrigerators.

The dwelling units are heated individually by Goodman gas-fired condensing boilers rated at 95% efficient. Domestic hot water is provided by individual atmospheric gas-fired 40-gallon/34-MBH storage water heaters.

Each unit also feature individual circuit breaker load centers. These circuit breaker panels however use obsolete Stab-Lok type circuit breakers. Units feature hardwired smoke detectors in the living areas and bedrooms.

Interior Unit Doors

Interior unit passage doors and closet doors are hollow-core types.

Existing conditions	Capital needs	Green alternative
Doors vary in condition and age.	The replace shows annual allowances for the as-needed replacement of passage and closet doors.	<u>No Green alternative is suggested.</u>

Flooring

As mentioned above, most floors are covered with VCT but some retain the original hardwood strip flooring. This report assumes that eventually all floors will be covered with resilient vinyl.

Existing conditions	Capital needs	Green alternative
The dwelling unit floors vary in condition and age.	VCT replacement costs are shown annually on repeating 10 year cycles.	GM 4 Recommended Green Alternative: Replace the VCT with natural linoleum tile. Linoleum is a natural product (containing

Narrative

Existing conditions	Capital needs	Green alternative
		linseed oil, powdered wood or cork, ground limestone, resin binders, natural jute backing), which has been found to be more durable than its vinyl tile counterpart. Linoleum tile hardens over time, and therefore becomes less susceptible to scratching and cracking. Installation of linoleum has a lower annual life cycle cost than vinyl and keeps the vinyl product out of our landfills in the future.

Bathrooms

Bathrooms feature enameled steel tubs with ceramic tile surrounds and anti-scald valves. HUD severe use all wood vanities with plastic laminate tops and inset sinks, low-flow (1.6-GPF toilets) and a standard set of bathroom accessories.

Existing conditions	Capital needs	Green alternative
The enameled steel tubs and ceramic tile surrounds are in good to fair condition.	Costs to replace the tubs and surrounds are shown starting in Year 3	No Green alternative is suggested.
Bathroom vanities vary in condition.	Costs to replace the vanities with HUD server use all wood vanities with one-piece solid surface sink tops are shown starting in	No Green alternative is suggested.

Narrative

Existing conditions	Capital needs	Green alternative
	Year 3.	
The vitreous china low-flow (1.6-GPF) toilets vary in condition. Management noted that running toilets were a problem that wasted water and increased utility costs.	Costs to replace the toilets in-kind are shown starting in Year 3.	EWCM 8 Recommended Green Alternative: Replace the toilets with flapperless models (.8-GPF) to reduce water consumption. The LCC analysis recommends replacement in Year 1 to achieve the greatest saving with this option.

Kitchens

Kitchens feature all wood HUD severe use cabinets with plastic laminate countertops, 30-inch free-standing gas ranges with rangehoods, and frost free top freezer refrigerators. The report suggests the addition of automatic magnetically hood-mounted dry chemical fire extinguisher canister to each rangehood to reduce fire damage. The reduction in fire insurance costs will mitigate the cost of these devices.

Existing conditions	Capital needs	Green alternative
The HUD severe use cabinets are in fair condition.	Costs to replace the cabinets in-kind are shown starting in Year 3.	No Green alternative is suggested.

Narrative

Existing conditions	Capital needs	Green alternative
The plastic laminate countertops vary widely in condition.	Costs to replace the countertops in-kind are shown concurrent with the cabinet replacements.	GM 5 Recommended Green Alternative: Replace the existing countertops with solid-surface models to reduce the use of petroleum based products and to increase the countertops service life reducing operating costs.
The cooking ranges are approaching the end of their expected useful service life.	Costs to replace the ranges are shown concurrent with the cabinet replacements.	No Green alternative is suggested.
Per management, the Energy Star rated refrigerators are replaced on an as-needed basis.	Costs to continue the as-needed refrigerator replacement process are shown annually throughout the report.	No Green alternative is suggested.
The rangehoods vary widely in condition.	Costs to replace the rangehoods are shown concurrent with the cabinet and range replacements.	No Green alternative is suggested.
	The addition of automatic magnetically hood-mounted dry chemical fire extinguisher canisters (2 per rangehood) are shown every six years starting in Year 1.	No Green alternative is suggested.

Narrative

Unit Mechanical and Electrical

Dwelling units are heated by Goodman gas-fired 80-MBH condensing (95%-EFF) furnaces that are controlled by wall mounted thermostats. Domestic hot water (DHW) is provided by individual 40—gallon/34-MBH atmospheric gas-fired storage water heaters. Each unit has a circuit breaker panel equipped with obsolete Stab-Lok type circuit breakers. Units have hardwired smoke detectors in the living areas and bedrooms. Lighting fixtures are predominantly incandescent types.

Existing conditions	Capital needs	Green alternative
The Goodman furnaces were reported to be operating as designed by management. No operational analysis could be undertaken due to the warm weather environment during the assessment.	Costs to replace the furnaces in-kind are shown starting in Year 5.	These furnaces are considered Green, however when replacing, the development should install the highest efficiency models available to reduce energy usage and utility costs as much as possible.
Per management, the DHW heater are replaced on an as-needed basis.	Costs to continue the as-needed water heater replacement process are shown annually throughout the report.	No Green alternative is suggested.
The Stab-Lok circuit breakers are obsolete. Case of wiring fires have been attributed to these devices.	Costs to upgrade the circuit breaker panels and circuit breakers are shown starting in Year 1.	No Green alternative is suggested.
Per management, the smoke detectors are replaced on an as-needed basis.	Annual allowances to replace the smoke detectors, as-needed are shown throughout the report.	No Green alternative is suggested.

Narrative

Existing conditions	Capital needs	Green alternative
Unit lighting varies in age and condition.	Costs to replace all the dwelling unit lighting are shown starting in Year 1.	EWCM 9 Recommended Green Alternative: Replace the existing lighting fixtures with efficient long-life LED fixtures to reduce energy usage as well as utility and operating costs.

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.

None were detected.

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 ranging from 100°F to 120°F. DHW temperatures should be in the range of 110°F to 130°F; at temperatures of 140°F, burns (scalding) can occur.

Indoor Air Quality

Ventilation (Common Areas and Apartments):

This building does not have any mechanically supplied fresh air; instead each occupied space has a series of operable windows to provide fresh air.

Temperature, Humidity, Carbon Dioxide (CO₂)

Space temperature and humidity are the key components for comfort level. Temperature and relative humidity was measured in

Narrative

conditioned spaces (management office, dwelling unit, common hallway). The temperature of the conditioned spaces was comparable to the outside air temperature and humidity as most areas had windows open to the outside.

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

Mold and airborne concerns:

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

Reporting:

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

Table A. Flow Rate

Conditioned Space	Actual Read	Design Specification	Notes
Hallways / Stairwells			N/A No mechanical ventilation
Community Room			N/A No mechanical ventilation
Office			N/A No mechanical ventilation
Apartment			N/A No mechanical ventilation

Narrative

Table B. Carbon Dioxide

Space	Actual Read	Design Specification	Notes
Hallways / Stairwells	~750 ppm	< 1,000 ppm	Conditioned space; windows open
Community Room	950 ppm	< 1,000 ppm	Conditioned space; closed at time of assessment all system shut down
Office	~850	<1000 ppm	Condition space; HVAC system operating as designed
Apartment	~650	< 1,000 ppm	Conditioned space; windows open
Apartment	~575	< 1000 ppm	Conditioned space; windows open
Apartment	~850	< 1000 ppm	Conditioned space; windows open
Apartment	~500	< 1000 ppm	Conditioned space; windows open

Table C. Carbon Monoxide

Conditioned Space	Actual Read	Design Specification	Notes
Hallways / Stairwells		≈0 ppm	Carbon Monoxide level was not measured.
Community Room		≈0 ppm	Carbon Monoxide level was not measured.
Office		≈0 ppm	Carbon Monoxide level was not measured.
Apartment #		≈0 ppm	Carbon Monoxide level was not measured.

Narrative

Apartment #		≈0 ppm	Carbon Monoxide level was not measured.
Apartment #		≈0 ppm	Carbon Monoxide level was not measured.
Apartment #		≈0 ppm	Carbon Monoxide level was not measured.

Narrative

Capital Needs Summary, Replacement Reserve Analysis - *Conventional*

Future capital actions are based on useful life expectations and assume continued effective maintenance and physical management. The timing of actions by system (including quantities and costs) is also presented in the Capital Needs Worksheet. Costs for the twenty-year plan total \$10,694,674 in current dollars (\$35,649/unit), or \$13,471,191 (\$44,904/unit) in inflated dollars.

Capital Needs Summary, Replacement Reserve Analysis - *Green*

Future capital actions are based on useful life expectations and assume continued effective maintenance and physical management. The timing of actions by system (including quantities and costs) is also presented in the Capital Needs Worksheet. Costs for the twenty-year plan total \$9,850,282 (\$32,834/unit) in current dollars, or \$12,022,520 (\$40,075/unit) in inflated dollars.

Additional Notes:

1. The Physical Inspection of the property was conducted on June 18/19, 2018. Additional information was provided to ON-SITE INSIGHT by site staff and others. OSI was represented on this assignment by Bob Labadini. We would like to thank site staff for their assistance.
2. Regular updates of this plan are recommended to ensure careful monitoring of major building systems and to adjust the program to accommodate unanticipated circumstances surrounding the buildings, operations, and/or occupants.



The office parking area



The community building parking area



Typical condition of resident parking



Typical concrete walkways



The Peerless Community building boiler



The community building DHW heater



One of three HVAC units at the office building



Typical air handler at the community building



The fire alarm panel and generator transfer switch at the community building



One of the walk up buildings' video intercom panels



Typical walkup building



One of the four unit garden style buildings



Typical townhouse style building



The office building



The community building



Typical walk up building hall/stairwell



Typical unit living room



Typical unit kitchen



Typical unit bathroom



Typical unit circuit breaker panel with Stab-Lok breaker switches

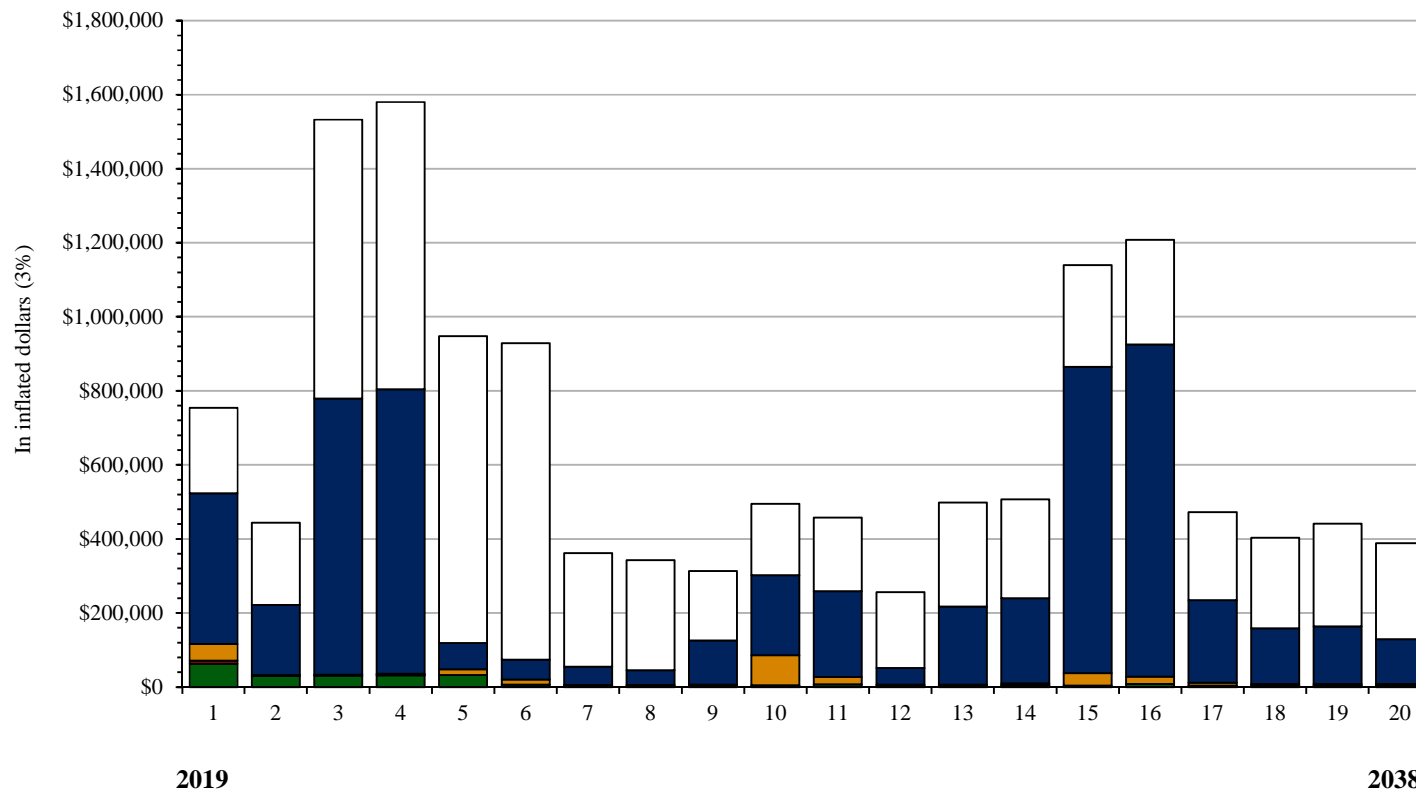


Typical unit Goodman warm air furnace



Typical unit water heater

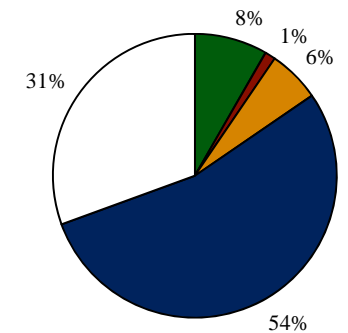
Capital Needs Summary - *Conventional*



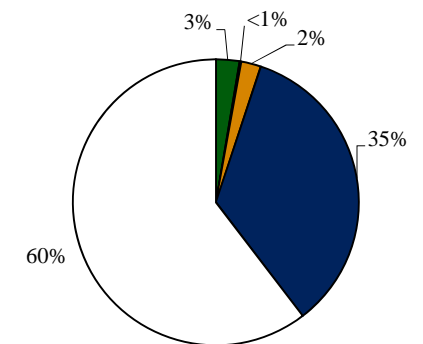
Total Costs by Building System (inflated dollars)

	Year 1	Years 1-10	Years 1-20
Site Systems & Distribution Systems	\$62,679 or \$209/unit	\$205,449 or \$685/unit	\$251,139 or \$837/unit
Mechanical Room	\$9,000 or \$30/unit	\$12,630 or \$42/unit	\$15,274 or \$51/unit
Building Mech. & Elec.	\$44,900 or \$150/unit	\$173,882 or \$580/unit	\$279,346 or \$931/unit
Building Architectural	\$406,905 or \$1,356/unit	\$2,657,518 or \$8,858/unit	\$5,747,757 or \$19,159/unit
Dwelling Units	\$230,468 or \$768/unit	\$4,649,770 or \$15,499/unit	\$7,177,675 or \$23,926/unit
In inflated dollars:	\$753,952 or \$2,513/unit	\$7,699,249 or \$25,664/unit	\$13,471,191 or \$44,904/unit
In current dollars:	\$753,952 or \$2,513/unit	\$6,926,629 or \$23,089/unit	\$10,694,674 or \$35,649/unit

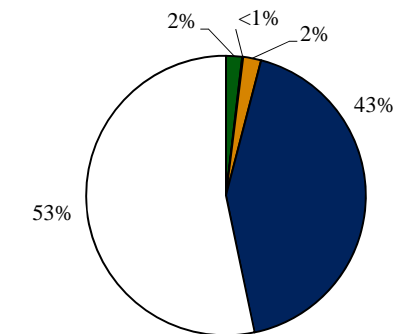
River Rouge Housing



Year One Distribution



Ten Year Distribution



Twenty Year Distribution

Capital Needs Summary - *Conventional*

OSI Ref: **18293**
 Property Age: **67 Years**
 Financing: **ousing Authority**

Residential Buildings: **66**
 Total Number of Units: **300**
 Occupancy: **Mixed**

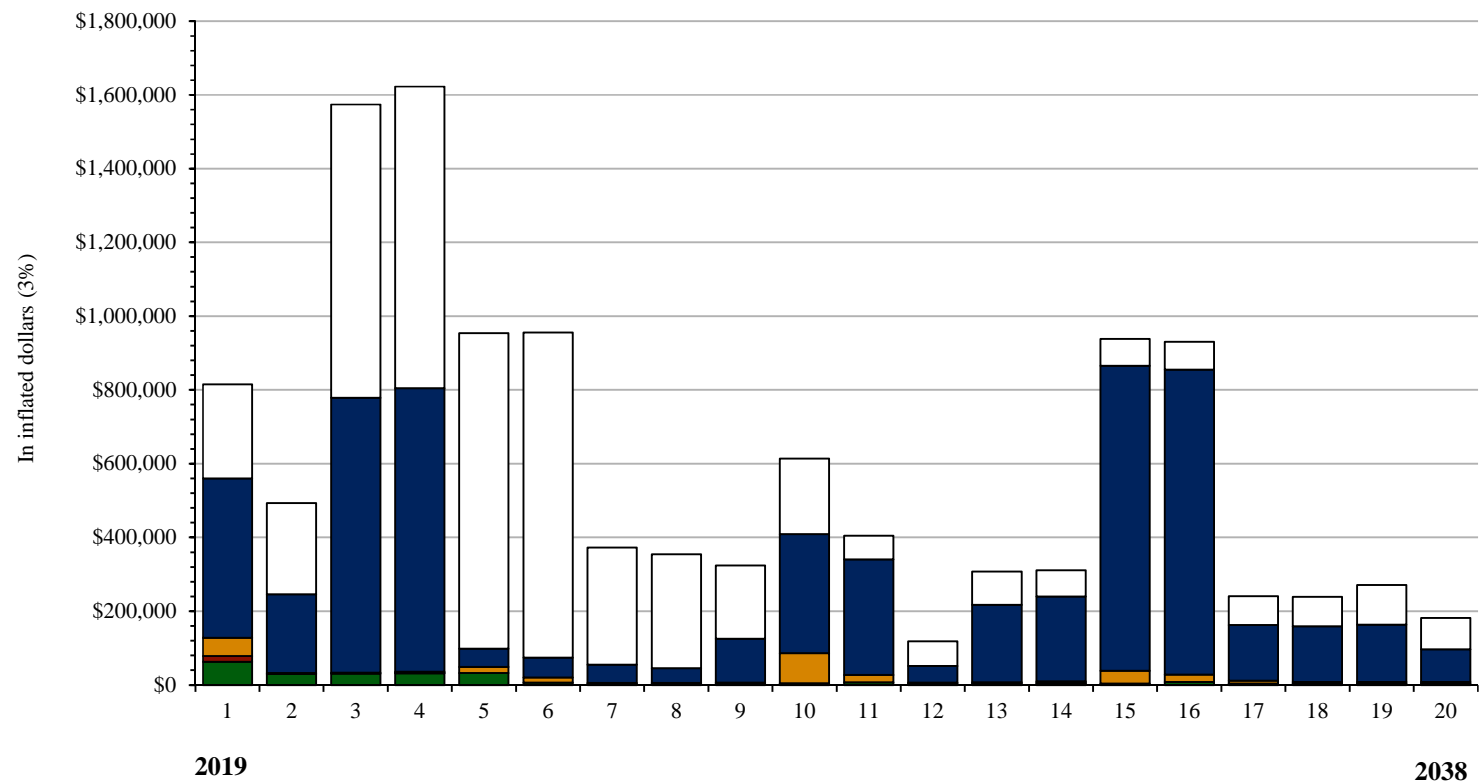
	2019 Year 1	2020 Year 2	2021 Year 3	2022 Year 4	2023 Year 5	2024 Year 6	2025 Year 7	2026 Year 8	2027 Year 9	2028 Year 10
Site Systems & Distribution Systems										
Surface	\$62,679	\$29,763	\$30,656	\$31,575	\$32,523	\$6,264	\$2,866	\$2,952	\$3,040	\$3,131
Distribution Systems	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Site Sub-Total	\$62,679	\$29,763	\$30,656	\$31,575	\$32,523	\$6,264	\$2,866	\$2,952	\$3,040	\$3,131
Mechanical Room										
Boilers	\$9,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,664
Boiler Room Systems	\$0	\$0	\$0	\$1,967	\$0	\$0	\$0	\$0	\$0	\$0
Mechanical Sub-Total	\$9,000	\$0	\$0	\$1,967	\$0	\$0	\$0	\$0	\$0	\$1,664
Building Mech. & Electrical										
Mechanical	\$37,400	\$2,575	\$2,652	\$2,732	\$12,943	\$14,491	\$2,985	\$3,075	\$3,167	\$3,262
Electrical	\$7,500	\$0	\$0	\$0	\$2,814	\$0	\$0	\$0	\$0	\$78,286
Elevators	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Mechanical & Electrical Sub-Total	\$44,900	\$2,575	\$2,652	\$2,732	\$15,757	\$14,491	\$2,985	\$3,075	\$3,167	\$81,548
Building Architectural										
Structural and Exterior	\$289,220	\$75,945	\$745,694	\$768,065	\$36,346	\$37,437	\$38,560	\$39,716	\$119,304	\$42,135
Roof Systems	\$106,761	\$109,964	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$148,877
Halls, Stairs, Lobbies	\$3,300	\$3,399	\$0	\$0	\$0	\$10,343	\$10,653	\$0	\$0	\$23,406
Community Spaces	\$7,624	\$0	\$0	\$0	\$33,993	\$5,796	\$0	\$0	\$0	\$979
Building Architectural Sub-Total	\$406,905	\$189,308	\$745,694	\$768,065	\$70,339	\$53,576	\$49,213	\$39,716	\$119,304	\$215,397
Dwelling Units										
Living Areas	\$74,754	\$76,996	\$79,306	\$81,685	\$84,136	\$86,660	\$89,260	\$91,938	\$94,696	\$97,537
Bathrooms	\$4,184	\$4,310	\$199,711	\$205,702	\$211,873	\$218,229	\$4,996	\$5,146	\$5,300	\$5,459
Kitchens	\$41,788	\$27,591	\$358,226	\$368,973	\$380,042	\$391,443	\$49,897	\$32,945	\$33,934	\$34,952
Mechanical & Electrical	\$109,743	\$113,035	\$116,426	\$119,919	\$153,061	\$157,653	\$162,382	\$167,254	\$53,512	\$55,117
Dwelling Units Sub-Total	\$230,468	\$221,932	\$753,669	\$776,279	\$829,112	\$853,986	\$306,535	\$297,283	\$187,441	\$193,065
Total Capital Costs	\$753,952	\$443,578	\$1,532,671	\$1,580,618	\$947,731	\$928,316	\$361,599	\$343,026	\$312,953	\$494,805

River Rouge Housing

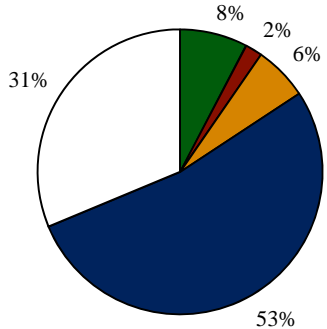
Costs on these pages are aggregated by category from the Capital Needs worksheets which follow. Total capital costs on these pages are carried forward to line F of the Replacement Reserve Analysis(es) that follow.

2029 Year 11	2030 Year 12	2031 Year 13	2032 Year 14	2033 Year 15	2034 Year 16	2035 Year 17	2036 Year 18	2037 Year 19	2038 Year 20	
\$7,261	\$3,322	\$3,422	\$3,524	\$3,630	\$8,418	\$3,851	\$3,967	\$4,086	\$4,208	Site Systems & Accessibility
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Surface Accessibility
\$7,261	\$3,322	\$3,422	\$3,524	\$3,630	\$8,418	\$3,851	\$3,967	\$4,086	\$4,208	Site Sub-Total
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Mechanical Room
\$0	\$0	\$0	\$2,643	\$0	\$0	\$0	\$0	\$0	\$0	Boilers Boiler Room Systems
\$0	\$0	\$0	\$2,643	\$0	\$0	\$0	\$0	\$0	\$0	Mechanical Sub-Total
\$16,799	\$3,461	\$3,564	\$3,671	\$9,454	\$19,475	\$4,012	\$4,132	\$4,256	\$4,384	Building Mech. & Electrical
\$3,360	\$0	\$0	\$0	\$24,885	\$0	\$4,012	\$0	\$0	\$0	Mechanical
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Electrical Elevators
\$20,159	\$3,461	\$3,564	\$3,671	\$34,339	\$19,475	\$8,024	\$4,132	\$4,256	\$4,384	Mechanical & Electrical Sub-Total
\$43,399	\$44,701	\$210,607	\$216,925	\$48,846	\$114,874	\$217,630	\$150,783	\$155,306	\$88,344	Building Architectural
\$153,343	\$0	\$0	\$0	\$746,878	\$769,284	\$0	\$0	\$0	\$0	Structural and Exterior Roof Systems
\$24,108	\$0	\$0	\$13,102	\$13,495	\$5,141	\$5,296	\$0	\$0	\$0	Halls, Stairs, Lobbies
\$10,246	\$0	\$0	\$0	\$17,706	\$7,790	\$0	\$0	\$0	\$32,433	Community Spaces
\$231,097	\$44,701	\$210,607	\$230,028	\$826,926	\$897,089	\$222,926	\$150,783	\$155,306	\$120,776	Building Architectural Sub-Total
\$100,463	\$103,477	\$106,581	\$109,778	\$113,072	\$116,464	\$119,958	\$123,556	\$127,263	\$131,081	Dwelling Units
\$5,623	\$5,792	\$5,966	\$6,144	\$6,329	\$6,519	\$6,714	\$6,916	\$7,123	\$7,337	Living Areas
\$36,000	\$37,080	\$107,699	\$88,901	\$91,569	\$94,316	\$42,986	\$44,276	\$71,141	\$46,972	Bathrooms
\$56,771	\$58,474	\$60,228	\$62,035	\$63,896	\$65,813	\$67,787	\$69,821	\$71,915	\$74,073	Kitchens
										Mechanical & Electrical
\$198,857	\$204,822	\$280,473	\$266,859	\$274,865	\$283,111	\$237,445	\$244,569	\$277,442	\$259,463	Dwelling Units Sub-Total
\$457,374	\$256,306	\$498,066	\$506,726	\$1,139,760	\$1,208,092	\$472,246	\$403,450	\$441,090	\$388,831	Total Capital Costs

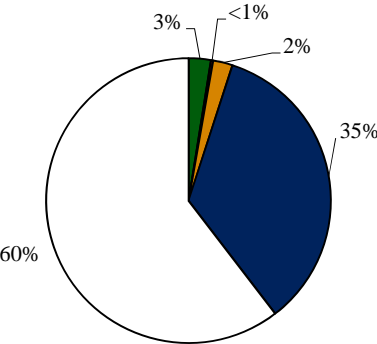
Capital Needs Summary - Green



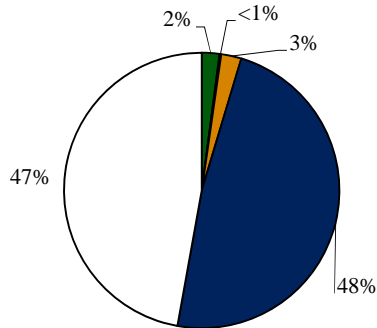
River Rouge Housing



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 & Distribution Systems	\$62,679 or \$209/unit	\$205,449 or \$685/unit	\$251,139 or \$837/unit
Mechanical Room	\$15,750 or \$53/unit	\$19,380 or \$65/unit	\$22,024 or \$73/unit
Building Mech. & Elec.	\$49,880 or \$166/unit	\$179,706 or \$599/unit	\$285,518 or \$952/unit
Building Architectural	\$431,937 or \$1,440/unit	\$2,793,049 or \$9,310/unit	\$5,791,069 or \$19,304/unit
Dwelling Units	\$254,829 or \$849/unit	\$4,881,843 or \$16,273/unit	\$5,672,770 or \$18,909/unit
In inflated dollars:	\$815,075 or \$2,717/unit	\$8,079,428 or \$26,931/unit	\$12,022,520 or \$40,075/unit
In current dollars:	\$815,075 or \$2,717/unit	\$7,260,947 or \$24,203/unit	\$9,850,282 or \$32,834/unit

Capital Needs Summary - Green

OSI Ref: 18293
 Property Age: 67 Years
 Financing: ousing Authority

Residential Buildings: 66
 Total Number of Units: 300
 Occupancy: Mixed

	2019 Year 1	2020 Year 2	2021 Year 3	2022 Year 4	2023 Year 5	2024 Year 6	2025 Year 7	2026 Year 8	2027 Year 9	2028 Year 10
Site Systems & Distribution Systems										
Surface	\$62,679	\$29,763	\$30,656	\$31,575	\$32,523	\$6,264	\$2,866	\$2,952	\$3,040	\$3,131
Distribution Systems	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Site Sub-Total	\$62,679	\$29,763	\$30,656	\$31,575	\$32,523	\$6,264	\$2,866	\$2,952	\$3,040	\$3,131
Mechanical Room										
Boilers	\$15,750	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,664
Boiler Room Systems	\$0	\$0	\$0	\$1,967	\$0	\$0	\$0	\$0	\$0	\$0
Mechanical Sub-Total	\$15,750	\$0	\$0	\$1,967	\$0	\$0	\$0	\$0	\$0	\$1,664
Building Mech. & Electrical										
Mechanical	\$42,380	\$2,575	\$2,652	\$2,732	\$13,787	\$14,491	\$2,985	\$3,075	\$3,167	\$3,262
Electrical	\$7,500	\$0	\$0	\$0	\$2,814	\$0	\$0	\$0	\$0	\$78,286
Elevators	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Mechanical & Electrical Sub-Total	\$49,880	\$2,575	\$2,652	\$2,732	\$16,601	\$14,491	\$2,985	\$3,075	\$3,167	\$81,548
Building Architectural										
Structural and Exterior	\$312,280	\$99,697	\$745,694	\$768,065	\$36,346	\$37,437	\$38,560	\$39,716	\$119,304	\$42,135
Roof Systems	\$106,761	\$109,964	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$231,632
Halls, Stairs, Lobbies	\$3,960	\$4,079	\$0	\$0	\$0	\$10,343	\$10,653	\$0	\$0	\$23,406
Community Spaces	\$8,936	\$0	\$0	\$0	\$13,175	\$5,796	\$0	\$0	\$0	\$25,110
Building Architectural Sub-Total	\$431,937	\$213,740	\$745,694	\$768,065	\$49,521	\$53,576	\$49,213	\$39,716	\$119,304	\$322,283
Dwelling Units										
Living Areas	\$74,754	\$76,996	\$79,306	\$81,685	\$84,136	\$86,660	\$89,260	\$91,938	\$94,696	\$97,537
Bathrooms	\$19,492	\$20,076	\$203,458	\$209,562	\$198,620	\$204,579	\$4,996	\$5,146	\$5,300	\$5,459
Kitchens	\$41,788	\$27,591	\$386,075	\$397,657	\$409,587	\$421,874	\$49,897	\$32,945	\$33,934	\$34,952
Mechanical & Electrical	\$118,796	\$122,360	\$126,031	\$129,812	\$163,251	\$168,148	\$173,193	\$178,388	\$64,980	\$66,930
Dwelling Units Sub-Total	\$254,829	\$247,024	\$794,870	\$818,716	\$855,594	\$881,261	\$317,345	\$308,417	\$198,910	\$204,877
Total Capital Costs	\$815,075	\$493,101	\$1,573,872	\$1,623,055	\$954,239	\$955,592	\$372,409	\$354,160	\$324,421	\$613,504

River Rouge Housing

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.

2029 Year 11	2030 Year 12	2031 Year 13	2032 Year 14	2033 Year 15	2034 Year 16	2035 Year 17	2036 Year 18	2037 Year 19	2038 Year 20	
\$7,261	\$3,322	\$3,422	\$3,524	\$3,630	\$8,418	\$3,851	\$3,967	\$4,086	\$4,208	Site Systems & Accessibility Surface Accessibility
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
\$7,261	\$3,322	\$3,422	\$3,524	\$3,630	\$8,418	\$3,851	\$3,967	\$4,086	\$4,208	Site Sub-Total
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Mechanical Room Boilers Boiler Room Systems
\$0	\$0	\$0	\$2,643	\$0	\$0	\$0	\$0	\$0	\$0	
\$0	\$0	\$0	\$2,643	\$0	\$0	\$0	\$0	\$0	\$0	Mechanical Sub-Total
\$16,799	\$3,461	\$3,564	\$3,671	\$9,802	\$19,475	\$4,012	\$4,132	\$4,256	\$4,384	Building Mech. & Electrical Mechanical Electrical Elevators
\$3,360	\$0	\$0	\$0	\$24,885	\$0	\$4,012	\$0	\$0	\$0	
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
\$20,159	\$3,461	\$3,564	\$3,671	\$34,687	\$19,475	\$8,024	\$4,132	\$4,256	\$4,384	Mechanical & Electrical Sub-Total
\$43,399	\$44,701	\$210,607	\$216,925	\$48,846	\$50,312	\$151,131	\$150,783	\$155,306	\$88,344	Building Architectural Structural and Exterior Roof Systems Halls, Stairs, Lobbies Community Spaces
\$238,581	\$0	\$0	\$0	\$746,878	\$769,284	\$0	\$0	\$0	\$0	
\$24,108	\$0	\$0	\$13,102	\$13,495	\$0	\$0	\$0	\$0	\$0	
\$6,720	\$0	\$0	\$0	\$17,706	\$7,790	\$0	\$0	\$0	\$0	
\$312,808	\$44,701	\$210,607	\$230,028	\$826,925	\$827,386	\$151,131	\$150,783	\$155,306	\$88,344	Building Architectural Sub-Total
\$4,563	\$4,700	\$4,841	\$4,987	\$5,136	\$5,290	\$5,449	\$5,612	\$5,781	\$5,954	Dwelling Units Living Areas Bathrooms Kitchens Mechanical & Electrical
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
\$17,471	\$17,995	\$39,921	\$19,091	\$19,664	\$20,254	\$20,861	\$21,487	\$47,668	\$22,796	
\$42,866	\$44,152	\$45,476	\$46,840	\$48,246	\$49,693	\$51,184	\$52,719	\$54,301	\$55,930	
\$64,900	\$66,847	\$90,239	\$70,918	\$73,045	\$75,237	\$77,494	\$79,819	\$107,750	\$84,680	Dwelling Units Sub-Total
\$405,128	\$118,331	\$307,832	\$310,785	\$938,288	\$930,515	\$240,500	\$238,701	\$271,398	\$181,615	Total Capital Costs

Projected Capital Needs Over Twenty Years

SITE SYSTEMS

Replacement Items	Quantity	Cost / Unit in 2019 \$	Total Cost in 2019 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)	Notes	
SURFACE									
Parking	37,851 sf	3.50	\$132,480		varies	20	1	over 5 Years	Asphalt paved residential parking areas Costs to strip and replace
Parking (Green)	sf								
Parking - Office	15,015 sf	2.25	\$33,783		27	20	1	in 1 Year	Asphalt paved poor condition Costs to scarify and resurface
Parking - Office (Green)	sf								
Crack-Fill and Sealcoat	15,015 sf	0.20	\$3,003		0	5	6 /11 /16	in 1 Year	Office parking lot only Periodic allowances
	30,466 ttl sf								Concrete paved, conditions vary
Pedestrian Paving	1 ls	48000.00	\$48,000		varies	20	1	over 20 Years	Annual allowances for as-needed repairs
Pedestrian Paving (Green)	sf								
Fencing	600 lf				3	35			Metal picket fencing between some bldgs. Operating
Fencing (Green)	lf								
Site Lighting	1 lf				67	15			City street lighting
Site Lighting (Green)	lf								
Retaining Walls	lf								
Landscaping	1 ls				varies	20			Open lawn areas, overgrown scrubs, and trees Operating
Landscaping (Green)	ea								

SITE DISTRIBUTION SYSTEMS

Gas Lines	1 ls				67	10			Utility provided service Monitor
Gas Lines (Green)	ls								
Sanitary Lines	1 ls				67	20			Municipal provided service Monitor
Sanitary Lines (Green)	ls								
Cold Water Lines	1 ls				67	20			Municipal provided service Monitor
Cold Water Lines (Green)	ls								
Electric Distribution	1 ls				67	50			Utility provided service Monitor

River Rouge Housing
SITE SYSTEMS

Replacement Items	Year 1 2019	Year 2 2020	Year 3 2021	Year 4 2022	Year 5 2023	Year 6 2024	Year 7 2025	Year 8 2026	Year 9 2027	Year 10 2028	Year 11 2029	Year 12 2030	Year 13 2031	Year 14 2032	Year 15 2033	Year 16 2034	Year 17 2035	Year 18 2036	Year 19 2037	Year 20 2038
SURFACE																				
Parking	\$26,496	\$27,291	\$28,110	\$28,953	\$29,821	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Parking (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Parking - Office	\$33,783	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Parking - Office (Green)	\$0	\$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	\$3,481	\$0	\$0	\$0	\$0	\$4,036	\$0	\$0	\$0	\$0	\$4,679	\$0	\$0	\$0	\$0
Pedestrian Paving	\$2,400	\$2,472	\$2,546	\$2,623	\$2,701	\$2,782	\$2,866	\$2,952	\$3,040	\$3,131	\$3,225	\$3,322	\$3,422	\$3,524	\$3,630	\$3,739	\$3,851	\$3,967	\$4,086	\$4,208
Pedestrian Paving (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Fencing	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Fencing (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Site Lighting	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Site Lighting (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Retaining Walls	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Landscaping	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Landscaping (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

SITE DISTRIBUTION SYSTEMS

Gas Lines	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Gas Lines (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Sanitary Lines	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Sanitary Lines (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Cold Water Lines	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Cold Water Lines (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Electric Distribution	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Projected Capital Needs Over Twenty Years

MECHANICAL ROOM

Replacement Items	Quantity	Cost / Unit in 2019 \$	Total Cost in 2019 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)		Notes
HEATING SYSTEMS									
Furnaces - Units	ea								
Furnaces - Units (Green)	ea								
Boiler - Community Bldg.	1 ea	9,000	\$9,000		27	25	1	in 1 Year	Peerless hydronic gas-fired ~ 450-MBH Costs to replace
Boiler - Community Bldg. (Green)	1 ea	15,750	\$15,750	\$6,750	27	25	1	in 1 Year	Peerless hydronic gas-fired ~ 450-MBH E1 Replace with high eff. Condensing boiler Eff-96%
Furnaces	ea								
Furnaces (Green)	ea								
Controls	ea								
Controls (Green)	ea								
Boiler Water Pumps	ea								
Boiler Water Pumps (Green)	ea								
Heating Water Pumps	1 ea	1,275	\$1,275		5	15	10	in 1 Year	B&G inline hydronic circulator to air handlers Costs to replace
Heating Water Pumps (Green)	ea								
Heating Water Pumps - 2	ea								
Heating Water Pumps - 2 (Green)	ea								
Flue Exhaust	300 ea				16	20			PCPVC at DU condensing furnaces; Monitor
Flue Exhaust (Green)	1 ea				27	20			Sheet metal at community bldg. Monitor
Flue Exhaust (Green)	ea								
Condensate & Feed Water	ea								
Miscellaneous	ea								
Miscellaneous (Green)	ea								
Miscellaneous	ea								
Miscellaneous (Green)	ea								

Costs projected at 3%

Replacement Items	Year 1 2019	Year 2 2020	Year 3 2021	Year 4 2022	Year 5 2023	Year 6 2024	Year 7 2025	Year 8 2026	Year 9 2027	Year 10 2028	Year 11 2029	Year 12 2030	Year 13 2031	Year 14 2032	Year 15 2033	Year 16 2034	Year 17 2035	Year 18 2036	Year 19 2037	Year 20 2038
HEATING SYSTEMS																				
Furnaces - Units	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Furnaces - Units (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boiler - Community Bldg.	\$9,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boiler - Community Bldg. (Green)	\$15,750	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Furnaces	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Furnaces (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Controls	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Controls (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boiler Water Pumps	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boiler Water Pumps (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Heating Water Pumps	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,664	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Heating Water Pumps (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Heating Water Pumps - 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Heating Water Pumps - 2 (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Flue Exhaust	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Flue Exhaust (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Condensate & Feed Water	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Projected Capital Needs Over Twenty Years

MECHANICAL ROOM--*continued*

Replacement Items	Quantity	Cost / Unit in 2019 \$	Total Cost in 2019 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)				Notes
BOILER ROOM SYSTEMS											
Boiler Room Piping/Valves	1 ls				27	25					Isolation valves & piping at Com Bldg. Monitor
Boiler Room Piping/Valves (Green)	ea										
3-Way Valve & Controller	ea										
3-Way Valve & Controller (Green)	ea										
Heat Exchanger	ea										
Heat Exchanger (Green)	ea										
DHW Generation	2 ea	900.00	\$1,800		6	10	4	14		in 1 Year	Off./Com. Bldgs.: Rheem 40-gal/34-MBH Costs to replace
DHW Generation (Green)	ea										
DHW Generation	ea										
DHW Generation (Green)	ea										
DHW Storage	ea										
DHW Storage (Green)	ea										
DHW Storage	ea										
DHW Storage (Green)	ea										
DHW Pumps	ea										
DHW Pumps (Green)	ea										
DHW Pumps	ea										
DHW Pumps (Green)	ea										
Miscellaneous	ea										
Miscellaneous (Green)	ea										
Miscellaneous	ea										

Costs projected at 3%

Replacement Items	Year 1 2019	Year 2 2020	Year 3 2021	Year 4 2022	Year 5 2023	Year 6 2024	Year 7 2025	Year 8 2026	Year 9 2027	Year 10 2028	Year 11 2029	Year 12 2030	Year 13 2031	Year 14 2032	Year 15 2033	Year 16 2034	Year 17 2035	Year 18 2036	Year 19 2037	Year 20 2038
BOILER ROOM SYSTEMS																				
Boiler Room Piping/Valves	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boiler Room Piping/Valves (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3-Way Valve & Controller	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3-Way Valve & Controller (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Heat Exchanger	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Heat Exchanger (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Generation	\$0	\$0	\$0	\$1,967	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,643	\$0	\$0	\$0	\$0	\$0	\$0
DHW Generation (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Generation	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Generation (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Storage	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Storage (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Storage	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Storage (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Pumps	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Pumps (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Pumps	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Pumps (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Projected Capital Needs Over Twenty Years

BUILDING MECHANICAL AND ELECTRICAL

Replacement Items	Quantity	Cost / Unit in 2019 \$	Total Cost in 2019 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)	Notes
BUILDING MECHANICAL								
Compactors	ea							
Building Fire Suppression	ls							
Building Distribution Systems	1 ls	50000.00	\$50,000		varies	50	1 over 20 Years	Standard systems replaced as needed Annual allowances for as-needed repairs/replacements
Building HVAC Systems	1 ea	3750.00	\$3,750		5	20	15 in 1 Year	Office Bldg. 2.5-Ton RTU heat pump Costs to replace
Building HVAC Systems (Green)	1 ea	3980.00	\$3,980	\$230	5	20	15 in 1 Year	E2 Office Bldg. 2.5-Ton RTU heat pump Replace w/SEER 18 unit
Building HVAC Systems	2 ea	4500.00	\$9,000		15	20	5 in 1 Year	Office Bldg. 3-Ton TRU heat pumps Costs to replace
Building HVAC Systems (Green)	2 ea	4875.00	\$9,750	\$750	15	20	5 in 1 Year	E3 Office Bldg. 3-Ton TRU heat pumps Replace w/SEER 18 unit
Building HVAC Systems	1 ea	15000.00	\$15,000		23	20	1 in 1 Year	Community Bldg. 10-Ton RTU air conditioner Costs to replace
Building HVAC Systems (Green)	1 ea	18000.00	\$18,000	\$3,000	23	20	1 in 1 Year	E4 Community Bldg. 10-Ton RTU air conditioner Replace w/SEER 18 unit
Building HVAC Systems	1 ea	9900.00	\$9,900		23	20	1 in 1 Year	Community Bldg. 6.6-Ton RTU air conditioner Costs to replace
Building HVAC Systems (Green)	1 ea	11880.00	\$11,880	\$1,980	23	20	1 in 1 Year	E5 Community Bldg. 6.6-Ton RTU air conditioner Replace w/SEER 18 unit
Community Bldg Air Handlers	2 ea	5000.00	\$10,000		23	5	1 6 11 16 in 1 Year	Trane air handlers Periodic allowances for repairs
Community Bldg Air Handlers (Green)	ea							

BUILDING ELECTRICAL

Building Power Wiring	1 ls				67	99		Commercial grade common area disconnects Dwelling Units are metered individually
Emergency Generator	1 ea	16452.00	\$16,452		20	35	15 in 1 Year	Onan 12.5 kW natural gas fueled generator Costs to replace
Emergency Lights	1 ls				67	10		Office/Com. Bldg. self contained battery powered Operating
Smoke / Fire Detection	1 ls	7500.00	\$7,500		24	20	1 in 1 Year	Community Bldg. Notifier SFP-400B FACP Costs to replace
CCTV Security Monitoring Syst.	1 ls	2500.00	\$2,500		1	6	5 11 17 1 in 1 Year	CCTV system, Periodic allowances for upgrades
Signaling / Communication	8 ea	7500.00	\$60,000		5	15	10 in 1 Year	Video/intercom panels at walkup bldgs.

BUILDING ELEVATORS

Shafts and Doorways	ea							N/A
Cabs	ea							
Controller/Dispatcher	ea							
Machine Room Equipment	ea							

BUILDING MECHANICAL AND ELECTRICAL

Costs projected at 3%

Replacement Items	Year 1 2019	Year 2 2020	Year 3 2021	Year 4 2022	Year 5 2023	Year 6 2024	Year 7 2025	Year 8 2026	Year 9 2027	Year 10 2028	Year 11 2029	Year 12 2030	Year 13 2031	Year 14 2032	Year 15 2033	Year 16 2034	Year 17 2035	Year 18 2036	Year 19 2037	Year 20 2038
BUILDING MECHANICAL																				
Compactors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building Fire Suppression	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building Distribution Systems	\$2,500	\$2,575	\$2,652	\$2,732	\$2,814	\$2,898	\$2,985	\$3,075	\$3,167	\$3,262	\$3,360	\$3,461	\$3,564	\$3,671	\$3,781	\$3,895	\$4,012	\$4,132	\$4,256	\$4,384
Building HVAC Systems	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$5,672	\$0	\$0	\$0	\$0	\$0
Building HVAC Systems (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$6,020	\$0	\$0	\$0	\$0	\$0
Building HVAC Systems	\$0	\$0	\$0	\$0	\$10,130	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building HVAC Systems (Green)	\$0	\$0	\$0	\$0	\$10,974	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building HVAC Systems	\$15,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building HVAC Systems (Green)	\$18,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building HVAC Systems	\$9,900	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building HVAC Systems (Green)	\$11,880	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Community Bldg Air Handlers	\$10,000	\$0	\$0	\$0	\$0	\$11,593	\$0	\$0	\$0	\$0	\$13,439	\$0	\$0	\$0	\$0	\$15,580	\$0	\$0	\$0	\$0
Community Bldg Air Handlers (Greer	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
BUILDING ELECTRICAL																				
Building Power Wiring	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Emergency Generator	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$24,885	\$0	\$0	\$0	\$0	\$0
Emergency Lights	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Smoke / Fire Detection	\$7,500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
CCTV Security Monitoring Syst. Signaling / Communication	\$0	\$0	\$0	\$0	\$2,814	\$0	\$0	\$0	\$0	\$78,286	\$3,360	\$0	\$0	\$0	\$0	\$0	\$4,012	\$0	\$0	\$0
Shafts and Doorways	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Cabs	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Controller/Dispatcher	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Machine Room Equipment	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Projected Capital Needs Over Twenty Years

BUILDING ARCHITECTURE

Replacement Items	Quantity	Cost / Unit in 2019 \$	Total Cost in 2019 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)			Notes		
STRUCTURE												
Foundation	15,434 lf				67	100				Poured concrete & CMU block Monitor		
Framing	1 ls				67	100				Concrete/wood framed Monitor		
Slab	67,363 sf				67	100				Poured concrete Monitor		
Insect Prevention	64 ea	2400.00	\$153,600		Add	10	1	in	1 Year	Reported costs to install prevention equipment Future maintenance from Operating		
BUILDING EXTERIOR												
Exterior Common Doors	30 ea	1652.00	\$49,560		varies	35	1	over	35 Years	Heavy metal insulated doors w/vision lite Annual allowances to replace as-needed		
Exterior Common Doors (Green)	ea											
Dwelling Unit Hall Doors	74 ea	1250.00	\$92,500		varies	35	1	over	35 Years	Flush panel insulated metal doors Annual allowances to replace as-needed		
Dwelling Unit Hall Doors (Green)	ea											
DU Direct Entry Doors	488 ea	1500.00	\$732,000		varies	35	1	over	35 Years	Heavy flush panel insulated metal doors Annual allowances to replace as-needed		
DU Direct Entry Doors (Green)	ea											
Service Doors	ea											
Storm Doors	488 ea	225.00	\$109,800		varies	15	1	16	over	15 Years	Aluminum storm doors at direct entry units Annual allowances to replace as-needed	
	206,289 ttl sf									Brick masonry		
Exterior Walls - Brick	10,314 sf	6.00	\$61,887		67	8	1	9	17	in	1 Year	Periodic allowances to repoint/repair 5%
Exterior Walls - Brick (Green)	sf											
Exterior Walls - Vinyl	46,169 sf	5.00	\$230,845		27	40	13	over	2 Years	Vinyl siding mostly at upper floor locations Costs to replace		
Exterior Walls - Vinyl (Green)	sf											
Exterior Walls	sf											
Trim, Soffit, Fascia	lf											
Trim, Soffit, Fascia (Green)	lf											
Exterior Ceilings	sf											
Exterior Wall Insulation	ea											
Exterior Wall Insulation (Green)	1 ls				Add	20						Existing wall insulation is limited to R-value of materials. Recommend adding as interior walls are repl

River Rouge Housing

BUILDING ARCHITECTURE

Costs projected at 3%

Replacement Items	Year 1 2019	Year 2 2020	Year 3 2021	Year 4 2022	Year 5 2023	Year 6 2024	Year 7 2025	Year 8 2026	Year 9 2027	Year 10 2028	Year 11 2029	Year 12 2030	Year 13 2031	Year 14 2032	Year 15 2033	Year 16 2034	Year 17 2035	Year 18 2036	Year 19 2037	Year 20 2038
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
Insect Prevention	\$153,600	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
BUILDING EXTERIOR																				
Exterior Common Doors	\$1,416	\$1,458	\$1,502	\$1,547	\$1,594	\$1,642	\$1,691	\$1,742	\$1,794	\$1,848	\$1,903	\$1,960	\$2,019	\$2,079	\$2,142	\$2,206	\$2,272	\$2,340	\$2,411	\$2,483
Exterior Common Doors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Dwelling Unit Hall Doors	\$2,643	\$2,722	\$2,804	\$2,888	\$2,975	\$3,064	\$3,156	\$3,250	\$3,348	\$3,448	\$3,552	\$3,658	\$3,768	\$3,881	\$3,998	\$4,117	\$4,241	\$4,368	\$4,499	\$4,634
Dwelling Unit Hall Doors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DU Direct Entry Doors	\$20,914	\$21,542	\$22,188	\$22,854	\$23,539	\$24,245	\$24,973	\$25,722	\$26,494	\$27,288	\$28,107	\$28,950	\$29,819	\$30,713	\$31,635	\$32,584	\$33,561	\$34,568	\$35,605	\$36,673
DU Direct Entry Doors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Service Doors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Storm Doors	\$7,320	\$7,540	\$7,766	\$7,999	\$8,239	\$8,486	\$8,740	\$9,003	\$9,273	\$9,551	\$9,837	\$10,133	\$10,437	\$10,750	\$11,072	\$11,404	\$11,746	\$12,099	\$12,462	\$12,836
Exterior Walls - Brick	\$61,887	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$78,396	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$99,310	\$0	\$0	\$0
Exterior Walls - Brick (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Walls - Vinyl	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$164,565	\$169,502	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Walls - Vinyl (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Walls	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Trim, Soffit, Fascia	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Trim, Soffit, Fascia (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Ceilings	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Wall Insulation	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Wall Insulation (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 2019 \$	Total Cost in 2019 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)	Notes
BUILDING EXTERIORS (cont.)								
Windows - Large Sliders	500 ea	685.00	\$342,500		27	30	3 over 2 Years	Aluminum triple sash slider w/insulating dbl glazing Costs to replace
Windows - Large Sliders (Green)	ea							
Windows - Small Sliders	1,834 ea	500.00	\$917,000		27	30	3 over 2 Years	Aluminum dbl sash slider w/insulating dbl glazing Costs to replace
Windows - Small Sliders (Green)	ea							
Window Glazing	5,168 ea	70.00	\$361,760		0	15	18 over 20 Years	Insulating dbl glazed glass sashes Costs to replace failed (fogged) sashes
Window Glazing (Green)	ea							
Window Lintels	2,334 ea	35.00	\$81,690		67	30	3 18 over 2 Years	Painted metal lintels. Costs to scrape & paint with window replacements
Unit Balconies	ea							
Unit Balconies (Green)	ea							
Unit Patios	ea							
Unit Patios (Green)	ea							
Building Mounted Lighting	1,036 ea	80.00	\$82,880		varies	15	1 16 over 2 Years	Incandescent wall mounted entry courtesy lighting Costs to replace
Building Mounted Lighting (Green)	1,032 ea	125.00	\$129,000	\$46,120	varies	20	1 over 2 Years	Incandescent wall mounted entry courtesy lighting E6 Costs to replace with efferent Long-life LED fixtures
ROOF SYSTEMS								
Structure	170,819 sf				67	100		Wood framed and sheathed flat and pitched Monitor
Roof Covering	50,712 sf	4.50	\$228,204		10	20	10 over 2 Years	Shingle covered pitched roofs Costs to replace
Roof Covering (Green)	50,722 sf	7.00	\$355,054	\$126,850	10	100	10 over 2 Years	Shingle covered pitched roofs G1 Costs to install long-life metal tile roof system
Roof Covering	98,755 sf	10.00	\$987,549		5	20	15 in 2 Years	White membrane roof coverings. Future replacement
Roof Covering	21,352 sf	10.00	\$213,522		>20	20	1 over 2 Years	Tar & gravel being repl w/white membrane
Roof Covering (Green)	120,107 sf				varies	20		White membrane roof covering is seen as a good alternative to tar & gravel
Roof Covering	sf							
Skylights	ea							
Penthouses	ea							

Costs projected at 3%

Replacement Items	Year 1 2019	Year 2 2020	Year 3 2021	Year 4 2022	Year 5 2023	Year 6 2024	Year 7 2025	Year 8 2026	Year 9 2027	Year 10 2028	Year 11 2029	Year 12 2030	Year 13 2031	Year 14 2032	Year 15 2033	Year 16 2034	Year 17 2035	Year 18 2036	Year 19 2037	Year 20 2038
BUILDING EXTERIORS (cont.)																				
Windows - Large Sliders	\$0	\$0	\$181,679	\$187,129	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Windows - Large Sliders (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Windows - Small Sliders	\$0	\$0	\$486,423	\$501,015	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Windows - Small Sliders (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	\$29,897	\$30,794	\$31,717
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	\$43,332	\$44,632	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$67,511	\$69,536	\$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	\$0	\$0	\$0	\$0	\$0
Unit Patios (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building Mounted Lighting	\$41,440	\$42,683	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$64,562	\$66,499	\$0	\$0	\$0
Building Mounted Lighting (Green)	\$64,500	\$66,435	\$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	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$148,877	\$153,343	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Roof Covering (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$231,632	\$238,581	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Roof Covering	\$106,761	\$109,964	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$746,878	\$769,284	\$0	\$0	\$0	\$0
Roof Covering (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Roof Covering	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Skylights	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Penthouses	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Projected Capital Needs Over Twenty Years

BUILDING ARCHITECTURE--continued

Replacement Items	Quantity	Cost / Unit in 2019 \$	Total Cost in 2019 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)	Notes
HALLS								
Hallway Walls and Ceilings	27,452 sf	0.65	\$17,844		2	8	6 14	Common hallways Repainting cycles
Hallway Walls and Ceilings (Green)	27,452 sf	0.65	\$17,844	\$0	2	8	6 14	Common hallways Repaint with low-VOC content paint
Hallway Floors	7,176 sf	5.00	\$35,878		5	15	10	Vinyl composite tile (VCT) Replacement cycles
Hallway Floors (Green)	7,176 sf	5.00	\$35,878	\$0	5	20	10	Vinyl composite tile (VCT) G2 Replace VCT with natural linoleum
Hallway Floors	sf							
Hallway Floors (Green)	sf							
Common Area Int. Lighting	66 ea	Average 100.00	\$6,600		varies	15	1 16	Common Hallways; incandescent Costs to replace
Common Area Int. Lighting (Green)	66 ea	120.00	\$7,920	\$1,320	varies	20	1	Common Hallways; incandescent E7 Replace w/efficient long-life dedicated LED fixtures
Hallway Heating	ea							
Hallway Heating (Green)	ea							
Hallway Doors	ea							
Miscellaneous	ea							
Miscellaneous (Green)	ea							
STAIRS								
Stair Walls and Ceilings	sf							Stair costs included with hallway costs.
Stair Walls and Ceilings (Green)	sf							
Stair Floors	sf							
Stair Floors (Green)	sf							
Stair Interior Lighting	ea							
Stair Interior Lighting (Green)	ea							
Stair Doors	ea							
Stair Railings	ea							

Costs projected at 3%

Replacement Items	Year 1 2019	Year 2 2020	Year 3 2021	Year 4 2022	Year 5 2023	Year 6 2024	Year 7 2025	Year 8 2026	Year 9 2027	Year 10 2028	Year 11 2029	Year 12 2030	Year 13 2031	Year 14 2032	Year 15 2033	Year 16 2034	Year 17 2035	Year 18 2036	Year 19 2037	Year 20 2038
HALLS																				
Hallway Walls and Ceilings	\$0	\$0	\$0	\$0	\$0	\$10,343	\$10,653	\$0	\$0	\$0	\$0	\$0	\$0	\$13,102	\$13,495	\$0	\$0	\$0	\$0	\$0
Hallway Walls and Ceilings (Green)	\$0	\$0	\$0	\$0	\$0	\$10,343	\$10,653	\$0	\$0	\$0	\$0	\$0	\$0	\$13,102	\$13,495	\$0	\$0	\$0	\$0	\$0
Hallway Floors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$23,406	\$24,108	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hallway Floors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$23,406	\$24,108	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hallway Floors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hallway Floors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Common Area Int. Lighting	\$3,300	\$3,399	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$5,141	\$5,296	\$0	\$0	\$0
Common Area Int. Lighting (Green)	\$3,960	\$4,079	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hallway Heating	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hallway Heating (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hallway Doors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$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
STAIRS																				
Stair Walls and Ceilings	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Stair Walls and Ceilings (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Stair Floors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Stair Floors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Stair Interior Lighting	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Stair Interior Lighting (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Stair Doors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Stair Railings	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Projected Capital Needs Over Twenty Years

BUILDING ARCHITECTURE--continued

Replacement Items	Quantity	Cost / Unit in 2019 \$	Total Cost in 2019 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)				Notes
LOBBIES AT OFFICE AND COMMUNITY BUILDINGS											
Lobby Walls & Ceilings	808 sf	0.65	\$525		5	10	5	15		in 1 Year	Painted surfaces Repainting cycles
Lobby Walls & Ceilings (Green)	808 sf	0.65	\$525	\$0	5	10	5	15		in 1 Year	Painted surfaces Repaint with low-VOC content paint
Lobby Floors	211 sf	5.00	\$1,056		10	15	5	20		in 1 Year	VCT Replacement cycles
Lobby Floors (Green)	211 sf	5.00	\$1,056	\$0	10	20	10			in 1 Year	VCT G2Replace w/ long-life Eco-friendly natural linoleum
OFFICE/COMMUNITY BUILDINGS											
Walls and Ceilings	16,050 sf	0.65	\$10,432		5	10	5	15		in 1 Year	Office/Community Bldg. painted surfaces Repainting cycles
Walls and Ceilings (Green)	16,050 sf	0.65	\$10,433	\$0	5	10	5	15		in 1 Year	Office/Community Bldg. painted surfaces Repaint with low-VOC content paint
Floor Covering-Carpet	1,312 sf	2.00	\$2,624		10	10	1	11		in 1 Year	Standard olefin carpet Replacement cycles
Floor Covering-Carpet (Green)	1,312 sf	3.00	\$3,936	\$1,312	10	20	1			in 1 Year	Standard olefin carpet G3Replace with carpet tile
Floor Covering-VCT	3,269 ea	5.00	\$16,347		10	15	5	20		in 1 Year	VCT flooring Replacement cycles
Floor Covering-VCT (Green)	3,269 ea	5.00	\$16,345	-\$2	10	20	10			in 1 Year	VCT flooring G2Replace w/ long-life Eco-friendly natural linoleum
Com Bldg. Kitchen Equipment	1 ls	5000.00	\$5,000		varies	5	1	6	11	16	in 1 Year Periodic allowances to replace/repair
Com Bldg. Kitchen Equipment (Green)	ea										
RESTROOMS OFFICE/COMMUNITY BUILDINGS											
Walls and Ceilings	1,151 sf	0.65	\$748		5	10	5	15		in 1 Year	Painted surfaces Repainting cycles
Walls and Ceilings (Green)	1,151 sf	0.65	\$748	\$0	5	10	5	15		in 1 Year	Painted surfaces Repaint with low-VOC content paint
Floor Covering-VCT	219 sf	5.00	\$1,093		10	15	5	20		in 1 Year	VCT flooring Replacement cycles
Floor Covering-VCT (Green)	219 sf	5.00	\$1,093	\$0	10	20	10			in 1 Year	VCT flooring G2Replace w/ long-life Eco-friendly natural linoleum
Restroom Fixtures	3 sets	250.00	\$750		varies	30	10			in 1 Year	Toilets and wall hung sinks Costs to replace
Restroom Fixtures (Green)	ea										
Restroom Accessories	3 sets				varies	10					Standard restroom accessories Operating
Miscellaneous	ea										
Miscellaneous (Green)	ea										

BUILDING ARCHITECTURE--continued

Costs projected at 3%

Replacement Items	Year 1 2019	Year 2 2020	Year 3 2021	Year 4 2022	Year 5 2023	Year 6 2024	Year 7 2025	Year 8 2026	Year 9 2027	Year 10 2028	Year 11 2029	Year 12 2030	Year 13 2031	Year 14 2032	Year 15 2033	Year 16 2034	Year 17 2035	Year 18 2036	Year 19 2037	Year 20 2038
LOBBIES AT OFFICE AND COMMUNITY BUILDINGS																				
Lobby Walls & Ceilings	\$0	\$0	\$0	\$0	\$591	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$795	\$0	\$0	\$0	\$0	\$0
Lobby Walls & Ceilings (Green)	\$0	\$0	\$0	\$0	\$591	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$794	\$0	\$0	\$0	\$0	\$0
Lobby Floors	\$0	\$0	\$0	\$0	\$1,189	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,852
Lobby Floors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,378	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
OFFICE/COMMUNITY BUILDINGS																				
Walls and Ceilings	\$0	\$0	\$0	\$0	\$11,742	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$15,780	\$0	\$0	\$0	\$0	\$0
Walls and Ceilings (Green)	\$0	\$0	\$0	\$0	\$11,742	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$15,780	\$0	\$0	\$0	\$0	\$0
Floor Covering-Carpet	\$2,624	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3,527	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Floor Covering-Carpet (Green)	\$3,936	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Floor Covering-VCT	\$0	\$0	\$0	\$0	\$18,398	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$28,664
Floor Covering-VCT (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$21,327	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Com Bldg. Kitchen Equipment	\$5,000	\$0	\$0	\$0	\$0	\$5,796	\$0	\$0	\$0	\$0	\$6,720	\$0	\$0	\$0	\$0	\$7,790	\$0	\$0	\$0	\$0
Com Bldg. Kitchen Equipment (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
RESTROOMS OFFICE/COMMUNITY BUILDINGS																				
Walls and Ceilings	\$0	\$0	\$0	\$0	\$842	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,132	\$0	\$0	\$0	\$0	\$0
Walls and Ceilings (Green)	\$0	\$0	\$0	\$0	\$842	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,132	\$0	\$0	\$0	\$0	\$0
Floor Covering-VCT	\$0	\$0	\$0	\$0	\$1,230	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,916
Floor Covering-VCT (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,426	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Restroom Fixtures	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$979	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Restroom Fixtures (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Restroom Accessories	\$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

Replacement Items	Quantity	Cost / Unit 2019.00	Total Cost in 2019 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)		Notes
LIVING AREA FINISHES									
Unit Hallway Doors	_____ ea	_____	_____	_____	_____	_____	_____	_____	Hallway door incl. in Building Architectural section
Unit Interior Doors	1,006 ea	65.00	\$65,390	_____	varies	25	1	over 50 Years	Hollow-core passage doors Annual allowances to replace as needed
Unit Closet Doors	1,606 ea	65.00	\$104,390	_____	varies	25	1	over 50 Years	Hollow-core closet doors Annual allowances to replace as needed
Unit Walls and Ceilings	829,975 sf	_____	_____	_____	varies	5	_____	_____	Painted surfaces
Unit Walls and Ceilings (Green)	829,975 sf	_____	_____	_____	varies	5	_____	_____	Repaint with low-VOC content paint
Living Area Floors	142,716 sf	5.00	\$713,581	_____	varies	10	1 11	over 10 Years	VCT flooring Replacement cycles
Living Area Floors (Green)	142,716 sf	5.00	\$713,581	\$0	varies	20	1	over 10 Years	VCT flooring G4 Replace w/long-life Eco-friendly natural linoleum tile
Living Area Floors	_____ sf	_____	_____	_____	_____	_____	_____	_____	_____
Living Area Floors (Green)	_____ sf	_____	_____	_____	_____	_____	_____	_____	_____
BATHROOMS									
Bathroom Floors	8,368 sf	5.00	\$41,841	_____	67	10	1 11	over 10 Years	Many floors original ceramic tile Being replaced with VCT as-needed
Bathroom Floors (Green)	8,368 sf	5.00	\$41,841	\$0	67	35	1	over 10 Years	When ceramic tile is replaced G4 Install long-life Eco-friendly natural linoleum tile
Bathtub and Shower	300 ea	1800.00	\$540,000	_____	67	35	3	over 4 Years	Enameled steel tubs w/ceramic tile surrounds Costs to replace
Bathtub and Shower (Green)	_____ ea	_____	_____	_____	_____	_____	_____	_____	_____
Bathroom Vanity	314 ea	475.00	\$149,150	_____	27	30	3	over 4 Years	Wood HUD severe use models w/plastic laminated tops & drop in sinks. Costs to replace
Bathroom Vanity (Green)	_____ ea	_____	_____	_____	_____	_____	_____	_____	_____
Bathroom Sinks	_____ ea	_____	_____	_____	_____	_____	_____	_____	Sink costs included with vanity costs.
Bathroom Toilets	314 ea	150.00	\$47,100	_____	27	30	3	over 4 Years	1.6-GPF vitreous china toilets Costs to replace
Bathroom Toilets (Green)	314 ea	195.00	\$61,230	\$14,130	27	30	1	over 4 Years	LCC analysis recommends replacement in Year 1 1.6-GPF vitreous china toilets E8 Replace with Flapper less toilet to reduce water waste
Ventilation & Exhaust	_____ ea	_____	_____	_____	_____	_____	_____	_____	_____
Ventilation & Exhaust (Green)	_____ ea	_____	_____	_____	_____	_____	_____	_____	_____
Accessories	_____ ea	_____	_____	_____	_____	_____	_____	_____	_____

Costs projected at 3%

Replacement Items	Year 1 2019	Year 2 2020	Year 3 2021	Year 4 2022	Year 5 2023	Year 6 2024	Year 7 2025	Year 8 2026	Year 9 2027	Year 10 2028	Year 11 2029	Year 12 2030	Year 13 2031	Year 14 2032	Year 15 2033	Year 16 2034	Year 17 2035	Year 18 2036	Year 19 2037	Year 20 2038
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	\$1,308	\$1,347	\$1,387	\$1,429	\$1,472	\$1,516	\$1,562	\$1,608	\$1,657	\$1,706	\$1,758	\$1,810	\$1,865	\$1,921	\$1,978	\$2,038	\$2,099	\$2,162	\$2,226	\$2,293
Unit Closet Doors	\$2,088	\$2,150	\$2,215	\$2,281	\$2,350	\$2,420	\$2,493	\$2,568	\$2,645	\$2,724	\$2,806	\$2,890	\$2,977	\$3,066	\$3,158	\$3,253	\$3,350	\$3,451	\$3,554	\$3,661
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	\$71,358	\$73,499	\$75,704	\$77,975	\$80,314	\$82,724	\$85,205	\$87,761	\$90,394	\$93,106	\$95,899	\$98,776	\$101,740	\$104,792	\$107,935	\$111,174	\$114,509	\$117,944	\$121,482	\$125,127
Living Area Floors (Green)	\$71,358	\$73,499	\$75,704	\$77,975	\$80,314	\$82,724	\$85,205	\$87,761	\$90,394	\$93,106	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Living Area Floors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Living Area Floors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
BATHROOMS																				
Bathroom Floors	\$4,184	\$4,310	\$4,439	\$4,572	\$4,709	\$4,851	\$4,996	\$5,146	\$5,300	\$5,459	\$5,623	\$5,792	\$5,966	\$6,144	\$6,329	\$6,519	\$6,714	\$6,916	\$7,123	\$7,337
Bathroom Floors (Green)	\$4,184	\$4,310	\$4,439	\$4,572	\$4,709	\$4,851	\$4,996	\$5,146	\$5,300	\$5,459	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathtub and Shower	\$0	\$0	\$143,222	\$147,518	\$151,944	\$156,502	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
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	\$39,558	\$40,745	\$41,967	\$43,226	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathroom Vanity (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathroom Sinks	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathroom Toilets	\$0	\$0	\$12,492	\$12,867	\$13,253	\$13,650	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathroom Toilets (Green)	\$15,308	\$15,767	\$16,240	\$16,727	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ventilation & Exhaust	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ventilation & Exhaust (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Accessories	\$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 2019 \$	Total Cost in 2019 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)				Notes
KITCHENS											
Kitchen Floors	27,575 sf	5.00	137,876		varies	10	1	11	over 10 Years	VCT Replacement cycles	
Kitchen Floors (Green)	27,575 sf	5.00	137,876	\$0	varies	20	1		over 10 Years	VCT G4Replace w/long-life, Eco Friendly natural linoleum tile	
Kitchen Cabinets	300 ea	3000.00	900,000		27	30	3		over 4 Years	Wood HUD severe use type Costs to replace	
Kitchen Cabinets (Green)	ea										
Kitchen Cabinets	ea										
Kitchen Cabinets (Green)	ea										
Kitchen Countertops	300 ea	450.00	135,000		varies	10	3	13	over 4 Years	Plastic laminate on particleboard Replace concurrent with cabinets	
Kitchen Countertops (Green)	300 ea	800.00	240,000	\$105,000	varies	30	3		over 4 Years	Plastic laminate on particleboard G5Replace with solid surface countertops	
Range	300 ea	650.00	195,000		15	20	3		over 4 Years	30-inch gas free-standing ranges Costs to replace	
Range (Green)	ea										
Range	ea										
Range (Green)	ea										
Refrigerator	300 ea	650.00	195,000		varies	15	1	16	over 15 Years	Frost free, top freezer, Energy Star rated Annual allowances to replace as needed	
Refrigerator (Green)	ea										
Refrigerator	ea										
Refrigerator (Green)	ea										
Dishwasher	ea										
Dishwasher (Green)	ea										
Rangehood and Vent	300 ea	45.00	13,500		27	20	3		over 4 Years	Recirculating rangehoods Costs to replace	
Disposals	ea										
Fire Extinguishers	600 ea	25.00	15,000		ADD	6	1	7 13 19	in 1 Year	Magnetically hood-mounted dry chemical canisters Costs to add and future replacement cycles	
Fire Extinguishers (Green)	ea										

River Rouge Housing
DWELLING UNITS--continued

Costs projected at 3%

Replacement Items	Year 1 2019	Year 2 2020	Year 3 2021	Year 4 2022	Year 5 2023	Year 6 2024	Year 7 2025	Year 8 2026	Year 9 2027	Year 10 2028	Year 11 2029	Year 12 2030	Year 13 2031	Year 14 2032	Year 15 2033	Year 16 2034	Year 17 2035	Year 18 2036	Year 19 2037	Year 20 2038
KITCHENS																				
Kitchen Floors	\$13,788	\$14,201	\$14,627	\$15,066	\$15,518	\$15,984	\$16,463	\$16,957	\$17,466	\$17,990	\$18,529	\$19,085	\$19,658	\$20,248	\$20,855	\$21,481	\$22,125	\$22,789	\$23,472	\$24,177
Kitchen Floors (Green)	\$13,788	\$14,201	\$14,627	\$15,066	\$15,518	\$15,984	\$16,463	\$16,957	\$17,466	\$17,990	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Kitchen Cabinets	\$0	\$0	\$238,703	\$245,864	\$253,239	\$260,837	\$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 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	\$35,805	\$36,880	\$37,986	\$39,126	\$0	\$0	\$0	\$0	\$0	\$0	\$48,119	\$49,563	\$51,050	\$52,581	\$0	\$0	\$0	\$0
Kitchen Countertops (Green)	\$0	\$0	\$63,654	\$65,564	\$67,531	\$69,556	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Range	\$0	\$0	\$51,719	\$53,270	\$54,869	\$56,515	\$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
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	\$13,000	\$13,390	\$13,792	\$14,205	\$14,632	\$15,071	\$15,523	\$15,988	\$16,468	\$16,962	\$17,471	\$17,995	\$18,535	\$19,091	\$19,664	\$20,254	\$20,861	\$21,487	\$22,132	\$22,796
Refrigerator (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Refrigerator	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$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	\$3,581	\$3,688	\$3,799	\$3,913	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Disposals	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Fire Extinguishers	\$15,000	\$0	\$0	\$0	\$0	\$0	\$17,911	\$0	\$0	\$0	\$0	\$0	\$21,386	\$0	\$0	\$0	\$0	\$0	\$25,536	\$0
Fire Extinguishers (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 2019 \$	Total Cost in 2019 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)	Notes
IN-UNIT MECHANICAL								
Unit Warm Air Furnaces	300 ea	1250.00	\$375,000		15	20	5 over 4 Years	Goodman gas-fired condensing 80-MBH/Eff-95% Costs to replace
Unit Warm Air Furnaces (Green)	300 ea							Goodman gas-fired condensing 80-MBH/Eff-95% Replace with highest eff rated models available
Unit Thermostats	300 ea				15	20		Wall mounted Operating
Unit Thermostats (Green)	ea							
Unit Air Conditioning	If							
Unit Air Conditioning (Green)	If							
Unit Radiation	ea							
Unit Radiation (Green)	ea							
Unit Domestic Hot Water	300 ea	900.00	\$270,000		varies	10	1 11 over 10 Years	Various maker 40-gallon/34-MBH gas-fired Annual allowances to replace as-needed
Unit Domestic Hot Water (Green)	ea							
Miscellaneous	ea							
Miscellaneous (Green)	ea							
IN-UNIT ELECTRICAL								
Unit Electrical Panel	300 ea	900.00	\$270,000		67	50	1 over 4 Years	Stab-lock type circuit breakers Costs to replace panels
Unit Wiring	1 ls				67	75		Copper Monitor
Unit Security Call System	ea							
Unit Smoke/Fire Detection	1,088 ea	45.00	\$48,960		varies	10	1 11 over 10 Years	Hardwired detectors in living areas and bedrooms Annual allowances to replace as-needed
Unit Lighting	1,552 If	Average 100.00	\$155,200		varies	15	1 16 over 15 Years	Incandescent fixtures Costs to replace as-needed
Unit Lighting (Green)	1,552 If	125.00	\$194,000	\$38,800	varies	20	1 over 10 Years	Incandescent fixtures E9 Replace with efficient long-life LED fixtures
Unit Lighting	ea							
Unit Lighting (Green)	ea							
Miscellaneous	ea							

River Rouge Housing
DWELLING UNITS--continued

Costs projected at 3%

Replacement Items	Year 1 2019	Year 2 2020	Year 3 2021	Year 4 2022	Year 5 2023	Year 6 2024	Year 7 2025	Year 8 2026	Year 9 2027	Year 10 2028	Year 11 2029	Year 12 2030	Year 13 2031	Year 14 2032	Year 15 2033	Year 16 2034	Year 17 2035	Year 18 2036	Year 19 2037	Year 20 2038
IN-UNIT MECHANICAL																				
Unit Warm Air Furnaces	\$0	\$0	\$0	\$0	\$105,516	\$108,682	\$111,942	\$115,301	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Warm Air Furnaces (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Thermostats	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Thermostats (Green)	\$0	\$0	\$0	\$0	\$0	\$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	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Radiation (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Domestic Hot Water	\$27,000	\$27,810	\$28,644	\$29,504	\$30,389	\$31,300	\$32,239	\$33,207	\$34,203	\$35,229	\$36,286	\$37,374	\$38,496	\$39,650	\$40,840	\$42,065	\$43,327	\$44,627	\$45,966	\$47,345
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	\$67,500	\$69,525	\$71,611	\$73,759	\$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	\$4,896	\$5,043	\$5,194	\$5,350	\$5,510	\$5,676	\$5,846	\$6,021	\$6,202	\$6,388	\$6,580	\$6,777	\$6,981	\$7,190	\$7,406	\$7,628	\$7,857	\$8,092	\$8,335	\$8,585
Unit Lighting	\$10,347	\$10,657	\$10,977	\$11,306	\$11,645	\$11,995	\$12,354	\$12,725	\$13,107	\$13,500	\$13,905	\$14,322	\$14,752	\$15,194	\$15,650	\$16,120	\$16,603	\$17,101	\$17,615	\$18,143
Unit Lighting (Green)	\$19,400	\$19,982	\$20,581	\$21,199	\$21,835	\$22,490	\$23,165	\$23,860	\$24,575	\$25,313	\$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

Simple Payback Analysis

EWCM

#1

Replace Community Building Boiler

Peerless gas-fired atmospheric 450-MBH Efficiency ~75% 27-years old. Energy calculations are from the Energy Star.org alculator

Replacement Costs

	Type	Cost
A. Proposed Conventional:	In-kind replacement	\$11,250.00
B. Proposed Green:	Efficient condensing ~96% EFF	\$13,500.00
C. Incremental Cost Between Proposed Conventional and Proposed Green:		\$2,250.00

Boiler Efficiencies

A. Existing Efficiency:	75%
B. Conventional Efficiency:	80%
C. Green Efficiency:	96%

Annual Utility Cost

	Existing	Conventional	Green
	222,400,000 btus	213,800,000 btus	173,700,000 btus
	2224.00 therms	2138.00 therms	1737.00 therms
Utility Cost	\$0.69 /therm	\$0.69 /therm	\$0.69 /therm
Heating Cost	\$1,538.05	\$1,478.58	\$1,201.26

Annual Savings: Existing to Conventional

Savings = \$1,538.05 - \$1,478.58 = \$59.48 /yr

Annual Savings: Conventional to Green

Savings = \$1,478.58 - \$1,201.26 = \$277.32 /yr

Annual Savings: Existing to Green

Savings = \$59.48 + \$277.32 = \$336.79 /yr

Simple Payback: Conventional

\$11,250.00 / \$59.48 = 189.2 yrs

Simple Payback: Green

\$13,500.00 / \$336.79 = 40.1 yrs

Incremental Payback: Conventional to Green

\$2,250.00 / \$277.32 = 8.1 yrs

Simple Payback Analysis

EWCM

#2

Replace Office Building HVAC Unit

2.5-Ton Packaged roof top unit (RTU). Energy calulations derived using the Energy Star.org calculator.

Replacement Costs

	Type	Cost
A. Proposed Conventional:	Relpace with a SEER 13 rated unit	\$3,750.00
B. Proposed Green:	Replace with a SEER 18 rated unit	\$3,980.00
C. Incremental Cost Between Proposed Conventional and Proposed Green:		\$230.00

Air Conditioning SEER (Seasonal Energy Efficiency Ratio)

A. Existing SEER:	10.0
B. Conventional SEER:	13.0
C. Green SEER:	18.0

Annual Utility Cost

	Existing	Conventional	Green
	42,066,548 btus	40,548,208 btus	30,841,068 btus
	12329.00 kWh	11884.00 kWh	9039.00 kWh
Utility Cost	\$0.14 /kWh	\$0.14 /kwh	\$0.14 /kwh
Heating Cost	\$1,686.48	\$1,625.61	\$1,236.44

Annual Savings: Existing to Conventional

$$\text{Savings} = \$1,686.48 - \$1,625.61 = \$60.87/\text{yr}$$

Annual Savings: Conventional to Green

$$\text{Savings} = \$1,625.61 - \$1,236.44 = \$389.17/\text{yr}$$

Annual Savings: Existing to Green

$$\text{Savings} = \$60.87 + \$389.17 = \$450.04/\text{yr}$$

Simple Payback: Conventional

$$\$3,750.00 / \$60.87 = 61.6 \text{ yrs}$$

Simple Payback: Green

$$\$3,980.00 / \$450.04 = 8.8 \text{ yrs}$$

Incremental Payback: Conventional to Green

$$\$230.00 / \$389.17 = 0.6 \text{ yrs}$$

Simple Payback Analysis

EWCM

#3

Replace Office HVAC Units

Two 3-Ton Packaged roof top units (RTUs)

Replacement Costs

	Type	Cost
A. Proposed Conventional:	Install SEER 13 Units	\$9,000.00
B. Proposed Green:	Install SEER 18 Units	\$9,750.00
C. Incremental Cost Between Proposed Conventional and Proposed Green:		\$750.00

Air Conditioning SEER (Seasonal Energy Efficiency Ratio)

A. Existing SEER:	10.0
B. Conventional SEER:	13.0
C. Green SEER:	18.0

Annual Utility Cost

	Existing	Conventional	Green
	50,477,128 btus	48,658,532 btus	37,009,964 btus
	14794.00 kWh	14261.00 kWh	10847.00 kWh
Utility Cost	\$0.14 /kWh	\$0.14 /kWh	\$0.14 /kWh
Heating Cost	\$2,023.67	\$1,950.76	\$1,483.76

Annual Savings: Existing to Conventional

$$\text{Savings} = \$2,023.67 - \$1,950.76 = \$72.91/\text{yr}$$

Annual Savings: Conventional to Green

$$\text{Savings} = \$1,950.76 - \$1,483.76 = \$467.00/\text{yr}$$

Annual Savings: Existing to Green

$$\text{Savings} = \$72.91 + \$467.00 = \$539.91/\text{yr}$$

Simple Payback: Conventional

$$\$9,000.00 / \$72.91 = 123.4 \text{ yrs}$$

Simple Payback: Green

$$\$9,750.00 / \$539.91 = 18.1 \text{ yrs}$$

Incremental Payback: Conventional to Green

$$\$750.00 / \$467.00 = 1.6 \text{ yrs}$$

Simple Payback Analysis

EWCM

#4

Replace Community Building HVAC Units

One, 10-Ton Central Station RTU Aie Conditioner

Replacement Costs

	Type	Cost
A. Proposed Conventional:	Install a SEER 13 Rated Unit	\$15,000.00
B. Proposed Green:	Install a SEER 18 Rated unit	\$18,000.00
C. Incremental Cost Between Proposed Conventional and Proposed Green:		\$3,000.00

Air Conditioning SEER (Seasonal Energy Efficiency Ratio)

A. Existing SEER:	10.0
B. Conventional SEER:	13.0
C. Green SEER:	18.0

Annual Utility Cost

	Existing	Conventional	Green
	168,259,368 btus	162,196,244 btus	123,367,684 btus
	49314.00 kWh	47537.00 kWh	36157.00 kWh
Utility Cost	\$0.14 /kWh	\$0.14 /kWh	\$0.14 /kWh
Heating Cost	\$6,745.66	\$6,502.59	\$4,945.92

Annual Savings: Existing to Conventional

$$\text{Savings} = \$6,745.66 - \$6,502.59 = \$243.08/\text{yr}$$

Annual Savings: Conventional to Green

$$\text{Savings} = \$6,502.59 - \$4,945.92 = \$1,556.67/\text{yr}$$

Annual Savings: Existing to Green

$$\text{Savings} = \$243.08 + \$1,556.67 = \$1,799.75/\text{yr}$$

Simple Payback: Conventional

$$\$15,000.00 / \$243.08 = 61.7 \text{ yrs}$$

Simple Payback: Green

$$\$18,000.00 / \$1,799.75 = 10.0 \text{ yrs}$$

Incremental Payback: Conventional to Green

$$\$3,000.00 / \$1,556.67 = 1.9 \text{ yrs}$$

Simple Payback Analysis

EWCM

#5

Replace Community Building Air Conditioning

One, 6.6-Ton Central Station RTU Air Conditioner

Replacement Costs

	Type	Cost
A. Proposed Conventional:	Install a SEER 13 unit	\$9,900.00
B. Proposed Green:	Install a SEER 18 unit	\$11,880.00
C. Incremental Cost Between Proposed Conventional and Proposed Green:		\$1,980.00

Air Conditioning SEER (Seasonal Energy Efficiency Ratio)

A. Existing SEER:	10.0
B. Conventional SEER:	13.0
C. Green SEER:	18.0

Annual Utility Cost

	Existing	Conventional	Green
	111,050,364 btus	107,048,088 btus	81,420,556 btus
	32547.00 kWh	31374.00 kWh	23863.00 kWh
Utility Cost	\$0.14 /kWh	\$0.14 /kWh	\$0.14 /kWh
Heating Cost	\$4,452.10	\$4,291.65	\$3,264.22

Annual Savings: Existing to Conventional

$$\text{Savings} = \$4,452.10 - \$4,291.65 = \$160.45/\text{yr}$$

Annual Savings: Conventional to Green

$$\text{Savings} = \$4,291.65 - \$3,264.22 = \$1,027.43/\text{yr}$$

Annual Savings: Existing to Green

$$\text{Savings} = \$160.45 + \$1,027.43 = \$1,187.88/\text{yr}$$

Simple Payback: Conventional

$$\$9,900.00 / \$160.45 = 61.7 \text{ yrs}$$

Simple Payback: Green

$$\$11,880.00 / \$1,187.88 = 10.0 \text{ yrs}$$

Incremental Payback: Conventional to Green

$$\$1,980.00 / \$1,027.43 = 1.9 \text{ yrs}$$

Simple Payback Analysis

EWCM

#6

Convert Lighting -Exterior Common Area Lighting

Replacement Costs

A. Total cost to convert exterior incandescent lighting to LED lighting:

\$129,000.00

Utility Cost

Electricity: **\$0.14**
Natural Gas: **\$0.69**

Existing Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage \$/Year
Type 1:	Exterior Common Areas	75	1,032	12	365	339,012	\$46,373.45
Type 2:						0	\$0.00
Type 3:						0	\$0.00
Type 4:						0	\$0.00
Type 5:						0	\$0.00
Total:						339,012	\$46,373.45

Proposed Green Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage \$/Year
Type 1:	Exterior Common Areas	10	1,032	12	365	45,202	\$6,183.13
Type 2:						0	\$0.00
Type 3:						0	\$0.00
Type 4:						0	\$0.00
Type 5:						0	\$0.00
Total:						45,202	\$6,183.13

Annual Electric Savings

1,002,481,085 BTUs
293,810.40 kWh
Savings = 293,810.40 x \$0.14 = \$40,190.32 /yr

Annual Natural Gas Savings¹

0 BTUs
0.00 therms
Savings = 0.00 x \$0.69 = \$0.00 /yr

Annual Net Cost Savings

\$40,190.32 + \$0.00 = \$40,190.32

5. Simple Payback

\$129,000.00 / \$40,190.32 = 3.21 yrs

Additional Notes/Comments:

Simple Payback Analysis

EWCM

#6

Convert Lighting - Interior Common Area Lighting

Replacement Costs

A. Total cost to convert interior incandescent Lighting to LED lighting:

\$7,920.00

Utility Cost

Electricity: \$0.14
Natural Gas: \$0.69

Existing Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage \$/Year
Type 1:	Interior Common Areas	60	66	8	365	11,563	\$1,581.73
Type 2:						0	\$0.00
Type 3:						0	\$0.00
Type 4:						0	\$0.00
Type 5:						0	\$0.00
Total:						11,563	\$1,581.73

Proposed Green Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage \$/Year
Type 1:	Interior Common Areas	5	66	8	365	964	\$131.81
Type 2:						0	\$0.00
Type 3:						0	\$0.00
Type 4:						0	\$0.00
Type 5:						0	\$0.00
Total:						964	\$131.81

Annual Electric Savings

36,165,835 BTUs

10,599.60 kWh

Savings = 10,599.60 x \$0.14 = \$1,449.92 /yr

Annual Natural Gas Savings¹

0 BTUs

0.00 therms

Savings = 0.00 x \$0.69 = \$0.00 /yr

Annual Net Cost Savings

\$1,449.92 + \$0.00 = \$1,449.92

5. Simple Payback

\$7,920.00 / \$1,449.92 = 5.46 yrs

Additional Notes/Comments:

Simple Payback Analysis

EWCM

#7

Replace Toilets - Dwelling Units

Replacement Costs

A. Proposed Conventional	\$45,900.00
B. Proposed Green	\$59,670.00
C. Incremental Cost Between Proposed Conventional and Proposed Green	\$13,770.00

Existing Conditions

A. Total number of existing toilets	314	
B. Average gallons per flush:	2.0	
C. Estimated total number of flushes per day:	8.0	
D. Estimated total daily usage per toilet:	16	gal/day
E. Estimated number of days per year facility in use:	365	
F. Cost of water and sewer:	\$0.0184	(\$/gal)

Proposed Conditions: Conventional Models

A. Total number of toilets	314	
B. Average gallons per flush:	1.6	
C. Estimated total number of flushes per day	8.0	
D. Estimated total daily usage per toilet:	13	gal/day
E. Estimated number of days per year facility in use:	365	
F. Cost of water and sewer:	\$0.0184	(\$/gal)

Proposed Conditions: Green Models

A. Total number of toilets	314	
B. Average gallons per flush:	0.80	
C. Estimated total number of flushes per day	8.0	
D. Estimated total daily usage per toilet:	6	gal/day
E. Estimated number of days per year facility in use:	365	
F. Cost of water and sewer:	\$0.0184	(\$/gal)

Annual Water Use: Existing Models

$$314 \times 16 \times 365 = 1,833,760 \text{ gal/yr}$$

Annual Water Use: Proposed Conventional Models

$$314 \times 13 \times 365 = 1,467,008 \text{ gal/yr}$$

Annual Water Use: Proposed Green Models

$$314 \times 6 \times 365 = 733,504 \text{ gal/yr}$$

Annual Savings: Existing to Proposed Conventional Models

$$1,833,760 - 1,467,008 \times \$0.02 = \$6,764.85 \text{ \$/yr}$$

Annual Savings: Proposed Conventional to Proposed Green Models

$$1,467,008 - 733,504 \times \$0.02 = \$13,529.70 \text{ \$/yr}$$

Annual Savings: Existing to Proposed Green Models

$$\$6,764.85 + \$13,529.70 = \$20,294.55 \text{ \$/yr}$$

Simple Payback: Conventional

$$\$45,900.00 / \$6,764.85 = 6.79 \text{ yrs}$$

Simple Payback: Green

$$\$59,670.00 / \$20,294.55 = 2.94 \text{ yrs}$$

Incremental Payback: Proposed Conventional to Proposed Green Models

$$\$13,770.00 / \$6,764.85 = 2.04 \text{ yrs}$$

Simple Payback Analysis

EWCM

#8

Convert Lighting - DU Interior Lighting

Replacement Costs

A. Total cost to convert Interior incandescent lighting to LED lighting:

\$194,000.00

Utility Cost

Electricity: **\$0.14**
Natural Gas: **\$0.69**

Existing Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage \$/Year
Type 1:	DU Interior Lighting	60	1,552	8	365	271,910	\$37,194.62
Type 2:						0	\$0.00
Type 3:						0	\$0.00
Type 4:						0	\$0.00
Type 5:						0	\$0.00
Total:						271,910	\$37,194.62

Proposed Green Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage \$/Year
Type 1:	DU Interior Lighting LED	6	1,552	8	365	27,191	\$3,719.46
Type 2:						0	\$0.00
Type 3:						0	\$0.00
Type 4:						0	\$0.00
Type 5:						0	\$0.00
Total:						27,191	\$3,719.46

Annual Electric Savings

834,982,456 BTUs
244,719.36 kWh
Savings = 244,719.36 x \$0.14 = \$33,475.16 /yr

Annual Natural Gas Savings¹

0 BTUs
0.00 therms
Savings = 0.00 x \$0.69 = \$0.00 /yr

Annual Net Cost Savings

\$33,475.16 + \$0.00 = \$33,475.16

5. Simple Payback

\$194,000.00 / \$33,475.16 = 5.80 yrs

Additional Notes/Comments:

Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 1

Community Building Heating Boiler

Atmospheric Hydronic Gas-Fired

vs.

Condensing Hydronic Gas-fired

(Conventional Product)

(Green Product)

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term 25

Conventional Product:

Atmospheric Hydronic Gas-Fired

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	Atmospheric Boiler	1	ea	\$11,250.00	\$11,250	25	1	1.0	\$11,250	\$11,250
Utility Cost	Natural Gas	2,224	Therms	\$0.69	\$1,538	1	1	25.0	\$56,079	\$23,066
Total Life Cycle Cost									\$67,329	\$34,316

Energy Savings

Net Life Cycle Cost after Energy Savings									\$67,329	\$34,316

Green Product:

Condensing Hydronic Gas-fired

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	Condensing Boiler	1	ea	\$13,500.00	\$13,500	25	1	1.0	\$13,500	\$13,500
Utility Cost	Natural Gas	1,737	Therms	\$0.69	\$1,201	1	1	25.0	\$43,799	\$18,015
Total Life Cycle Cost									\$57,299	\$31,515

Energy Savings

Net Life Cycle Cost after Energy Savings									\$57,299	\$31,515

ECONOMIC RETURN ANALYSIS

Green NPV	\$2,801
Green IRR	20.7%

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Condensing Hydronic Gas-fired

Override with Green Product? No

Final Product Choice

Green Product: Condensing Hydronic Gas-fired

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

Community Building Heating Boiler

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

Final Product Choice

Green Product:

Condensing Hydronic Gas-fired

Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Condensing Boiler	1	ea	\$13,500.00	\$13,500	25	1	1.0	\$13,500	\$13,500
Utility Cost	Natural Gas	1,737	Therms	\$0.69	\$1,201	1	1	25.0	\$43,799	\$18,015
Total Life Cycle Cost									\$57,299	\$31,515
<i>Energy Savings</i>										
Net Life Cycle Cost after Energy Savings									\$57,299	\$31,515

ECONOMIC RETURN ANALYSIS

Timing NPV	n/a
Timing IRR	n/a

TIMING RECOMMENDATION

Replacement Year:	1
-------------------	---

Notes:

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

Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 2

Office Building HVAC

SEER 13 HVAC unit

vs.

SEER 18 HVAC unit

(Conventional Product)

(Green Product)

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

20

Conventional Product:

SEER 13 HVAC unit

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	SEER 13 HVAC Unit	1	ea	\$3,750.00	\$3,750	20	1	1.0	\$3,750	\$3,750
Utility Cost	Electricity	11,884	kWh	\$0.14	\$1,626	1	1	20.0	\$43,684	\$21,508
Total Life Cycle Cost									\$47,434	\$25,258

Energy Savings

Net Life Cycle Cost after Energy Savings									\$47,434	\$25,258

Green Product:

SEER 18 HVAC unit

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	SEER 18 HVAC Unit	1	ea	\$3,980.00	\$3,980	20	1	1.0	\$3,980	\$3,980
Utility Cost	Electricity	9,039	kWh	\$0.14	\$1,237	1	1	20.0	\$33,226	\$16,359
Total Life Cycle Cost									\$37,206	\$20,339

Energy Savings

Net Life Cycle Cost after Energy Savings									\$37,206	\$20,339

ECONOMIC RETURN ANALYSIS

Green NPV	\$4,919
Green IRR	n/a

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: SEER 18 HVAC unit

Override with Green Product? No

Final Product Choice

Green Product: SEER 18 HVAC unit

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

Office Building HVAC

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product	14
Replacement Year	15

Final Product Choice	
Green Product:	SEER 18 HVAC unit

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	SEER 18 HVAC Unit	1	ea	\$3,980.00	\$3,980	20	1	1.0	\$3,980	\$3,980		
Utility Cost	Electricity	9,039	kWh	\$0.14	\$1,237	1	1	20.0	\$33,226	\$16,359		
Total Life Cycle Cost										\$37,206	\$20,339	
<i>Energy Savings</i>												
Net Life Cycle Cost after Energy Savings										\$37,206	\$20,339	

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	SEER 18 HVAC Unit	1	ea	\$3,980.00	\$3,980	20	15	0.3	\$1,135	\$918		
Utility Cost	Electricity	9,039	kWh	\$0.14	\$1,237	1	15	6.0	\$12,098	\$3,405		

<i>Expenses for Current Product Through Useful Life</i>												
Utility Cost	Electricity	11,884	kWh	\$0.14	\$1,626	1	1	14.0	\$27,778	\$17,032		
Total Life Cycle Cost										\$41,011	\$21,354	
<i>Energy Savings</i>												
Net Life Cycle Cost after Energy Savings										\$41,011	\$21,354	

ECONOMIC RETURN ANALYSIS

Timing NPV	\$1,015
Timing IRR	12.14%

TIMING RECOMMENDATION

Replacement Year:	1
-------------------	---

Notes:

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

Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 3

Office Building HVAC Units (2)

SEER 13 Units

vs.

SEER 18 Units

(Conventional Product)

(Green Product)

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term 20

Conventional Product:

SEER 13 Units

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	SEER 13 Units	2	ea	\$9,000.00	\$18,000	20	1	1.0	\$18,000	\$18,000
Utility Cost	Electricity	14,261	kWh	\$0.14	\$1,951	1	1	20.0	\$52,422	\$25,811
Total Life Cycle Cost									\$70,422	\$43,811

Energy Savings

Net Life Cycle Cost after Energy Savings									\$70,422	\$43,811

Green Product:

SEER 18 Units

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	SEER 18 Units	2	ea	\$9,750.00	\$19,500	20	1	1.0	\$19,500	\$19,500
Utility Cost	Electricity	10,847	kWh	\$0.14	\$1,484	1	1	20.0	\$39,872	\$19,632
Total Life Cycle Cost									\$59,372	\$39,132

Energy Savings

Net Life Cycle Cost after Energy Savings									\$59,372	\$39,132

ECONOMIC RETURN ANALYSIS

Green NPV	\$4,679
Green IRR	49.5%

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: SEER 18 Units

Override with Green Product? No

Final Product Choice

Green Product: SEER 18 Units

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

Office Building HVAC Units (2)

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

4

Replacement Year

5

Final Product Choice

Green Product:

SEER 18 Units

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	SEER 18 Units	2	ea	\$9,750.00	\$19,500	20	1	1.0	\$19,500	\$19,500
Utility Cost	Electricity	10,847	kWh	\$0.14	\$1,484	1	1	20.0	\$39,872	\$19,632
Total Life Cycle Cost									\$59,372	\$39,132

Energy Savings

Net Life Cycle Cost after Energy Savings									\$59,372	\$39,132

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	SEER 18 Units	2	ea	\$9,750.00	\$19,500	20	5	0.8	\$15,109	\$14,547
Utility Cost	Electricity	10,847	kWh	\$0.14	\$1,484	1	5	16.0	\$33,664	\$14,096

Expenses for Current Product Through Useful Life

Utility Cost	Electricity	14,261	kWh	\$0.14	\$1,951	1	1	4.0	\$8,162	\$7,278
Total Life Cycle Cost									\$56,935	\$35,921

Energy Savings

Net Life Cycle Cost after Energy Savings									\$56,935	\$35,921

ECONOMIC RETURN ANALYSIS

Timing NPV	(\$3,210)
Timing IRR	n/a

TIMING RECOMMENDATION

Replacement Year:	5
-------------------	---

Notes:

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

Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 4

Community Building HVAC Unit

SEER 13 Unit

vs.

SEER 18 Unit

(Conventional Product)

(Green Product)

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

20

Conventional Product:

SEER 13 Unit

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	SEER 13 Unit	1	ea	\$15,000.00	\$15,000	20	1	1.0	\$15,000	\$15,000
Utility Cost	Electricity	47,537	kWh	\$0.14	\$6,503	1	1	20.0	\$174,740	\$86,036

Total Life Cycle Cost

\$189,740

\$101,036

Energy Savings

Net Life Cycle Cost after Energy Savings									\$189,740	\$101,036

Green Product:

SEER 18 Unit

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	SEER 18 Unit	1	ea	\$18,000.00	\$18,000	20	1	1.0	\$18,000	\$18,000
Utility Cost	Electricity	36,157	kWh	\$0.14	\$4,946	1	1	20.0	\$132,908	\$65,439

Total Life Cycle Cost

\$150,908

\$83,439

Energy Savings

Net Life Cycle Cost after Energy Savings									\$150,908	\$83,439

ECONOMIC RETURN ANALYSIS

Green NPV	\$17,596
Green IRR	114.1%

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product:	SEER 18 Unit
----------------	--------------

Override with Green Product? No

Final Product Choice

Green Product:	SEER 18 Unit
----------------	--------------

Notes:

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

Energy and Water Conservation Measure (EWCM): # 4

Community Building HVAC Unit

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

Final Product Choice

Green Product:

Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	SEER 18 Unit	1	ea	\$18,000.00	\$18,000	20	1	1.0	\$18,000	\$18,000
Utility Cost	Electricity	36,157	kWh	\$0.14	\$4,946	1	1	20.0	\$132,908	\$65,439
Total Life Cycle Cost									\$150,908	\$83,439
<i>Energy Savings</i>										
Net Life Cycle Cost after Energy Savings									\$150,908	\$83,439

ECONOMIC RETURN ANALYSIS

Timing NPV	n/a
Timing IRR	n/a

TIMING RECOMMENDATION

Replacement Year:

Notes:

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

Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 5

Community Building HVAC Unit

SEER 13 Unit

vs.

SEER 18 Unit

(Conventional Product)

(Green Product)

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term 20

Conventional Product: SEER 13 Unit									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted

Life Cycle Costs

Install/Replace	SEER 13 Unit	1	ea	\$9,900.00	\$9,900	20	1	1.0	\$9,900	\$9,900
Utility Cost	Electricity	31,374	kWh	\$0.14	\$4,292	1	1	20.0	\$115,327	\$56,783
Total Life Cycle Cost									\$125,227	\$66,683

Energy Savings

Net Life Cycle Cost after Energy Savings									\$125,227	\$66,683

Green Product: SEER 18 Unit									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted

Life Cycle Costs

Install/Replace	SEER 18 Unit	1	ea	\$11,880.00	\$11,880	20	1	1.0	\$11,880	\$11,880
Utility Cost	Electricity	23,863	kWh	\$0.14	\$3,264	1	1	20.0	\$87,717	\$43,189
Total Life Cycle Cost									\$99,597	\$55,069

Energy Savings

Net Life Cycle Cost after Energy Savings									\$99,597	\$55,069

ECONOMIC RETURN ANALYSIS

Green NPV	\$11,614
Green IRR	114.1%

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: SEER 18 Unit

Override with Green Product? No

Final Product Choice

Green Product: SEER 18 Unit

Notes:

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

Energy and Water Conservation Measure (EWCM): # 5

Community Building HVAC Unit

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

Final Product Choice

Green Product:

Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	SEER 18 Unit	1	ea	\$11,880.00	\$11,880	20	1	1.0	\$11,880	\$11,880
Utility Cost	Electricity	23,863	kWh	\$0.14	\$3,264	1	1	20.0	\$87,717	\$43,189
Total Life Cycle Cost									\$99,597	\$55,069
<i>Energy Savings</i>										
Net Life Cycle Cost after Energy Savings									\$99,597	\$55,069

ECONOMIC RETURN ANALYSIS

Timing NPV	n/a
Timing IRR	n/a

TIMING RECOMMENDATION

Replacement Year:

Notes:

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

Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 6

Upgrade Common Area Exterior Lighting Fixtures

Incandescent Fixtures

(Conventional Product)

vs.

Dedicated LED Fixtures

(Green Product)

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term 20

Conventional Product:

Incandescent Fixtures

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	Exterior Lighting Fixtures	1,032	ea	\$80.00	\$82,560	15	1	1.3	\$114,673	\$100,745
Utility Cost	Electricity	339,012	kWh	\$0.14	\$46,377	1	1	20.0	\$1,246,163	\$613,568
Total Life Cycle Cost									\$1,360,836	\$714,313

Energy Savings

Net Life Cycle Cost after Energy Savings									\$1,360,836	\$714,313

Green Product:

Dedicated LED Fixtures

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	Exterior Lighting Fixtures	1,032	ea	\$125.00	\$129,000	20	1	1.0	\$129,000	\$129,000
Utility Cost	Electricity	45,202	kWh	\$0.14	\$6,184	1	1	20.0	\$166,157	\$81,810
Total Life Cycle Cost									\$295,157	\$210,810

Energy Savings

Net Life Cycle Cost after Energy Savings									\$295,157	\$210,810

ECONOMIC RETURN ANALYSIS

Green NPV	\$503,503
Green IRR	665.7%

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Dedicated LED Fixtures

Override with Green Product? No

Final Product Choice

Green Product: Dedicated LED Fixtures

Notes:

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

Energy and Water Conservation Measure (EWCM): # 6

Upgrade Common Area Exterior Lighting Fixtures

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

Final Product Choice

Green Product:

Dedicated LED Fixtures

Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Exterior Lighting Fixtures	1,032	ea	\$125.00	\$129,000	20	1	1.0	\$129,000	\$129,000
Utility Cost	Electricity	45,202	kWh	\$0.14	\$6,184	1	1	20.0	\$166,157	\$81,810
Total Life Cycle Cost									\$295,157	\$210,810
<i>Energy Savings</i>										
Net Life Cycle Cost after Energy Savings									\$295,157	\$210,810

ECONOMIC RETURN ANALYSIS

Timing NPV	n/a
Timing IRR	n/a

TIMING RECOMMENDATION

Replacement Year:	1
-------------------	---

Notes:

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

Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 7

Interior Common Area Lighting

Fluorescent Fixtures

vs.

Dedicated LED Fixtures

(Conventional Product)

(Green Product)

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term 20

Conventional Product:

Fluorescent Fixtures

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	Fluorescent Fixtures	66	ea	\$100.00	\$6,600	15	1	1.3	\$9,167	\$8,054
Utility Cost	Electricity	11,563	kWh	\$0.14	\$1,582	1	1	20.0	\$42,504	\$20,928
Total Life Cycle Cost									\$51,671	\$28,981

Energy Savings

Net Life Cycle Cost after Energy Savings									\$51,671	\$28,981

Green Product:

Dedicated LED Fixtures

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	LED Fixtures	66	ea	\$120.00	\$7,920	20	1	1.0	\$7,920	\$7,920
Utility Cost	Electricity	964	kWh	\$0.14	\$132	1	1	20.0	\$3,544	\$1,745
Total Life Cycle Cost									\$11,464	\$9,665

Energy Savings

Net Life Cycle Cost after Energy Savings									\$11,464	\$9,665

ECONOMIC RETURN ANALYSIS

Green NPV	\$19,317
Green IRR	n/a

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Dedicated LED Fixtures

Override with Green Product? No

Final Product Choice

Green Product: Dedicated LED Fixtures

Notes:

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

Energy and Water Conservation Measure (EWCM): # 7

Interior Common Area Lighting

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

Final Product Choice

Green Product: Dedicated LED Fixtures

Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	LED Fixtures	66	ea	\$120.00	\$7,920	20	1	1.0	\$7,920	\$7,920
Utility Cost	Electricity	964	kWh	\$0.14	\$132	1	1	20.0	\$3,544	\$1,745
Total Life Cycle Cost									\$11,464	\$9,665
<i>Energy Savings</i>										
Net Life Cycle Cost after Energy Savings									\$11,464	\$9,665

ECONOMIC RETURN ANALYSIS

Timing NPV	n/a
Timing IRR	n/a

TIMING RECOMMENDATION

Replacement Year: 1

Notes:

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

Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 8

Dwelling Unit Toilets

Standard 1.6-GPF Flapper Types

vs.

.8-GPF Flapperless Types

(Conventional Product)

(Green Product)

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term 30

Conventional Product:

Standard 1.6-GPF Flapper Types

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	Standard Flapper Toilets	314	ea	\$150.00	\$47,100	30	1	1.0	\$47,100	\$47,100
Utility Cost	Water/Sewer	1,467,008	Gallons	\$0.02	\$27,059	1	1	30.0	\$1,287,362	\$443,497
Total Life Cycle Cost									\$1,334,462	\$490,597

Energy Savings

Net Life Cycle Cost after Energy Savings									\$1,334,462	\$490,597

Green Product:

.8-GPF Flapperless Types

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	Flapperless Toilets	341	ea	\$195.00	\$66,495	30	1	1.0	\$66,495	\$66,495
Utility Cost	Water/Sewer	733,504	Gallons	\$0.02	\$13,530	1	1	30.0	\$643,681	\$221,749
Total Life Cycle Cost									\$710,176	\$288,244

Energy Savings

Net Life Cycle Cost after Energy Savings									\$710,176	\$288,244

ECONOMIC RETURN ANALYSIS

Green NPV	\$202,354
Green IRR	240.6%

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: .8-GPF Flapperless Types

Override with Green Product? No

Final Product Choice

Green Product: .8-GPF Flapperless Types

Notes:

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

Energy and Water Conservation Measure (EWCM): # 8

Dwelling Unit Toilets

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product	2
Replacement Year	3

Final Product Choice	
Green Product:	.8-GPF Flapperless Types

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	Flapperless Toilets	341	ea	\$195.00	\$66,495	30	1	1.0	\$66,495	\$66,495		
Utility Cost	Water/Sewer	733,504	Gallons	\$0.02	\$13,530	1	1	30.0	\$643,681	\$221,749		
Total Life Cycle Cost										\$710,176	\$288,244	

Energy Savings

Net Life Cycle Cost after Energy Savings										\$710,176	\$288,244	

Replacement at End of Remaining Useful Life				Year	3							
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted		
Install/Replace	Flapperless Toilets	341	ea	\$195.00	\$66,495	30	3	0.9	\$60,098	\$59,359		
Utility Cost	Water/Sewer	733,504	Gallons	\$0.02	\$13,530	1	3	28.0	\$616,216	\$195,316		

Expenses for Current Product Through Useful Life

Utility Cost	Water/Sewer	1,467,008	Gallons	\$0.02	\$27,059	1	1	2.0	\$54,931	\$52,866		
Total Life Cycle Cost										\$731,244	\$307,541	

Energy Savings

Net Life Cycle Cost after Energy Savings										\$731,244	\$307,541	

ECONOMIC RETURN ANALYSIS

Timing NPV	\$19,297
Timing IRR	29.30%

TIMING RECOMMENDATION

Replacement Year:	1
-------------------	---

Notes:

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

Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 9

Dwelling Unit Interior Lighting

Incandescent Fixtures

(Conventional Product)

vs.

Dedicated LED Fixtures

(Green Product)

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term 20

Conventional Product:

Incandescent Fixtures

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	Incandescent Fixtures	1,552	ea	\$100.00	\$155,200	15	1	1.3	\$215,567	\$189,385
Utility Cost	Electrify	271,910	kWh	\$0.14	\$37,197	1	1	20.0	\$999,505	\$492,122
Total Life Cycle Cost									\$1,215,072	\$681,507

Energy Savings

Net Life Cycle Cost after Energy Savings									\$1,215,072	\$681,507

Green Product:

Dedicated LED Fixtures

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	LED Fixtures	1,552	ea	\$125.00	\$194,000	20	1	1.0	\$194,000	\$194,000
Utility Cost	Electricity	27,191	kWh	\$0.14	\$3,720	1	1	20.0	\$99,951	\$49,212
Total Life Cycle Cost									\$293,951	\$243,212

Energy Savings

Net Life Cycle Cost after Energy Savings									\$293,951	\$243,212

ECONOMIC RETURN ANALYSIS

Green NPV	\$438,295
Green IRR	650.9%

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Dedicated LED Fixtures

Override with Green Product? No

Final Product Choice

Green Product: Dedicated LED Fixtures

Notes:

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

Energy and Water Conservation Measure (EWCM): # 9

Dwelling Unit Interior Lighting

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

Final Product Choice

Green Product:

Dedicated LED Fixtures

Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	LED Fixtures	1,552	ea	\$125.00	\$194,000	20	1	1.0	\$194,000	\$194,000
Utility Cost	Electricity	27,191	kWh	\$0.14	\$3,720	1	1	20.0	\$99,951	\$49,212
Total Life Cycle Cost									\$293,951	\$243,212
<i>Energy Savings</i>										
Net Life Cycle Cost after Energy Savings									\$293,951	\$243,212

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

Shigled Roof Alternative

Three-tab Asphlt Shingles

vs.

Metal Tile

(Conventional Product)

(Green Product)

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term 100

Conventional Product: Three-tab Asphlt Shingles									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted

Life Cycle Costs

Install/Replace	Asphalt shingles	50,712	sf	\$4.50	\$228,204	20	1	5.0	\$5,157,557	\$369,322
Total Life Cycle Cost									\$5,157,557	\$369,322

Energy Savings

Net Life Cycle Cost after Energy Savings									\$5,157,557	\$369,322

Green Product: Metal Tile									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted

Life Cycle Costs

Install/Replace	Metal Tile	50,712	sf	\$7.00	\$354,984	100	1	1.0	\$354,984	\$354,984
Total Life Cycle Cost									\$354,984	\$354,984

Energy Savings

Net Life Cycle Cost after Energy Savings									\$354,984	\$354,984

ECONOMIC RETURN ANALYSIS

Green NPV	\$14,338
Green IRR	8.4%

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Metal Tile

Override with Green Product? No

Final Product Choice

Green Product: Metal Tile

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

Shigled Roof Alternative

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

Final Product Choice

Green Product:

Metal Tile

Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Metal Tile	50,712	sf	\$7.00	\$354,984	100	1	1.0	\$354,984	\$354,984
Total Life Cycle Cost									\$354,984	\$354,984
<i>Energy Savings</i>										
Net Life Cycle Cost after Energy Savings									\$354,984	\$354,984

ECONOMIC RETURN ANALYSIS

Timing NPV	n/a
Timing IRR	n/a

TIMING RECOMMENDATION

Replacement Year:	1
-------------------	---

Notes:

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

Life Cycle Cost Analysis

Green Measure (GM):

2

Common Area Flooring

Vinyl Composite Tile VCT

vs.

Natural Linoleum Tile

(Conventional Product)

(Green Product)

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term 20

Conventional Product:

Vinyl Composite Tile VCT

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	VCT	10,875	sf	\$5.00	\$54,375	15	1	1.3	\$75,525	\$66,352

Total Life Cycle Cost \$75,525 \$66,352

Energy Savings

--	--	--	--	--	--	--	--	--	--	--

Net Life Cycle Cost after Energy Savings \$75,525 \$66,352

Green Product:

Natural Linoleum Tile

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	Natural Linoleum Tile	10,875	sf	\$5.00	\$54,375	20	1	1.0	\$54,375	\$54,375

Total Life Cycle Cost \$54,375 \$54,375

Energy Savings

--	--	--	--	--	--	--	--	--	--	--

Net Life Cycle Cost after Energy Savings \$54,375 \$54,375

ECONOMIC RETURN ANALYSIS

Green NPV	\$11,977
Green IRR	(6.9%)

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Natural Linoleum Tile

Override with Green Product? No

Final Product Choice

Green Product: Natural Linoleum Tile

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

Common Area Flooring

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

Final Product Choice

Green Product:

Natural Linoleum Tile

Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Natural Linoleum Tile	10,875	sf	\$5.00	\$54,375	20	1	1.0	\$54,375	\$54,375
Total Life Cycle Cost									\$54,375	\$54,375
<i>Energy Savings</i>										
Net Life Cycle Cost after Energy Savings									\$54,375	\$54,375

ECONOMIC RETURN ANALYSIS

Timing NPV	n/a
Timing IRR	n/a

TIMING RECOMMENDATION

Replacement Year:	1
-------------------	---

Notes:

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

Life Cycle Cost Analysis

Green Measure (GM):

3

Upgrade Carpeted Flooring

Standard Olefin Carpet

vs.

Carpet Tile

(Conventional Product)

(Green Product)

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

20

Conventional Product:

Standard Olefin Carpet

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	Olefin Carpet	1,312	sf	\$2.00	\$2,624	10	1	2.0	\$6,150	\$4,257

Total Life Cycle Cost

\$6,150

\$4,257

Energy Savings

Net Life Cycle Cost after Energy Savings									\$6,150	\$4,257

Green Product:

Carpet Tile

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	Carpet Tile	1,312	sf	\$3.00	\$3,936	20	1	1.0	\$3,936	\$3,936

Total Life Cycle Cost

\$3,936

\$3,936

Energy Savings

Net Life Cycle Cost after Energy Savings									\$3,936	\$3,936

ECONOMIC RETURN ANALYSIS

Green NPV	\$321
Green IRR	10.4%

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Carpet Tile

Override with Green Product? No

Final Product Choice

Green Product: Carpet Tile

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

Upgrade Carpeted Flooring

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

Final Product Choice

Green Product:

Carpet Tile

Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Carpet Tile	1,312	sf	\$3.00	\$3,936	20	1	1.0	\$3,936	\$3,936
Total Life Cycle Cost									\$3,936	\$3,936
<i>Energy Savings</i>										
Net Life Cycle Cost after Energy Savings									\$3,936	\$3,936

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):

4

Dwelling Unit Flooring

VCT

vs.

Natural Linoleum Tile

(Conventional Product)

(Green Product)

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

20

Conventional Product:

VCT

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	VCT	178,659	sf	\$5.00	\$893,295	10	1	2.0	\$2,093,809	\$1,449,365

Total Life Cycle Cost

\$2,093,809

\$1,449,365

Energy Savings

--	--	--	--	--	--	--	--	--	--	--

Net Life Cycle Cost after Energy Savings

\$2,093,809

\$1,449,365

Green Product:

Natural Linoleum Tile

Cost over Life Cycle (EUL)

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

Life Cycle Costs

Install/Replace	Natural Linoleum Tile	178,659	sf	\$5.00	\$893,295	20	1	1.0	\$893,295	\$893,295

Total Life Cycle Cost

\$893,295

\$893,295

Energy Savings

--	--	--	--	--	--	--	--	--	--	--

Net Life Cycle Cost after Energy Savings

\$893,295

\$893,295

ECONOMIC RETURN ANALYSIS

Green NPV	\$556,070
Green IRR	n/a

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product:	Natural Linoleum Tile
----------------	-----------------------

Override with Green Product?

No

Final Product Choice

Green Product:	Natural Linoleum Tile
----------------	-----------------------

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

Dwelling Unit Flooring

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

Final Product Choice

Green Product:

Natural Linoleum Tile

Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Natural Linoleum Tile	178,659	sf	\$5.00	\$893,295	20	1	1.0	\$893,295	\$893,295
Total Life Cycle Cost									\$893,295	\$893,295
<i>Energy Savings</i>										
Net Life Cycle Cost after Energy Savings									\$893,295	\$893,295

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):

5

Kthchen Counter Upgrade

Plactic Laminate on Partivleboard

vs.

Solid Surface Countertops

(Conventional Product)

(Green Product)

STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term 30

Conventional Product: Plactic Laminate on Partivleboard									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted

Life Cycle Costs

Install/Replace	Plactic Laminate	300	ea	\$450.00	\$135,000	10	1	3.0	\$560,254	\$271,349
Total Life Cycle Cost									\$560,254	\$271,349

Energy Savings

Net Life Cycle Cost after Energy Savings									\$560,254	\$271,349

Green Product: Solid Surface Countertops									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted

Life Cycle Costs

Install/Replace	Solid Surface Countertops	300	ea	\$800.00	\$240,000	30	1	1.0	\$240,000	\$240,000
Total Life Cycle Cost									\$240,000	\$240,000

Energy Savings

Net Life Cycle Cost after Energy Savings									\$240,000	\$240,000

ECONOMIC RETURN ANALYSIS

Green NPV	\$31,349
Green IRR	10.1%

PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product:	Solid Surface Countertops
----------------	---------------------------

Override with Green Product? No

Final Product Choice

Green Product:	Solid Surface Countertops
----------------	---------------------------

Notes:

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

Green Measure (GM):

5

Kthchen Counter Upgrade

STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

Final Product Choice

Green Product:

Solid Surface Countertops

Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Solid Surface Contertops	300	ea	\$800.00	\$240,000	30	1	1.0	\$240,000	\$240,000
Total Life Cycle Cost									\$240,000	\$240,000
<i>Energy Savings</i>										
Net Life Cycle Cost after Energy Savings									\$240,000	\$240,000

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.

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,

A handwritten signature in black ink, appearing to read "Bob Labadini", is written over a horizontal line.

Bob Labadini

Name

Senior Associate/Mechanical Specialist

Title

June 29, 2018

Date