



RAD GREEN PCA REPORT

HOUSING AUTHORITY OF BERGEN COUNTY

One Bergen County Plaza, Floor 2
Hackensack, New Jersey 07601
George Stavrou



RAD PROGRAM GREEN PHYSICAL CONDITION ASSESSMENT of HIGHLAND VIEW APARTMENTS

300 Highland Avenue
Palisades Park, New Jersey 07650

PREPARED BY:**EMG**

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EMG Project #: 107534.13R-004.306
Date of Report: October 7, 2014
On site Date: March 6, 2014

GREEN RECOMMENDATIONS AT A GLANCE

GREEN CONSERVATION MEASURE	RECOMMEND FOR REHABILITATION				
	Already Exists	N/A	Yes	No	Report Reference / Comment
BUILDING ENVELOPE					
Install EnergyStar Windows			✓		Section 3.3.3
Install EnergyStar Sliding Doors		✓			Section 3.3.3
Install Storm Windows		✓			Section 3.3.3
Install Window Sun Shades			✓		Section 3.3.3
Install Additional Thermal Insulation			✓		Section 3.3.4
Install Vegetative Roofing			✓		Section 3.3.4
Install EnergyStar Rated Reflective Metal			✓		Section 3.3.4
Install EnergyStar Rated Asphalt Shingle		✓			Section 3.3.4
Convert Carpeted Surfaces to Smooth-and-Cleanable Surfaces			✓		Section 3.7.2
Replace Siding with Cementitious (cement fiber) Siding		✓			Section 3.3.2
Implement Air Leakage Control			✓		Section 3.3.2
MECHANICAL SYSTEMS	Already Exists	N/A	Yes	No	Report Reference / Comment
Install Vent Dampers	✓				Section 3.4.1 and 3.4.2
Convert Equipment to Electronic Ignition	✓				Section 3.4.1 and 3.4.2
Install Boiler Controls	✓				Section 3.4.2.1
Replace Inefficient Boiler	✓				Section 3.4.2.1
Install Programmable/ Setback Thermostats			✓		Sections 3.4.2.1, 3.4.2.2
Insulate Hot Water or Steam Pipes			✓		Sections 3.4.1.1, 3.4.2.1, 3.4.2.2
Seal and Insulate Ducts			✓		Sections 3.4.2.1, 3.4.2.2
Install Geothermal Heat Pumps		✓			Energy Audit Section 4.4
Install Geothermal System for Heating and Hot Water		✓			Energy Audit Section 4.4
Install Swamp Coolers		✓			Energy Audit 5
Implement Temperature and Humidity Monitoring			✓		Section 4.4
Install Photo-Controls for Exterior Lighting	✓				Section 3.2.6
Upgrade or Replace Inefficient Motors	✓				Energy Audit 5
Install Water-Saving Toilets			✓		Section 3.4.1.2
Install Water Saving Faucets / Showerheads	✓		✓		Section 3.4.1.2
Convert Exterior Lighting Fixtures			✓		Section 3.2.6
Convert Hot Water Heater System to Solar			✓		Energy Audit 4.1
Install EnergyStar Heating Systems			✓		Sections 3.4.2.1, 3.4.2.2
Install EnergyStar Cooling Systems			✓		Sections 3.4.2.1, 3.4.2.2
Install Energy Efficient Water Heaters			✓		Sections 3.4.1.1, 3.4.1.2

GREEN CONSERVATION MEASURE	RECOMMEND FOR REHABILITATION				
	Already Exists	N/A	Yes	No	Report Reference / Comment
MECHANICAL SYSTEMS					
Duct Bathroom Exhaust Fans to Exterior	✓				Section 3.4.2.2
INDOOR AIR QUALITY	Already Exists	N/A	Yes	No	Report Reference / Comment
Green Household Cleaning Products			✓		Section 4.4
Low VOC Carpeting			✓		Section 3.7.2.3
Install Rubber Walk Off Mats			✓		Section 4.4
Install Rubber Stair Treads			✓		Section 4.4
Install Carbon Monoxide Detectors	✓				Section 3.6
ELECTRICAL SYSTEMS	Already Exists	N/A	Yes	No	Report Reference / Comment
Install Power Co-Generation System			✓		Energy Audit 4.3
Install Fuel Cells Owned by a Property		✓			Energy Audit 4.5
Install Wind Power System			✓		Energy Audit 4.2
Install Solar PV System			✓		Energy Audit 4.1
Replace Fluorescent Lamps with EnergyStar Lamps in Apartments	✓				Section 3.7.2.4
Replace Fluorescent Lamps with EnergyStar Lamps in Common Areas	✓		✓		Section 3.7.1.2
Replace Ceiling Fans with EnergyStar Fans in Apartments		✓			Section 3.7.2.4
Install LED Exit Signs	✓				Section 3.6
Install Occupational Sensors for Interior Lighting			✓		Energy Audit 5.3
Install EnergyStar Refrigerators			✓		Section 3.7.2.2
Install EnergyStar Dishwashers		✓			Section 3.7.2.2
Install Lighting Controls in Building			✓		Energy Audit 5.2
RECYCLING / LANDSCAPING	Already Exists	N/A	Yes	No	Report Reference / Comment
Consider Native / Xeriscape Landscaping Plan	✓				Section 3.2.3
Follow Integrated Pest Management Plan			✓		Part III
Implement Household Recycling Plan	✓				Section 3.2.6
Implement Household Hazardous Recycling Plan			✓		Section 3.2.6
Implement Construction Debris Recycling Plan			✓		Section 3.2.6
Porous Paving Surfaces			✓		Section 3.2.2
Install Soil Moisture Sensors			✓		Section 3.2.4
Utility Leak Monitoring Program			✓		Section 3.2.7

GREEN ELEMENT CHECKLIST AT A GLANCE

Checklist for Review of Green Physical Condition Assessment Elements	Report Reference
Sufficiently recent (within 120 days)	Cover Page - Date
Certification that contractor meets all required qualifications	Certification Section Page 1 & Appendix H
Green recommendations to reduce energy usage	Throughout Report
Green recommendations to reduce water usage	Section 3.4.1.2
Green recommendations to safeguard/improve indoor environmental air quality	Section 4.4
Summary of the green alternatives, their costs and cost/health impacts	Section 4.4
Utility/temperature and humidity monitoring costs	Section 4.4
Comments on the financial or health benefits of suggested green alternatives	Section 4.4
Green item recommendation data source and pricing identified	UW Model and Part II Energy Audit Section 1
Payback analysis when recommending replacement of traditional items with green items at the end of their useful life	UW Model
Payback analysis when recommending early replacement of existing items with green(er) items	UW Model
EA recommendations for rehab/reserves/operations	Part II Energy Audit
Evidence of sizing calculation for HVAC, or explanation as to inappropriateness	Energy Audit 3.1
Evidence the PCA contractor tested the duct-work for leakage	Energy Audit 3.1
Lighting replacements for all common areas	Section 3.7.1.2
Evidence of sizing consideration for DHW, if individual	Energy Audit 4
Kitchen and bath exhaust fans (Energy Star if cost-efficient)	Section 3.4.2.2
Carbon monoxide alarms	Section 3.6
Low- or non-VOC paint, caulking, sealants, etc	Sections 3.3.2
Carpet replacement (smooth surface flooring or low-VOC)	Section 3.7.2.3
Rubber walk- mats at entryways	Section 4.4
Rubber stair treads	Section 4.4
Cement board siding	Section 3.3.2
Green management of construction/rehab debris	Section 3.2.6
Green roofing (EnergyStar shingles, reflective roof, garden roof)	Section 3.3.5
Water efficient landscaping	Section 3.2.3
Thermostats (Energy Star)	Sections 3.4.2.1, 3.4.2.2
Checklist for Review of Green Energy Audit Elements	Report Reference
Certification that Energy Auditor meets all required qualifications	Certification Section Page 1 and Appendix H
Prudent energy-related improvements to the property with estimates of cost and financial calculations of probable payback when accounting for the remaining useful life of existing components	Energy Audit Section 5
Recommendations include such variables as operating hours, equipment efficiency, and building and occupant energy demand characteristics	Energy Audit Section 5
Building meets current code, with respect to energy-related items	Section 4.1
Actual costs, appropriate rates and utility configuration of the subject property (rather than sample or profile property)	Energy Audit 2.2
Financial calculations are sufficiently transparent to permit an understanding of the variables considered and their appropriateness	UW Model & Energy Audit Section 5
Recommendation on whether additional insulation, air sealing or caulking and sealing, is a cost-justified expenditure	Energy Audit 5.2
Co-generation, if potentially feasible	Energy Audit 4.3
Current energy usage and costs (kilowatt-hour, therms, utility cost)	Energy Audit 2.3, 2.4, 2.5

Checklist for Review of Green Energy Audit Elements	Report Reference
Recommended energy efficiency improvements	Energy Audit Section 5
Installed cost estimates for recommended energy efficiency measures	Energy Audit Section 5
Expected useful life of recommended energy measures	Energy Audit Section 5
Annual energy saving estimates (consumption and cost reductions)	Energy Audit Section 5
Simple payback period in years for each recommended measures	Energy Audit Section 5
Potential savings in water consumption expenses which are associated with energy improvements	Energy Audit Section 5

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CERTIFICATION

EMG has completed a Green Physical Condition Assessment (GPCA) and a Limited Environmental Screening of the subject property, Highland View Apartments located at 300 Highland Avenue in Palisades Park, Bergen County, New Jersey 07650.

The GPCA was performed at the Client's request using methods and procedures consistent with good commercial and customary practice conforming with:

- Client supplied scope of work for market upgrades.
- Fannie Mae (FNMA) Document FNMA, Delegated Underwriting Services (DUS) Guide Section 3 entitled "Physical Needs Assessment Guidance to the Property Evaluator".
- Green Physical Condition Assessment Statement of Work and Contractor Qualifications.

This report is exclusively for the use and benefit of the Client identified on the first page of this report, the Client's successors, and the HUD RAD office. This report is not for the use or benefit of any other person or entity, nor may it be relied upon by any other person or entity, for any purpose, without the advance written consent of EMG. The purpose for which this report shall be used shall be limited to the use as stated in the contract between the client and EMG.

The opinions EMG expresses in this report were formed utilizing the degree of skill and care ordinarily exercised by any prudent architect or engineer in the same community under similar circumstances. EMG assumes no responsibility or liability for the accuracy of information contained in this report which has been obtained from the Client or the Client's representatives, from other interested parties, or from the public domain. The conclusions presented represent EMG's professional judgment based on information obtained during the course of this assignment. EMG's evaluations, analyses and opinions are not representations regarding the design integrity, structural soundness, or actual value of the property. Factual information regarding operations, conditions and test data provided by the Client or their representative has been assumed to be correct and complete. The conclusions presented are based on the data provided, observations made, and conditions that existed specifically on the date of the assessment.

EMG certifies that EMG has no undisclosed interest in the subject property, EMG's relationship with the Client is at arms-length, and that EMG's employment and compensation are not contingent upon the findings or estimated costs to remedy any deficiencies due to deferred maintenance and any noted component or system replacements.

EMG's PCA cannot wholly eliminate the uncertainty regarding the presence of physical deficiencies and the performance of a subject property's building systems. Preparation of a PCR in accordance with ASTM E2018-08 is intended to reduce, but not eliminate, the uncertainty regarding the potential for component or system failure and to reduce the potential that such component or system may not be initially observed. This GPCA was prepared recognizing the inherent subjective nature of EMG's opinions as to such issues as workmanship, quality of original installation, and estimating the remaining useful life of any given component or system. It should be understood that EMG's suggested remedy may be determined under time constraints, formed without the aid of engineering calculations, testing, exploratory probing, code compliance, the removal of materials, or design considerations. Furthermore, there may be other alternate or more appropriate schemes or methods to remedy the physical deficiency. EMG's opinions are generally formed without detailed knowledge from individuals familiar with the performance of the component or system.

In preparation of this report EMG has used staff who are certified to complete building energy audits by RESNET or BPI (or their training providers), or be a Certified Energy Manager (CEM), or be a State equivalent certified energy auditor, or be a professional architect, or be a registered professional engineer, or be a RESNET certified Home Energy Rater or BPI Certified Building Analyst.

EMG staff has training in evaluating building systems and conditions and continue to receive training on an annual basis. EMG staff is LEED certified or have equivalent certifications. EMG staff takes training classes in environmental and energy subjects on a regular basis with at least 10-hours of education per year.

EMG is not be under suspension or debarment by HUD, or involved as a defendant in criminal or civil action with HUD. EMG has an acceptable record of performance with HUD and has completed hundreds of reports where the residents receive Section 8 or public housing assistance. EMG produces reports that are well regarded in the marketplace in terms of content, timeliness and responsiveness. We have the capacity to complete the project inspection and prepare the report in a time frame acceptable to the Lender/Owner

Any questions regarding this report should be directed to the Program Manager at ebeeghly@emgcorp.com or at 800.733.0660, x7607.

Prepared by: Jill Orlov
Field Observer/Energy Auditor
Project Manager

Reviewed by:



Andrew Hupp, Reviewer for
Edward Beeghly

PART I - GREEN PHYSICAL CONDITION ASSESSMENT

1. EXECUTIVE SUMMARY

The Client contracted with EMG to conduct a Green Physical Condition Assessment (GPCA) and a Limited Environmental Screening consisting of field observations, document review and related due diligence tasks of the subject property, Highland View Apartments located at 300 Highland Avenue in Palisades Park, Bergen County, New Jersey 07650. The PCA was performed on March 6, 2014.

The multi-family property has one, six-story apartment building containing a total of 95 rental apartment units on a site of approximately 0.82 acres. Construction of the property was completed in 1978.

On site amenities consist of outdoor seating areas, laundry facilities and community room which also serves the greater community as cooling and heating centers during emergencies.

Generally, the property was constructed within industry standards, has been well maintained during recent years, and appeared to be in good to fair overall condition. The property representative provided EMG documentation and information regarding maintenance procedures and capital repair/s during the past three years. These upgrades include:

- Electrical switchgear and apartment panel replacement (formerly Federal Pacific)
- Hot water storage tanks

EMG's cost evaluation takes into consideration these previous improvements, the quality as well as the level of maintenance and workmanship at the subject property. EMG observed elements of the reported work during the site reconnaissance.

There are a number of Rehabilitation Needs and Long Term Physical Needs which should be accomplished during the next 20 years as part of the preventive maintenance program. These needs are identified in the various sections of this report and are summarized in the tables.

No Critical Repair items were observed on the property.

1.1. COST TABLES

The cost tables on the following pages identify the Critical Repairs, Rehabilitation Needs and Physical Needs over the Term for the property. The cost methodology is explained in Section 2 and further detail is provided for the individual cost items in report Sections 3 through 4.

Critical Needs Summary

Project Name: Highland View Apartments

Street Address: 300 Highland Avenue

City, State: Palisades Park, New Jersey

Zip Code: 07650

Critical Repair Description	PCA Contractor Estimate	Actual Cost	Included in Rehab or To Be Completed Prior To Closing?

TOTAL: All Critical Needs	\$0	\$0
TOTAL: Critical Needs Included in Rehab	\$0	\$0
TOTAL: Critical Needs To Be Completed Prior To Closing	\$0	\$0

Project Name Highland View Apartments
Street Address 300 Highland Avenue
City, State Palisades Park, New Jersey
Zip Code 07650

Total # of Units: 95
Original PCA Submission Date: 1/0/00
Last Time All Bids (Budget) Updated:

REHABILITATION SPECIFICATIONS IMPROVEMENTS						
WORK						
Work Item (A)		Description of Improvements Work (B)	Quantity (C)	Unit Cost (D)	Budget (E)	Date of Bid Expiration (F)
Rehab Items (Code, Description)		Increase row height to fully display description text				
3.2.2	Storm Water Drainage		0	\$0.00	\$0	
3.2.4	Parking and Driveways	Overlay asphalt pavement	9,125	\$1.25	\$11,406	
3.2.4.01	Sealcoat Asphalt		0	\$0.00	\$0	
3.2.4.02	ADA van stall	Provide ADA parking	1	\$200.00	\$200	
3.2.6	Land and Grounds: Irrigation		0	\$0.00	\$0	
3.2.9.01	ADA access aisle	Provide ADA parking	20	\$5.00	\$100	
3.2.9.02	Site Other #2		0	\$0.00	\$0	
3.2.9.03	Site Other #3		0	\$0.00	\$0	
3.2.9.04	Site Other #4		0	\$0.00	\$0	
3.3.2.2	Exterior Walls		0	\$0.00	\$0	
3.3.2.3	Insulation		0	\$0.00	\$0	
3.3.2.4.01	Sliding Glass Doors		0	\$0.00	\$0	
3.3.2.4.02	Windows		0	\$0.00	\$0	
3.3.2.5.01	Exterior Doors		0	\$0.00	\$0	
3.3.2.5.02	Storm Doors		0	\$0.00	\$0	
3.3.2.9.01	Caulking and Sealant	Replace building caulking and sealants	4,570	\$3.84	\$17,549	
3.3.2.9.02	Bldg Envelope Other #2		0	\$0.00	\$0	
3.3.2.9.03	Bldg Envelope Other #3		0	\$0.00	\$0	
3.3.2.9.04	Bldg Envelope Other #4		0	\$0.00	\$0	
3.3.4	Roofs		0	\$0.00	\$0	
3.4.1.2.01	Domestic Boilers - High Efficiency		0	\$0.00	\$0	
3.4.1.2.02	Domestic hot water storage tanks		0	\$0.00	\$0	
3.4.1.2.03	DHW #3		0	\$0.00	\$0	
3.4.1.2.04	DHW #4		0	\$0.00	\$0	
3.4.1.3.01	Water Savers: Faucets	Install low-flow faucet aerators	190	\$156.85	\$29,802	
3.4.1.3.02	Water Savers: Shower Heads	Install low-flow shower heads	95	\$90.00	\$8,550	
3.4.1.3.03	Water Savers: Toilets	Install water saving toilets - 1.6 gpf	95	\$385.00	\$36,575	
3.4.2.1.01	HVAC Common Area Heating		0	\$0.00	\$0	
3.4.2.1.02	HVAC In-Unit Heating		0	\$0.00	\$0	
3.4.3.1.01	Bath Exhaust Fans		0	\$0.00	\$0	
3.4.3.1.02	HVAC Common Area Cooling		0	\$0.00	\$0	
3.4.3.1.03	HVAC In-Unit Cooling		0	\$0.00	\$0	
3.4.9.01	Programmable Thermostats		0	\$0.00	\$0	
3.4.9.02	Condensing Unit 7.5 tons		0	\$0.00	\$0	
3.4.9.03	Condensing Unit 15 tons		0	\$0.00	\$0	
3.4.9.04	Thru the Wall AC unit		0	\$0.00	\$0	
3.5	Elevators		0	\$0.00	\$0	
3.5.01	Elevators Cab Interiors		0	\$0.00	\$0	
3.6.01	CO Detectors/Alarms		0	\$0.00	\$0	
3.6.02	Smoke Detectors	Install smoke detectors where required	96	\$347.00	\$33,312	
3.6.03	Life Safety Other #1		0	\$0.00	\$0	
3.7.1.01	Common Area Floor Coverings		0	\$0.00	\$0	
3.7.1.02	Common Area Interior Lighting Bulbs		0	\$0.00	\$0	
3.7.1.03	Common Area Interior Lighting Fixtures	Install T-8 lighting in common areas	60	\$78.00	\$4,680	
3.7.1.04	Exit Signs		0	\$0.00	\$0	
3.7.1.05	Exterior Lighting		0	\$0.00	\$0	
3.7.1.9.01	Vinyl tile - common area		0	\$0.00	\$0	
3.7.1.9.02	Common Area Painting		0	\$0.00	\$0	
3.7.2.1.01	Kitchen Cabinets		0	\$0.00	\$0	
3.7.2.1.02	Kitchen Counter Tops, Sinks		0	\$0.00	\$0	
3.7.2.1.03	Kitchen Floor Coverings		0	\$0.00	\$0	
3.7.2.11.01	Dishwashers		0	\$0.00	\$0	
3.7.2.11.02	Range Hoods		0	\$0.00	\$0	
3.7.2.11.03	Ranges		0	\$0.00	\$0	
3.7.2.11.04	Refrigerators 1		0	\$0.00	\$0	
3.7.2.11.05	Refrigerators 2		0	\$0.00	\$0	
3.7.2.19	Other Appliances		0	\$0.00	\$0	
3.7.2.19.01	Kitchen Exhaust Fans		0	\$0.00	\$0	
3.7.2.19.02	Kitchen Other #1		0	\$0.00	\$0	
3.7.2.19.03	Kitchen Other #2		0	\$0.00	\$0	
3.7.2.19.04	Kitchen Other #3		0	\$0.00	\$0	
3.7.2.2.01	Bath Counter Tops, Sinks		0	\$0.00	\$0	
3.7.2.2.02	Bath Floor Covering		0	\$0.00	\$0	
3.7.2.2.03	Bath Vanities		0	\$0.00	\$0	
3.7.2.29.01	Bathtub	Replace apartment unit bathtubs	76	\$2,000.00	\$152,000	
3.7.2.29.02	Lateral Piping Reslope for Bathtub	Repair lateral piping	95	\$2,500.00	\$237,500	
3.7.2.29.03	ADA mirror mounting	Provide ADA compliant mirrors	2	\$200.00	\$400	
3.7.2.29.04	Bath Other #4		0	\$0.00	\$0	
3.7.2.3.01	Interior Carpet		0	\$0.00	\$0	
3.7.2.3.02	Interior Doors		0	\$0.00	\$0	
3.7.2.3.03	Interior Painting		0	\$0.00	\$0	
3.7.2.39.01	Apartment unit interior doors	Replace apartment unit interior doors	96	\$442.50	\$42,480	
3.7.2.39.02	Interior Other #2		0	\$0.00	\$0	
3.7.2.39.03	Interior Other #3		0	\$0.00	\$0	

WORK						
Work Item (A)		Description of Improvements Work (B)	Quantity (C)	Unit Cost (D)	Budget (E)	Date of Bid Expiration (F)
3.7.2.39.04	Interior Other #4		0	\$0.00	\$0	
3.7.2.4.01	Ceiling Fans		0	\$0.00	\$0	
3.7.2.4.02	In-Unit Lighting Bulbs		0	\$0.00	\$0	
3.7.2.4.03	In-Unit Lighting Fixtures		0	\$0.00	\$0	
3.7.2.4.04	Intercom System		0	\$0.00	\$0	
3.7.2.4.05	In-Unit Electrical Other #2		0	\$0.00	\$0	
3.8.01	Common Area Washing Machines		0	\$0.00	\$0	
3.8.02	Common Area Dryers		0	\$0.00	\$0	
3.8.03	Generator - diesel 125 kVa		0	\$0.00	\$0	
3.8.04	Other #04		0	\$0.00	\$0	
3.8.05	Other #05		0	\$0.00	\$0	
3.8.06	Other #06		0	\$0.00	\$0	
3.8.07	Other #07		0	\$0.00	\$0	
3.8.08	Other #08		0	\$0.00	\$0	
3.8.09	Other #09		0	\$0.00	\$0	
3.8.10	Other #10		0	\$0.00	\$0	
3.8.11	Other #11		0	\$0.00	\$0	
3.8.12	Other #12		0	\$0.00	\$0	
3.8.13	Other #13		0	\$0.00	\$0	
3.8.14	Other #14		0	\$0.00	\$0	
3.8.15	Other #15		0	\$0.00	\$0	
N/A	Relocation Costs		N/A	N/A	\$0	

Total Improvements Eligible for Rehab Escrow \$574,554

10.0% Contingency \$57,455

Total Rehab Escrow Improvements Plus Contingency = TOTAL FUNDING \$632,009

Comment cells provided below:

Comments:

Additional comments:

20 Year Schedule for:

Highland View

Highland View

	2015	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	20 Year	20 Year
Replacement Component	Rehab	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Total	+ Rehab
3.2.2 Storm Water Drainage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.2.4 Parking and Driveways	11,406	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,406
3.2.4.01 Parking and Driveways Other #1	0	0	0	0	0	0	593	0	0	0	0	593	0	0	0	0	593	0	0	0	0	0	1,779
3.2.4.02 Parking and Driveways Other #2	200	0	0	0	0	0	0	0	0	0	0	200	0	0	0	0	0	0	0	0	0	200	400
3.2.6 Land and Grounds: Irrigation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.2.9.01 ADA access aisle	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
3.2.9.02 Site Other #2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.2.9.03 Site Other #3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.2.9.04 Site Other #4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.3.2.2 Exterior Walls	0	27,891	0	0	0	0	0	0	0	0	0	27,891	0	0	0	0	0	0	0	0	0	55,782	55,782
3.3.2.3 Insulation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.3.2.4.01 Sliding Glass Doors	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.3.2.4.02 Windows	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	158,784	0	0	0	0	0	158,784	158,784
3.3.2.5.01 Exterior Doors	0	3,200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,200	3,200
3.3.2.5.02 Storm Doors	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.3.2.9.01 Caulking and Sealant	17,549	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,549	0	0	0	0	17,549	35,098
3.3.2.9.02 Bldg Envelope Other #2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.3.2.9.03 Bldg Envelope Other #3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.3.2.9.04 Bldg Envelope Other #4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.3.4 Roofs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	386,591	0	0	0	386,591	386,591
3.4.1.2.01 Domestic Boilers - High Efficiency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18,900	0	0	0	18,900	18,900
3.4.1.2.02 Domestic hot water storage tanks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,000	1,500	0	0	4,500	4,500
3.4.1.2.03 DHW #3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.4.1.2.04 DHW #4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.4.1.3.01 Water Savers: Faucets	29,802	0	0	0	0	0	0	0	0	0	0	29,802	0	0	0	0	0	0	0	0	0	29,802	59,603
3.4.1.3.02 Water Savers: Shower Heads	8,550	0	0	0	0	0	0	0	0	0	0	8,550	0	0	0	0	0	0	0	0	0	8,550	17,100
3.4.1.3.03 Water Savers: Toilets	36,575	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36,575
3.4.2.1.01 HVAC Common Area Heating	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.4.2.1.02 HVAC In-Unit Heating	0	0	0	0	48,607	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48,607	48,607
3.4.3.1.01 Bath Exhaust Fans	0	63,102	63,102	63,102	0	0	0	0	0	0	0	63,102	63,102	63,102	0	0	0	0	0	0	0	378,612	378,612
3.4.3.1.02 HVAC Common Area Cooling	0	0	0	0	0	0	0	0	0	0	0	16,080	0	0	0	0	0	0	0	0	0	16,080	16,080
3.4.3.1.03 HVAC In-Unit Cooling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.4.9.01 Programmable Thermostats	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.4.9.02 Condensing Unit 7.5 tons	0	0	0	0	0	0	0	0	0	0	0	8,544	0	0	0	0	0	0	0	0	0	8,544	8,544
3.4.9.03 Condensing Unit 15 tons	0	0	0	0	0	0	0	0	0	0	0	17,482	0	0	0	0	0	0	0	0	0	17,482	17,482
3.4.9.04 Thru the Wall AC unit	0	0	0	0	0	0	0	0	0	0	0	0	3,460	0	1,730	0	0	0	0	0	0	5,190	5,190
3.5 Elevators	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	176,582	0	0	0	0	0	176,582	176,582
3.5.01 Elevators Cab Interiors	0	0	0	0	0	0	0	0	0	0	29,120	0	0	0	0	0	0	0	0	0	0	29,120	29,120
3.6.01 CO Detectors/Alarms	0	12,114	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,114	0	0	0	0	24,228	24,228
3.6.02 Smoke Detectors	33,312	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33,312	0	0	0	0	33,312	66,624
3.6.03 Life Safety Other #1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.7.1.01 Common Area Floor Coverings	0	41,482	0	0	0	0	0	0	41,482	0	0	0	0	0	0	41,482	0	0	0	0	0	124,446	124,446
3.7.1.02 Common Area Inter. Lighting Bulbs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.7.1.03 Common Area Inter. Lighting Fixtures	4,680	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,680	0	0	0	0	4,680	9,360
3.7.1.04 Exit Signs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.7.1.05 Exterior Lighting	0	24,750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24,750	0	0	0	0	49,500	49,500
3.7.1.9.01 Vinyl tile - common area	0	4,844	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,844	4,844
3.7.1.9.02 Common Area Painting	0	0	0	0	0	10,982	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,982	10,982
3.7.2.1.01 Kitchen Cabinets	0	0	0	0	0	0	0	0	71,250	71,250	71,250	0	0	0	0	0	0	0	0	0	0	213,750	213,750
3.7.2.1.02 Kitchen Counter Tops, Sinks	0	0	0	0	0	0	0	0	34,200	34,200	34,200	0	0	0	0	0	0	0	0	0	0	102,600	102,600
3.7.2.1.03 Kitchen Floor Coverings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.7.2.11.01 Dishwashers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.7.2.11.02 Range Hoods	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.7.2.11.03 Ranges	0	0	0	0	0	31,525	0	0	0	0	0	0	0	0	0	0	28,373	0	0	0	0	59,898	59,898
3.7.2.11.04 Refrigerators 1	0	4,350	0	0	0	0	0	0	0	0	0	36,975	0	0	0	0	4,350	0	0	0	0	45,675	45,675
3.7.2.11.05 Refrigerators 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.7.2.19 Other Appliances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.7.2.19.01 Kitchen Exhaust Fans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.7.2.19.02 Kitchen Other #1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.7.2.19.03 Kitchen Other #2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.7.2.19.04 Kitchen Other #3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.7.2.2.01 Bath Counter Tops, Sinks	0	20,286	20,286	20,286	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60,857	60,857
3.7.2.2.02 Bath Floor Covering	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.7.2.2.03 Bath Vanities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.7.2.29.01 Bathtub	152,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	152,000
3.7.2.29.02 Lateral Piping Reslope for Bathtub	237,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	237,500
3.7.2.29.03 ADA mirror mounting	400	0	0	0	0	0	0	0	0	0	0	400	0	0	0	0	0	0	0	0	0	400	800
3.7.2.29.04 Bath Other #4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.7.2.3.01 Interior Carpet	0	37,871	37,871	37,871	0	0	0	0	37,871	37,871	37,871	0	0	0	0	37,871	37,871	37,871	0	0	0	340,843	340,843
3.7.2.3.02 Interior Doors	0	0	0	0	94,145	0	0	0	0														

20 Year Schedule for:

Highland View

Highland View

	2015	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	20 Year	20 Year
Replacement Component	Rehab	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Total	+ Rehab
3.8.02 Common Area Dryers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,400	0	0	0	0	0	15,400	15,400
3.8.03 Generator - diesel 125 kVa	0	26,595	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26,595	26,595
3.8.04 Other #04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.8.05 Other #05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.8.06 Other #06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.8.07 Other #07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.8.08 Other #08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.8.09 Other #09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.8.10 Other #10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.8.11 Other #11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.8.12 Other #12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.8.13 Other #13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.8.14 Other #14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.8.15 Other #15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	574,554	293,655	141,019	141,019	148,010	48,607	43,101	0	184,803	143,321	187,841	229,378	86,322	82,862	55,595	430,119	171,002	37,871	408,491	1,500	0	2,834,518	3,409,071
Inflated Total	574,554	293,655	144,545	148,158	159,391	53,653	48,764	0	219,673	174,623	234,588	293,623	113,262	111,440	76,638	607,747	247,662	56,220	621,568	2,339	0	3,607,549	4,182,103

2. PURPOSE AND SCOPE

2.1. PURPOSE

The purpose of the RAD program is to allow Public Housing and Moderate Rehabilitation (Mod Rehab) properties to convert, to long-term Section 8 rental assistance contracts. The program also allows Rent Supplement (Rent Supp), Rental Assistance Payment (RAP), and Mod Rehab properties to convert tenant-based vouchers issued upon contract expiration or termination to project-based vouchers. The goal is to restructure the financing and to bring properties up to market standards through an initial rehabilitation and subsequent repairs and/or replacements over the next twenty year period. The restructuring program has three basic goals:

1. *Social* - Preserving the “affordable housing stock” by maintaining the long term physical integrity of HUD subsidized rental housing insured by FHA.
2. *Economic* - Reducing the long term Project based Section 8 rental assistance costs and reducing the costs of insurance claims paid by FHA.
3. *Administrative* - Promote greater operating cost efficiencies and establish systems to administer the program and terminate relationships owners/properties that violate agreements or program requirements

The purpose of the Green Physical Condition Assessment is to assist the client in assessing the physical condition of the property and meeting the stated goal of the program to encourage affordable multi-family rehabilitation of properties using sustainable Green Building principles. These sustainable Green Building principles are comprised of energy efficiency, sustainability, indoor air quality, and recycling. They also incorporate the “Health Housing” approach which was established by HUD in 1999 in response to a Congressional Directive regarding growing concerns about environmental health in children. This program is designed to incorporate Green principles into property rehabilitation and scheduled repairs and/or replacements over the next twenty years.

The Green PCA is comprised of four parts:

Part 1: PCA Report comparing Traditional and Green Requirements. The traditional PCA identifies repairs and/or replacements necessary in the first year and in the subsequent twenty years. The PCA will estimate costs using both “traditional” and “Green” principles and provides discussion on the benefits (financial and otherwise) of the green alternative material or system.

Part 2: Energy Audit.

It evaluates how energy and water is used at the property. This documents and recommends energy-related improvements that can be made to the property, the costs of the improvements, and provides a simple financial payback analysis. It includes an initial assessment of potentially viable alternatives for generating electricity, heating water, and heating and cooling the conditioned space at the building.

Part 3: Utility Consumption Baseline – It contains data on utility usage at the property, both tenant-paid and owner-paid, and including all common areas for a full 12-month period. It establishes a baseline to allow for benchmarking, and for future measurement of consumption and costs. As such, the utility baseline creates a whole building consumption profile in achieving its aim of establishing the standard on which future consumption can be compared.

Part 4: Integrated Pest Management Plan Inspection: This inspection may reveal the need for additional repairs or site alterations that will need to be included in the first year rehabilitations needs. It includes an evaluation of existing pest control practices and procedures and recommendations for change in site practices, if necessary.

For this PCA, at least 25% of apartment units and a representative sample of major building systems and components were observed and their physical condition evaluated in accordance with ASTM E2018-08. The report identifies Critical Repairs, Rehabilitation Specifications, and Long Term Physical Needs. The report also estimates costs using both “traditional” and “green” principles and provides discussion on the benefits of the green alternative. The standard is a non-luxury standard adequate for the rental market intended at the original approval of Project-based assistance. The physical needs identified are intended to reflect those necessary for the Project to retain its original market position as an affordable Project in a decent, safe and sanitary condition. The intent is to include those improvements that the Project requires to compete in the non-subsidized market, resulting in a marketable Project that competes on rent rather than amenities.

The property management staff and code enforcement agencies were interviewed for specific information relating to the physical property, code compliance, available maintenance procedures, available drawings and other documentation. The property systems and components were observed and evaluated for their present condition and the estimated cost for repairs and/or capital reserves are included in the cost estimates. All findings relating to these opinions of probable costs are included in the narrative sections of this report.

The physical condition of building systems and related components are typically defined as being in one of three categories: Good, Fair, and Poor. For the purposes of this report, the following definitions are used:

- Good = Satisfactory as-is. Requires only routine maintenance during the reserve term. Repair or replacement may be required due to a system’s estimated useful life.
 - Fair = Satisfactory as-is. Repair or replacement is required due to current physical condition and/or estimated remaining useful life.
 - Poor = Immediate repair, replacement, or significant maintenance is recommended.
- In an effort to quickly find key information EMG has created the following quick reference guide for the client and report reviewer.

2.2. PROPERTY EXPECTED USEFUL LIFE ESTIMATE

Subject to the qualifications stated in this paragraph and elsewhere in this report, the remaining useful life (RUL) of the property is estimated to be not less than 35 years. The foregoing estimate as to useful life is an expression of a professional opinion and is not a guarantee or warranty, express or implied. This estimate is based upon the observed physical condition of the property at the time of the EMG’s visit and is subject to the possible effect of concealed conditions or the occurrence of extraordinary events, such as natural disasters or other “acts of God”, which may occur subsequent to the date of the on site visit.

The remaining useful life for the property is further based on the assumption that: (a) the Critical Repairs, Rehabilitation Needs, and future repairs for which replacements provided as capital reserves are recommended are completed in a timely and workmanlike manner; and (b) a comprehensive program of preventive and remedial property maintenance is continuously implemented using an acceptable standard of care. The estimate is made only with regard to the expected physical or structural integrity of the improvements on the property, and no opinion regarding economic or market conditions, the present or future appraised value of the property, or its present or future economic utility is expressed by EMG.

2.3. OPINIONS OF PROBABLE COST

This section provides estimates for Critical Repairs, Rehab Items, and 20 Year Reserve Items as noted within this GPCA.

These estimates are based on Invoice or Bid Documents provided either by the Owner or facility and construction costs developed by construction resources such as *EnergyStar.gov*, *R.S. Means* and *Marshall & Swift*, EMG’s experience with past costs for similar properties, city cost indexes, and assumptions regarding future economic conditions.

2.4. METHODOLOGY

Based upon site observations, research and judgment, along with referencing Expected Useful Life (EUL) tables from various industry sources, EMG opines as to when a system or component will most probably require replacement. Accurate historical replacement records, if provided are typically the best sources of information. Exposure to the elements, initial quality and installation, extent of use, the quality and amount of preventive maintenance exercised, and other similar items are all factors that impact the effective remaining useful life of a system or component. The Remaining Useful Life (RUL) or effective remaining life of a component or system equals the EUL less its effective age. The estimated useful life calculations are based on those found in the Fannie Mae (FNMA) Document; FNMA, Delegated Underwriting Services (DUS) Guide Section 3 entitled "Physical Needs Assessment Guidance to the Property Evaluator".

Where quantities could not be derived from actual takeoff, lump sum or allowances are used. Estimated costs to correct are based on professional judgment and the probable or actual extent of the observed defect, inclusive of the cost to design, procure, construct and manage the corrections.

Each building system or component is further identified with the following references if costs or other actions are applicable:

- RM = Routine maintenance
- CR = Critical Repair
- RS = Rehabilitation Scope
- RR = Replacement Reserve
- NA = Not Applicable

2.5. CRITICAL REPAIRS

Based on observations of readily apparent conditions, Critical Repairs have been identified as health and safety deficiencies, violations of Section 8 housing quality standards or FHA's regulatory agreement standards that require immediate attention. These repairs include conditions that endanger the safety or well being of residents. It is expected that Critical Repairs will be completed prior to closing.

2.6. REHABILITATION NEEDS AND GREEN SIGNIFICANT ADDITIONS

The Rehab cost estimate is an estimate of repairs, replacements, or significant deferred or other maintenance items recommended within the next year. The Rehab cost estimate includes items which pass the early replacement criteria or which provide a direct environmental benefit to the property. This Green PCA identifies repairs necessary in the first year following restructuring. It offers "traditional" and "green" components that meet local building codes. It clearly identifies if "green" components exceed local building code requirements. It gives two "green" options, if available, for example evaluating 16 SEER and 19 SEER air-conditioning costs and efficiencies. It estimates costs using both "traditional" and "green" principles and it provides comments on the benefits (financial and otherwise) of the green alternative. As part of the savings analysis, the analysis includes evaluating costs and benefits for two levels of "green" for certain mandatory "green" options that may apply to the property.

Green Building or sustainable building is the practice of reducing the impact of buildings on the environment, both during construction and as part of the operation of the building systems. Their use of water, energy, and materials should be reduced through the use of new planning methods and material usage.

EMG's goal was to identify all opportunities to: 1) improve energy efficiency; 2) minimize water use; 3) use recycled or recyclable materials, 4) protect the indoor air quality; 5) reduce the 'carbon footprint' of the buildings and site; and 6) proper disposal of replaced materials.

In the table located on the following pages, EMG has identified components which will require replacement either immediately, within the first year (Rehab items), or over the course of the next twenty years (20 Year Reserve Items). We compare the cost of traditional replacements and compare them to "green" replacements. The anticipated benefits of green approaches are discussed throughout the report, along with increased short term costs for the long term benefits of choosing "Green" or sustainable alternatives.

Green Significant Additions are those items that meet the "green principles" and are recommended for early replacement in the subsequent year.

2.7. LONG TERM PHYSICAL NEEDS

Long Term Physical Needs are for recurring probable expenditures, which are not classified as operation or maintenance expenses, which should be annually budgeted for in advance. Long Term Physical Needs are reasonably predictable both in terms of frequency and cost. However, they may also include components or systems that have an indeterminable life but nonetheless have a potential liability for failure within an estimated time period. These items are included in the 20 Year Reserve Schedule.

This methodology excludes systems or components that are estimated to expire after the reserve term of 20 years and that are not considered material to the structural and mechanical integrity of the subject property. Furthermore, systems and components that were not deemed to have a material effect on the use were also excluded. Costs that are caused by acts of God, accidents or other occurrences that are typically covered by insurance, rather than reserved for, are also excluded.

Replacement costs were solicited from ownership/property management, EMG's discussions with service companies, manufacturers' representatives, and previous experience in preparing such schedules for other similar facilities. Costs for work performed by ownership's or property management's maintenance staff were also considered.

EMG's reserve methodology involves identification and quantification of those systems or components requiring reserve funds within the evaluation period which is defined as the age minus the reserve term. Additional information concerning systems or components respective replacement costs (in today's dollars), typical expected useful lives, and remaining useful lives were estimated so that a funding schedule could be prepared. The Long Term Physical Needs presupposes that all required remedial work has been performed or that monies for remediation have been budgeted for items defined as a Critical Repair or Rehab item.

2.8. PERSONNEL INTERVIEWED

In the process of conducting the Green PCA and follow-up telephone calls, the following personnel from the facility and government agencies were interviewed:

Name and Title	Organization	Phone Number
Jim Giel Property Manager	Highland View Apartments	201.954.4582
Wayne Moe Superintendent	Highland View Apartments	201.927.4264
George Beck Housing Officer	Palisades Park Building Department	201.585.4108

Name and Title	Organization	Phone Number
Left message	Palisades Park Fire Prevention Department	201.585.4100

EMG met with Jim Giel, Property Manager, the on site Point of Contact (POC), who was cooperative and provided information, that appeared to be accurate based upon our subsequent site observations. It is EMG's opinion that the on site contact was very knowledgeable about the subject property and questions EMG posed during the interview process. The POC's management involvement at the property has been during the past eleven years.

2.9. OWNER PROVIDED DOCUMENTATION

Prior to the PCA, relevant documentation was requested that could aid in the knowledge of the subject property's physical improvements, extent and type of use, and/or assist in identifying material discrepancies between reported information and observed conditions. The review of submitted documents does not include comment on the accuracy of such documents or their preparation, methodology, or protocol. The following documents were provided for review while performing the GPCA:

- Site plan
- Floor plans
- Utility billing information
- Capital improvement summary
- Elevator service purchase order dated December 19, 2013

No other documents were available for review.

2.10. CAPITAL IMPROVEMENTS FOR MARKET UPGRADES

The report identifies Short Term and Long Term Physical Needs. The standard is a non-luxury standard adequate for the rental market intended at the original approval of Project-based assistance. The Capital Improvements for Market Upgrades identified are intended to reflect those necessary for the Project to retain its original market position as an affordable Project in a decent, safe and sanitary condition. The intent is to include those improvements that the Project requires to compete in the non-subsidized market, resulting in a marketable Project that competes on rent rather than amenities.

EMG has evaluated the subject property in relation to the property's marketability within the surrounding community. Based on EMG's experience and observations, no market upgrades are recommended.

2.11. PRE-SURVEY QUESTIONNAIRE

A Pre-Survey Questionnaire was sent prior to EMG's on site visit. The completed questionnaire is included in Appendix G. Information obtained from the questionnaire has been used in preparation of this Green PCA.

2.12. WEATHER CONDITIONS

Weather conditions at the time of the on site review were partly cloudy, with temperatures in the low 20s (°F) and light winds. In addition, there were approximately six to eight inches of snow on the ground.

3. DESCRIPTION AND OBSERVATIONS

3.1. EXISTING BUILDING GENERAL DESCRIPTION

3.1.1. Apartment Unit Types and Unit Mix

The following table identifies the reported apartment types and mix at the subject property. Measurements were obtained by EMG through rough measurement of the unit types.

Apartment Unit Types and Mix		
Quantity	Type	Floor Area
94	1 Bedroom/1 Bathroom	487 to 610 SF
1	2 Bedrooms/1 Bathroom	858.5 SF
There are currently no vacant units.		
There are currently no down units.		
95	TOTAL	

There were no vacant units reported or observed on the day of our site visit.

3.1.2. Apartment Units Observed

Approximately 25 percent of the apartment units and all vacant units were observed in order to gain a clear understanding of the overall property condition. Other areas accessed included the exterior of the entire property, the roof and a representative number of the interior common areas. The following apartments were observed:

Apartment Units Observed		
Unit/Floor	Type	Remarks
518/5 th	1 Bedroom/1 Bathroom	Occupied, good condition. Slight air infiltration at windows. Inadequate baseboard heating. New tub.
516/5 th	1 Bedroom/1 Bathroom	Occupied, good condition. Closet doors fall off track easily. Outside wall cold.
514/5 th	1 Bedroom/1 Bathroom	Occupied, fair condition. Covered vent in bathroom due to cold air infiltration when windy. Tub does not drain properly, rusty drain. Toilet seal leak.
511/5 th	1 Bedroom/1 Bathroom	Occupied, good condition.
508/5 th	1 Bedroom/1 Bathroom	Occupied, good condition. Tub does not drain properly, backflow reported.
503/5 th	1 Bedroom/1 Bathroom	Occupied, good condition. New radiators; although, tenant reported feeling colder now.
502/5 th	1 Bedroom/1 Bathroom	Occupied, good condition.

Apartment Units Observed		
Unit/Floor	Type	Remarks
416/4 th	1 Bedroom/1 Bathroom	Occupied, good to fair condition. Slight air infiltration at windows. Rusty drain at tub.
412/4 th	1 Bedroom/1 Bathroom	Occupied, good condition. Uses oven for additional heat.
410/4 th	1 Bedroom/1 Bathroom	Occupied, fair condition. ADA unit. Non-compliant grab bars at toilet. Crack in plaster in bathroom.
406/4 th	1 Bedroom/1 Bathroom	Occupied, good condition.
306/3 rd	1 Bedroom/1 Bathroom	Occupied, fair condition. Stained carpet.
308/3 rd	1 Bedroom/1 Bathroom	Occupied, good to fair condition. Rusty drain at tub.
312/3 rd	1 Bedroom/1 Bathroom	Occupied, good condition.
215/2 nd	1 Bedroom/1 Bathroom	Occupied, good to fair condition. Drain collapsing at tub. Exhaust vent being serviced.
213/2 nd	1 Bedroom/1 Bathroom	Occupied, good condition. Cold air draft under AC unit.
211/2 nd	1 Bedroom/1 Bathroom	Occupied, good condition.
203/2 nd	1 Bedroom/1 Bathroom	Occupied, fair condition. Slight cracks around AC opening. Bumpy kitchen floor. Carpet seams exposed.
102/1 st	1 Bedroom/1 Bathroom	Occupied, good condition.
103/1 st	1 Bedroom/1 Bathroom	Occupied, good condition.
107/1 st	1 Bedroom/1 Bathroom	Occupied, good condition. ADA unit. Drain pipe insulation loose at kitchen.
109/1 st	1 Bedroom/1 Bathroom	Occupied, good condition. Older tub.
114/1 st	1 Bedroom/1 Bathroom	Occupied, good condition. Older tub.
116/1 st	1 Bedroom/1 Bathroom	Occupied, good condition.
G5/Ground	2 Bedroom/1 Bathroom	Occupied, good condition.
Vacant Units		
None		
Down Units		
None		

A "down unit" is a term used to describe a non-rentable apartment due to fire damage, water damage, missing appliances, damaged floor, wall or ceiling surfaces, or other significant deficiencies. The Point of Contact stated that there were no down units at the subject property.

All areas of the property were available for observation while on site.

3.2. SITE

3.2.1. Topography

Item	Description	Action	Condition	Replacement
Topography	Relatively flat except moderate to steep slope down towards north property line at frontage	RM	Good	Traditional
Adjacent Properties	Residential	NA	NA	NA
Retaining Walls	Concrete masonry unit and brick and reinforced concrete	RM/NA	Fair	Traditional

Green Physical Condition Discussions: As part of any re-landscaping plan, incorporate design features that enhance the soil quality, reduce storm water runoff and pollution, and encourage beneficial insects and wildlife. This measure also minimizes ongoing water requirements, maintenance needs, and green waste. In addition, seek to incorporate design features into the site that channel runoff to swales, porous surfaces, and holding areas. These measures reduces water runoff, helps filter and treat storm water, and protects the local ecosystem.

Observations/Comments:

- The property topography and adjacent uses did not appear to present conditions detrimental to the property. No significant areas of erosion were observed affecting the property. Based on the results of this assessment, no further actions appear to be required at this time.
- The masonry retaining walls are exhibiting separation at the corner joint. Sealant replacement is required. The cost for this work is relatively insignificant and can be performed through routine maintenance.
- The concrete retaining walls at the parking lot are in good condition and will require routine maintenance.

3.2.2. Storm Water Drainage

Item	Description	Action	Condition	Replacement
Drainage Systems and Erosion Control	Surface flow to inlets discharging to underground piping to municipal system	RM	Good	Traditional
On site Retention	Not Applicable	NA	NA	NA
Pavement System	Non-porous	RR	Good to fair	Green

Green Physical Condition Discussions: Increasing porous surfaces decreases runoff and protects the health of creeks, wetlands and other bodies of water. Reducing runoff improves soil health because it retains valuable topsoil on site. EMG evaluated opportunities to increase storm water retention on site by replacing or rehabilitating parking lots, sidewalks, and other hardscape features with porous pavement. These measures help reduce water runoff, help filter and treat storm water, and protect the local ecosystem. Pervious paving surfaces can cost more than hard surfaces but can easily be incorporated into future on site hard surface repairs and replacements.

Observations/Comments:

- Evidence of storm water runoff from adjacent properties was not observed. Based on the results of this assessment, no further actions appear to be required at this time.

- The storm water system appeared to provide adequate runoff with no evidence of major ponding or erosion noted. Based on the results of this assessment, no further actions appear to be required at this time.

3.2.3. Parking, Paving and Sidewalks

Item	Description	Action	Condition	Replacement
Parking and Paving	Surface lots and tuck-in parking 22 total parking stalls, including handicapped-accessible stalls 1 handicapped-accessible parking stall which is not van-accessible Asphalt with concrete at tuck-in stalls.	RR	Fair	Traditional
Sidewalks, Curbs and Gutters	Concrete and brick paver	RM	Good	Traditional
Site Access	One driveway plus one loop into site from adjacent street.	RM	Good	Traditional

Green Physical Condition Discussions: For replacement or rehabilitation of sidewalks and other hardscape features such as footings, mat foundations, slab on grade, slabs on metal deck, cast in place and tilt up walls, drives and equipment pads, displace Portland cement in concrete mixes with at least 20 percent recycled content materials (flyash or slag). This measure increases the durability and strength of the concrete, reduces greenhouse gas emissions associated with cement production, and helps keep flyash out of landfills.

Increasing porous surfaces decreases runoff and protects the health of creeks, wetlands and other bodies of water. Reducing runoff improves soil health because it retains valuable topsoil on site. Types of pervious or porous pavement include porous aggregate, porous turf, plastic geocells, open-jointed paving blocks, open-cell paving grids, porous concrete, granite or crushed rock, and soft porous surfacing such as bark or mulch.

Specify light color pigments or aggregates for any replacement or rehabilitation of sidewalks and other hardscape features. This measure reduces the building's cooling costs and minimizes the heat island effect by reducing the amount of heat retained by surrounding asphalt, concrete, and building structures. Adding colorants and pigments to mixes of concrete and asphalt does not generally increase costs. Changing aggregate colors is also relatively inexpensive.

Observations/Comments:

- Cracking was observed throughout the main parking area. Based on the Estimated Useful Life and the observed conditions, an overlay of the pavement system is recommended during the reserve term. The cost for this work is included in the 20 Year Reserve Schedule as a Rehab Item.
- In order to maximize the pavement life, pothole patching, crack sealing, seal coating and re-striping of the asphaltic concrete paving will be required during the reserve term. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- The property will be subjected to only minor concrete repairs of flatwork during the life of the loan and no repairs are noted as immediate needs. High-volume fly-ash concrete mixes are widely available and typically cost the same as low-volume mixes. The recommendation is made to specify recycled concrete materials for flatwork repairs. Use of recycled concrete will comply with LEED-EB Material and Resources Credit 2 – Optimize Use of Alternative Materials.

3.2.4. Landscaping and Grounds

Item	Description	Action	Condition	Replacement
Landscaping	Trees, grass, flowerbeds planters	RM	Good	Traditional
Irrigation	Automatic underground system	RM	Good	Traditional

Green Physical Condition Discussions: As part of any re-landscaping plan, incorporate design features that enhance the soil quality, reduce storm water runoff and pollution, and encourage beneficial insects and wildlife. This measure also minimizes ongoing water requirements, maintenance needs, and green waste. In addition, seek to incorporate design features into the site that channel runoff to swales, porous surfaces, and holding areas. These measures reduces water runoff, helps filter and treat storm water, and protects the local ecosystem.

Observations/Comments:

- Landscaping is minimal at the property and improvements are not necessary or planned. However, future landscaping efforts at the property should be “sustainable” featuring native plants and shrubs. Native landscaping can achieve significant savings over time by reducing labor, water, and chemical costs.
- The in-ground sprinkler system is controlled by automatic control valves with manual valves operated by the maintenance staff.
- EMG recommends installing soil moisture sensors to detect the amount of moisture contained in soil. Once the specified level of moisture is reached, the sensors prevent the automatic watering system from operating.
- The site point of contact reported there are not problems with the underground irrigation system. EMG recommends only ongoing routine maintenance of the system. Based on the results of this assessment, no further actions appear to be required at this time.

3.2.5. Patio, Terrace, and Balcony

Item	Description	Action	Condition	Replacement
Patios	Concrete and brick paved outdoor garden terrace and lounge area	RM	Fair	Traditional
Balconies	Not applicable	NA	NA	NA

Observations/Comments:

- The ground-level patio slabs have signs of isolated cracking and spalling near the light bollard at the southwest corner. Repairs consisting of removing and replacing portions of the walking surface are recommended within the year. The cost for this work is relatively insignificant and can be performed through routine maintenance.

3.2.6. General Site Improvements

Item	Description	Action	Condition	Replacement
Signage	Post mounted sign along loop entrance and building-mounted signage	RM	Fair	Traditional

Item	Description	Action	Condition	Replacement
Site Lighting	Parking lot light standards and decorative bollards 16 Metal Halide Fixtures @ 175 Watts (8 poles; 8 building-mounted 10 Metal Halide bollards @ 100 Watts Photosensor	GS	Good to fair	Green
Building Lighting	Wall-mounted fixtures and recessed soffit fixtures 8 Metal Halide Fixtures @ 175 Watts building-mounted 7 Fluorescent Fixtures @ 40 Watts Photosensor	GS	Good to fair	Green
Fencing	Chain link on top of concrete retaining walls Painted metal on top of masonry retaining walls	RM	Good	Traditional
Dumpsters	Set on concrete slab in service tuck-in area on the north side of building Trash compactor	RM	Good	Traditional
Recycling & Waste Management	Recycling plan is in place Construction debris plan is recommended	NA	NA	Green

Green Physical Condition Discussions: High-density residential properties should always consider, where space permits, the provision of bike parking/storage for residents, visitors, and employees. This measure will reduce traffic and pollution while increasing occupant/worker health. Secured and covered storage can be under building overhangs, stairwells (inside or out), bike lockers, in parking garages, or other means. The property may benefit by providing bicycle storage. The property layout provides several areas that could be converted to locked bicycle storage for residents; however, management has identified that there is not a great demand for bicycle storage at the facility.

Observations/Comments:

- The fencing is in good condition. Based on the Estimated Useful Life, fencing replacement is not recommended during the reserve term.
- The Dumpsters are owned and maintained by the property. Based on the results of this assessment, no further actions appear to be required at this time.
- Some recyclables provide revenue, which can be used for community improvements. Recycling rooms are located on each apartment floor.
- EMG recommends the property owners institute a management sponsored recycling program for the proper collection and disposal of maintenance and resident generated household hazardous waste. Provide an accessible area dedicated to the separation, collection, and storage of materials; electronic equipment, computer printer ink, compact fluorescent bulbs, and lithium batteries. The addition of recycling stations for hazardous household waste is recommended as a Green Restructuring item.
- EMG recommends the property owners institute a Green Waste Management Plan that includes items from future construction/renovation. The plan should set a 50% recycle and/or salvage goal to reduce landfill disposal. Materials to be recycled and/or salvaged include: clean dimensional wood, plywood, concrete, CMU, brick, gypsum board, asphalt shingles, glass, carpet and pad, and pipe. This type of plan has little

or no direct cost to the property. Requirements for including recycling and/or salvage costs should be added to all Requests for Proposals put out for contractor bids.

3.2.7. Utilities

The following is a table of utilities supplied to the site and the names of the suppliers:

Site Utility Providers	
Utility	Supplier
Sanitary sewer	United Water
Storm sewer	United Water
Domestic water	United Water
Electric service	PSE&G and Direct Energy
Natural gas service	PSE&G and Woodruff Energy
Telephone service	Verizon
Cable Television	Comcast

Green Physical Condition Discussions: It is recommended that property management perform regular visual assessments of known underground piping locations. These assessments can be performed as part of routine activities such as trash pickup, lawn mowing or while walking from one area of the property to another. The purpose is to look for tell-tale signs of utility piping leakage. These tell-tale sign manifest themselves as wet spots, non-weather related puddles, areas are always wet, soil undermining and noticeable increases in domestic water consumption. Such occurrence should be report to the local utility supplier immediately.

It is recommended that property management perform regular visual assessments of building and common area lighting. These assessments can be performed as part of routine activities such as trash pickup, lawn mowing or while walking from one area of the property to another. The purpose is to look for tell-tale signs of electrical utility waste. These spot assessments document light fixtures that are on during the day, damage or missing lighting fixtures, malfunctioning timer or photo cells.

Observations/Comments:

- The on site representatives reported that the utilities provided are adequate for the property.
- Green Energy Technologies are evaluated in the Energy Audit in Part II of this report.

3.3. STRUCTURAL FRAME AND BUILDING ENVELOPE

3.3.1. Foundations

Item	Description	Action	Condition	Replacement
Floor	Concrete slab-on-grade	RM	Good	Traditional
Footings	Concrete perimeter footings and pad footings	RM	Good	Traditional
Basements and Crawl Spaces	Not applicable	NA	NA	NA

Green Physical Condition Discussions: For replacement or rehabilitation of features such as footings, mat foundations, slab on grade, slabs on metal deck, cast in place and tilt up walls, drives and equipment pads, displace Portland cement in concrete mixes with at least 20 percent recycled content materials (flyash or slag). This measure increases the durability and strength of the concrete, reduces greenhouse gas emissions associated with cement production, and helps keep flyash out of landfills.

Observations/Comments:

- The foundations and footings could not be directly observed while on site. No apparent signs of significant cracking or movement that would indicate excessive settlement were observed. Based on the results of this assessment, no further actions appear to be required at this time.
- The construction drawings indicated concrete footings approximately 24" to 40" inches below grade.

3.3.2. Exterior Walls

Item	Description	Action	Condition	Replacement
Typical Finishes and Cladding	Brick veneer	RM	Good	Traditional
Other finishes	Brick veneer	RM	Good	Traditional
Sealants	Caulking and sealants at joints, finish transitions, and at wall openings.	TR	Fair	Traditional

Green Physical Condition Discussions: For repainting, specify recycled-content paint. The recycled-content should be at least 50 percent and can come from post-industrial or post-consumer sources. VOCs shall not exceed 250 grams per liter for recycled paint. This measure keeps unwanted paint out of landfills.

For rehabilitation or replacement of exterior siding, specify environmentally preferable siding products. Fiber cement, stucco, metal, brick and stone are durable and easy to maintain. FSC-certified wood siding is made with sustainably harvested wood. Depending on the siding product chosen, this measure may increase durability, reduce waste, maintenance and replacement costs, or support sustainable forestry practices.

Three popular forms of siding are not recommended due to environmental and durability concerns:

- Vinyl siding is a non-recyclable product that poses a landfill burden. In addition, vinyl manufacture produces dioxin, a persistent environmental toxin.
- Conventional wood siding imposes high maintenance costs and may involve detrimental harvesting practices.
- Composition siding (or hardboard) looks like wood siding and requires more ongoing maintenance than wood siding. It is made with wood fibers from industrial process waste or fast-growing tree species. The product is susceptible to water damage when improperly installed and is not recommended.

In addition to its aesthetic function, siding protects a building's exterior walls from wind, sunlight, pests and water. The following siding options are environmentally preferable compared to vinyl, conventional wood or composition siding:

- Fiber-cement siding is gaining popularity as a safe, durable product and is made of Portland cement, sand and cellulose fibers.
- Stucco is a common siding material in many areas of the country. It is made of sand, water, and cement. Some stucco has an acrylic finish.
- Brick or stone veneers are often used in new construction to give the façade a classic look.

- Metal siding is gaining popularity due to its durability, lack of maintenance needs, and because it is lightweight.
- Wood siding certified by the Forest Stewardship Council (FSC) comes from sustainably managed forestry operations. Another environmentally preferable option is siding made from reclaimed wood that may come from old buildings, telephone poles, or river and lake bottoms. Wood can hold up with proper maintenance, but the siding options listed above are likely to last longer and require less maintenance than wood.

Observations/Comments:

- No weatherstripping was observed at the entrances. Air infiltration was observed at the apartment windows and air conditioner opening. The Energy Audit recommends replacement of caulking, building sealants and weather stripping is recommended as part of the measures to control air leakage in the buildings. The cost for this work is included in the 20 Year Reserve Schedule as Rehab item.
- The brick does not have cracking or efflorescence evident. Based on the age and the condition of the exterior walls, it is recommended that a dedicated repair program be instituted for anticipated degradation of the mortar joints and overall exterior wall performance. Walls should be routinely checked for fractured, spalling or missing mortar joints, and cleaning or tuck pointing of the brick and joints should be performed where necessary. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.

3.3.3. Exterior and Interior Stairs

Item	Description	Action	Condition	Replacement
Exterior Steel Stairs	The exterior stairs are constructed of concrete treads. The handrails and balusters are constructed of metal.	RM	Good	Traditional
Interior Concrete Stairs	The interior stairs are constructed of concrete-filled steel pan treads. The handrails and balusters are constructed of metal.	RM	Good	Traditional

Observations/Comments:

- The exterior and interior stairs, balusters, and handrails are in good condition and will require routine maintenance over the evaluation period.

3.3.4. Exterior Windows and Doors

Item	Description	Action	Condition	Replacement
Windows	Metal-framed, sliding units with exterior screens Double –glazed No Low-E Coating Caulking at perimeter of frames	RR	Fair	Green

Item	Description	Action	Condition	Replacement
Exterior Doors	Aluminum storefront entrance doors Hollow metal doors in metal frames Push/pull hardware and deadbolts	RR	Fair	Green
Apartment Doors	Apartments accessed from interior corridor Hollow metal doors in metal frames Lever or knob handles with deadbolts	RM	Good	Traditional
Overhead Doors	Not Applicable	NA	NA	NA

Green Physical Condition Discussions: Windows and patio doors generally make up a significant fraction of a multi-family unit's exterior walls. They are also generally the weakest link in the building's thermal envelope. Windows can allow unwanted heat into the building during the summer and can account for as much as 25 percent of heat loss in the winter. High-performance windows help control heat gain and loss. Unfortunately replacing single-pane windows with newer, more efficient ones is generally not cost effective as a stand-alone retrofit. Replacement is generally more cost effective when pursued in conjunction with general wall rehabilitation to address rot, water damage, and other issues.

Rehabilitation provides an opportunity for increased energy savings and thermal comfort via door replacement and repair. Poor entrance door construction, an absence of wind barriers or airlocks, and inadequate weather-stripping can allow unwanted heat and cold into the building.

Observations/Comments:

- The windows are reported to be installed in 1999. Based on their Estimated Useful Life and the observed conditions, replacements are recommended during the reserve term. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- A payback analysis was completed for replacement of the existing windows with Energy Star rated units having low-E glazing and argon-filled panes. The payback period is 87 years and early replacement is not recommended. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- The building features entrance doors that provide egress to conditioned hallways. The assemblies appeared to be in good condition at the time of the inspection and do not warrant green replacement as there is little added efficiency to be gained.
- The first floor main entrance lobby features an airlock via entrance vestibule and maintaining weather stripping on these doors should be part of an ongoing operations and maintenance program.
- EMG recommends that all future replacements of doors exposed to the weather are performed using EnergyStar rated systems and that all future apartment and common area doors not exposed to the weather are replaced with appropriately fire rated renewable resource or rapidly renewable wood products.
- Based on the Estimated Useful Life and the observed conditions, replacement of the storefront building access system is recommended during the reserve term. The common area doors were not found to be of good energy efficiency rating. Where possible, we recommend all future replacements utilize a well-sealed, insulated-pane storefront access system. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- No significant problems were observed with the interior apartment entry doors. Based on their Estimated Useful Life and the observed conditions, replacements are recommended during the reserve term. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- All future replacements of dwelling unit doors are recommended to utilize renewable resource or rapidly renewable wood products.
- The sealant appeared to be flexible and smooth. Based on its Estimated Useful Life and the observed conditions, replacements are recommended during the reserve term. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.

3.3.5. Roofing

Item	Description	Action	Condition	Replacement
Type	Flat			
Finish	Built-up membrane with asphaltic wearing layer	RR	Good to fair	Green
Maintenance	Maintained by in-house staff or outside contractor as needed			
Age	The roof finishes are approximately 12 years old			
Warranties	Information regarding roof warranties or bonds was not available.			
Drainage	Internal drains	RM	Good	Traditional
Flashing	Built-up base and edge flashing	RM	Good	Green
Parapet and Copings	Metal drip edge	RM	Good	Traditional
Soffits, Eaves, and Fascias	Concealed soffits	RM	Good	Traditional
Skylights	Not applicable	NA	NA	NA
Attics	Not applicable	NA	NA	NA
Ventilation	Not applicable	NA	NA	NA
Other	Steel-framed canopy over pedestrian walkway along front elevation	RM	Good	Traditional

Green Physical Condition Discussions:**Reflective Roofing**

As part of any roofing rehabilitation, reduce the roof temperature by specifying cool roof products that meet Energy Star levels of efficiency. Installing a radiant barrier can reduce 90 percent or more of roof deck radiant heat. This measure reduces the air-conditioning load, minimizes the heat island effect, and extends the roof life.

To qualify for the Energy Star label, roofing products must meet the following specifications:

- For low-slope roofs (surfaces with a slope of 2:12 inches or less), the initial solar reflectance must be at least 0.65. The material must maintain a solar reflectance of at least 0.50 after three years of installation under normal conditions.
- For high-slope roofs (surfaces with a slope of 2:12 inches or greater), the initial solar reflectance must be at least 0.25. The material must maintain a solar reflectance of at least 0.15 after three years of installation under normal conditions.

A payback analysis was performed to install an Energy Star rated reflective roofing system. The payback period was calculated as 99 years. Based on the results of the payback analysis, the use of reflective roofing materials is not recommended.

Vegetative Roofing

Green roofs are a combination of vegetation and soil planted on a waterproof membrane atop a roof. They reduce roof temperature, cooling costs, and storm runoff. In addition to reducing cooling costs and minimizing storm water runoff, green roofs also:

- Filter pollution
- Reduce sewage system loads
- Protect underlying roof material from UV and temperature fluctuations
- Provide habitat for small animals
- Absorb carbon dioxide (CO₂)
- Offer an attractive alternative to traditional roofs
- Reduce noise transfer from the outdoors

The current structure and roofing configuration are not conducive to a vegetative roofing system. Green roofing is not recommended.

Observations/Comments:

- The subject property is not a candidate for energy savings related to installing an EnergyStar rated roofing system based on financial payback.
- According to the Point of Contact, there are no active roof leaks. This opinion was confirmed by our visual observations.
- No evidence of roof deck or insulation deterioration was observed or, according to the Point of Contact, reported. These items should be inspected during any future roofing repair or replacement. Based on the results of this assessment, no further actions appear to be required at this time.
- No evidence of fire retardant treated plywood (FRT) was observed in EMG's limited survey, and no use of FRT was reported by the Point of Contact. Based on the results of this assessment, no further actions appear to be required at this time.
- The primary roof is approximately 12 years old. According to the Point of Contact, the previous roofing replacements have included the complete removal of the prior roof. Based on the Estimated Useful Life and the observed conditions, replacement is recommended during the reserve term. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- Roof drainage appeared to be adequate. Clearing and minor repair of drain system components should be performed regularly as part of routine maintenance.

3.4. MECHANICAL AND ELECTRICAL SYSTEMS**3.4.1. Plumbing****3.4.1.1 Common Area Plumbing and Domestic Hot Water**

Item	Description	Action	Condition	Recommendation
Water Meter	Meters in vaults along public street	RM	Good	Traditional
Domestic Water Supply	Copper pipe	RM	Good	Traditional
Domestic Waste and Ventilation	Cast iron pipe and PVC	RM	Good	Traditional

Item	Description	Action	Condition	Recommendation
Domestic Hot Water	3 Central gas-fired boilers with 180,000 btu/hr capacity each 3 storage tanks with 140-gallon capacity each	RR	Good	Traditional
Vent Damper	Domestic Water Boiler are equipped with vent dampers The Boilers are not equipped with Outside Air temperature Reset Controls			
Electronic Ignition	Domestic Water Boilers have electronic ignition			
Insulation	Piping and tank insulation	RM	Good	Traditional
Common Area Restroom Fixtures	Commercial grade bath fixtures and accessories Standard flow fixtures	GS	Good	Green

Observations/Comments:

- The plumbing systems appear to be well maintained. The water pressure appears to be adequate. The plumbing systems will require routine maintenance during the reserve term.
- There is no evidence that the property uses polybutylene piping for the domestic water distribution system. In addition, the POC indicated that polybutylene piping is not used at the property.
- The pressure and quantity of hot water appear to be adequate.
- Domestic water heater sizing is included in the Energy Audit.
- Based on their estimated Remaining Useful Life (RUL), the indirect water heaters will require replacement during the reserve term. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- The boilers are replacements and appear to be approximately seven years old. Based on the Estimated Useful Life and the observed conditions, replacement is recommended during the reserve term. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- A payback analysis was completed for replacement of the existing domestic water boilers with high efficiency condensing boilers. The payback period is 45.5 years and early replacement is not recommended. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- The hot water storage tanks are replacements. Based on the Estimated Useful Life and the observed conditions, replacements are recommended during the reserve term. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- Hot water piping, tanks, and heat exchangers are well insulated. Approximately ten linear feet of insulation is missing on the lines in the sprinkler room and will require installation through routine maintenance. Refer to the Energy Audit for further discussion and payback analysis if appropriate.

3.4.1.2 In-Unit Plumbing and Domestic Hot Water

Item	Description	Action	Condition	Recommendation
Domestic Hot Water	Served by central system. Refer to Section 3.4.1.1.	RM	Good	Traditional
Insulation	Piping and tank insulation	RM	Poor	Traditional

Item	Description	Action	Condition	Recommendation
Apartment Bathrooms	Lavatory, vanity, bathtub, water closet	TR	Good to poor	Traditional

Where accessible we observed that the domestic hot water piping in the individual dwelling unit is not insulated.

The existing showers and sinks have water saving fixtures. Plumbing fixture flow rates are detailed in the water testing table below. The existing toilets are rated at 3.5 gallons per flush (GPF).

Hot water temperature was physically measured at a random but representative number of dwelling units. The temperatures recorded are as follows:

Sample Location	Faucet Location	Measured Temperature
Dwelling Unit - 518	Kitchen	108.2° F
Sample Location	Faucet Location	Measured Temperature
Dwelling Unit - 514	Bathroom	106.5° F
Dwelling Unit - 416	Kitchen	106.5° F
Dwelling Unit - 114	Bathroom	113.4° F
Laundry Room	Laundry Sink	122.1° F
Community Room	Kitchen	121.2° F
Rental Office	Restroom	120.7° F

EMG performed a flow test of the bathroom and kitchen faucets and showerhead and found each fixture to meet the requirements of the 1995, the National Energy Policy Act as follows:

Sample Location	Fixture	NEPA Guidance – Gallon Per Minute /Flush	Flow Test Results
Dwelling Unit - 518	Faucets	2.2 gpm	2.2 gpm
Dwelling Unit - 518	Showers	2.5 gpm	3.0 gpm
Dwelling Unit - 514	Faucets	2.2 gpm	2.2 gpm
Dwelling Unit - all	Toilet	3.5 gpf	3.5 gpf

Observations/Comments:

- The water pressure and quantity of cold water was observed to be adequate. Based on the results of this assessment, no further actions appear to be required at this time.
- The quantity of hot water was not adequate. Water temperatures were under 108 degrees in the morning. It was reported during the service call that was answered during the inspection that one of the boilers was not firing. It was repaired during the assessment.
- Domestic water heater sizing is included in the Energy Audit.
- Bathroom plumbing fixtures were generally original. All of the kitchens fixtures have been replaced as needed. Replacements are anticipated during the reserve period. The lack of proper drainage at the tubs

was reported and observed. Approximately 50% of the tubs require replacement with resetting. Approximately 20% have been replaced and reset; although, the laterals were not replaced. The resetting involves notching the slabs since the traps are embedded in the slabs. Approximately six are performed each year. The remaining units will require this work. The work also involves replacing the laterals since they are not sloped properly. It was reported that none of the laterals have been reinstalled with proper sloping. The cost for standard replacement work is included in the 20 Year Reserve Schedule as a Reserve Item. A cost allowance for the tub and lateral work is included in the 20 Year Reserve Schedule as a Rehab Item.

- The domestic water distribution piping does not have a history of chronic leaks. Based on the results of this assessment, no further actions appear to be required at this time.
- No polybutylene piping was observed at this property, and the maintenance supervisor reported that it was not used at the property. Based on the results of this assessment, no further actions appear to be required at this time.
- Hot water piping, tanks, and heat exchangers are not insulated. None of the apartments have insulated piping and will require installation. Refer to the Energy Audit for further discussion and payback analysis if appropriate.

3.4.2. Heating, Ventilating, and Air-conditioning (HVAC)

3.4.2.1 Common Area HVAC

Item	Description	Action	Condition	Recommendation
Maintenance	Maintained by outside contractor			
Age and Type	The HVAC equipment appears to vary in age			
Heating & Air-conditioning	Gas-fired rooftop packaged unit Electric split systems with pad-mounted condensing units	RR	Good	Green
Refrigerant	R-410A			
Quantity/Capacity	1 condensing unit @ 7.5 tons, 13 SEER, 2010 1 condensing unit @ 15 tons, 13 SEER, 2010 1 gas-fired packaged unit @ 10 tons, 13 SEER, 2010			
Vent Damper	Not applicable			
Boiler Controls	Not applicable			
Distribution	Ducts from roof to spaces Air handlers – one with hot water coil connected to domestic water storage tank, one natural gas-fired and one electric Circulating pumps	RM	Good	Traditional
Controls	Local thermostats	RM	Good	Traditional
Ducts	Concealed ducts above ceilings	RM	Good	Traditional
Insulation	Ducts not insulated and sealed Piping and tanks insulated	GS	Fair	Green

Item	Description	Action	Condition	Recommendation
Supplemental systems	PTAC's for Rental Office Through the wall air-conditioning unit in laundry room Ceiling-mounted unit heater in compactor room Electric resistance wall-mounted heaters at 3 entrances	RR	Good	Traditional
Ventilation	Bathroom exhaust fans Central exhaust fans with concealed ducts to spaces 39 Fans	GS	Fair	Green
Load Sizing	Manual J Load Sizing Calculations are included in the Energy Audit	NA	NA	NA

Observations/Comments:

- The rooftop package HVAC unit appeared to be well-maintained. Based on its Estimated Useful Life, replacement is recommended during the reserve term. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- The three Trane condensing units are four years old and were replaced in 2010. Based on the Estimated Useful Life and the observed conditions, replacements are recommended during the reserve term.
- A payback analysis was completed for replacement of the existing condensing units with Energy Star rated condensing units (16 SEER or better). The payback period is 61.3 years and early replacement is not recommended. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- The electric baseboard heaters appeared to be original. Based on the Estimated Useful Life and the observed conditions, replacement is recommended during the reserve term. Based on the minimal cost, the work can be performed through routine maintenance.
- The through-the-wall air-conditioning units have been well maintained. Due to their estimated Remaining Useful Life (RUL), replacement is recommended during the reserve term. Based on the Estimated Useful Life and the observed conditions, replacements are recommended during the reserve term. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- A payback analysis was completed for replacement of the existing through-the-wall air-conditioning unit in the laundry room with Energy Star rated AC units (9.4 EER or better). The payback period is 18.1 years and early replacement is recommended. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.

3.4.2.2 In-Unit HVAC

Item	Description	Action	Condition	Recommendation
Maintenance	Maintained by in-house staff			
Age and Type	The HVAC equipment appears to vary in age			
Heating and Air-conditioning	Electric baseboard radiators (new ones have oil) Individual thru-wall air-conditioning units provided by tenants	CR/RS RR/RM/NA	Good / Fair/ Poor	Traditional / Green
Refrigerant	Could not be determined			

Item	Description	Action	Condition	Recommendation
Quantity/Capacity	One to two air conditioners @ 1 ton each per apartment, 9.5 SEER Three baseboard heating units per apartment			
Distribution	Outlet vents at thru-wall air-conditioning unit	RM	Good	Traditional
Controls	Standard thermostats	RM	Good	Green
Ducts	Not applicable	NA	NA	NA
Insulation	Not applicable	NA	NA	NA
Ventilation	Bathroom and kitchen exhaust fans	RM	Good	Traditional
Load Sizing	Manual J Load Sizing Calculations are included in the Energy Audit	NA	NA	NA

It was reported by Jim Giel, that approximately 90 percent of the HVAC units are original. A replacement program is in place on an "as needed" basis.

The apartment units are not equipped with programmable thermostats. The pre-programmed settings that come with Energy Star qualified programmable thermostats are intended to deliver savings without sacrificing comfort. Depending on the tenant's schedule, one can see significant savings. The key is to establish a program that automatically reduces heating and cooling based on the tenants' lifestyles. Programmable thermostats are recommended for this property as a Green Significant Addition. The cost for installation of the programmable thermostats is not included in the cost tables.

The kitchen in each apartment unit is vented to the exterior by wall-mounted exhaust vents. The bathroom is ventilated to the exterior by wall-mounted exhaust fans.

Observations/Comments:

- Approximately 90% of the electric baseboard fin-tube units are original. Due to their condition and the estimated Remaining Useful Life (RUL) of the remaining units, some replacement should be expected during the reserve term. It was reported that the units seem inadequate. Some residents use portable heaters. See Sections 3.3.2 and 3.3.4 regarding insulating the exterior walls and sealing against air infiltration. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- The through-the-wall air-conditioning units are supplied by the residents and are reportedly their responsibility to maintain or replace. Based on the results of this assessment, no further actions appear to be required at this time.
- The bathroom exhaust fans are ducted to the exterior of the building. It was reported that cold air is felt during windy days. The exhaust fans require dampers. Based on their estimated Remaining Useful Life (RUL), replacement of the exhaust fans with energy star rated fans during the reserve term is recommended. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- The kitchen exhaust fans are ducted to the exterior of the building. Based on their estimated Remaining Useful Life (RUL), replacement of the exhaust fans with energy star rated fans during the reserve term is recommended. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.

3.5. BUILDING ELEVATORS AND CONVEYING SYSTEMS

Item	Description	Action	Condition	Recommendation
Type and Quantity	Two hydraulic passenger elevators 2,000 and 2,700-pound capacity Manufactured by Thyssen Krupp machinery and Galaxy Elevator Controls	RR	Good	Traditional
Maintenance	Service contract with Slade			
Inspection Certificate	Posted in cab; expired on 9/19/2013.			
Equipment	Located in room adjacent to shaft	RM	Good	Traditional
Other Devices	Electric safety stops Emergency communication equipment	RM	Good	Traditional
Elevator Cab Finishes	Vinyl floor, plastic-laminated and stainless steel paneled wood wall panels, soffited ceiling with recessed light fixtures	RM	Good	Traditional

Observations/Comments:

- According to the Point of Contact, the number of elevators and the responsiveness provides adequate service for the building. Based on the results of this assessment, no further actions appear to be required at this time.
- The maintenance staff stated that the elevator equipment is in good condition. The controls and cabs were replaced in 2004. No problems were observed at the time of EMG's site visit. Based on the Estimated Useful Life, some component repair and/or replacement is anticipated during the reserve term. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- The inspection was reported to have failed due need to replace an emergency lighting lamp. A follow up inspection is required. EMG recommends repairs as needed and an updated inspection is required. A hydraulic pressure test is scheduled.
- Replacement of the floor finish and wall panels in the cabs is recommended later in the term. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- According to the Point of Contact, the emergency communication equipment in the elevator operates properly. This opinion was not confirmed by our visual observations. Based on the results of this assessment, no further actions appear to be required at this time.

3.6. FIRE PROTECTION AND SECURITY SYSTEMS

Item	Description	Action	Condition	Recommendation
Sprinkler Systems	Wet pipe, automatic sprinkler system with flow switches, pull stations, and alarm horns Dry standpipes, Siamese connections and hose cabinets Backflow preventer Fire water pump (750 gpm) and diesel powered pumping equipment	RM	Good to fair	Traditional

Item	Description	Action	Condition	Recommendation
Other Equipment and Devices	Central alarm panel, strobe light alarms, illuminated exit signs, battery back-up light fixtures, hard-wired with battery back-up smoke detectors	RM	Good	Traditional
Special Systems	Not applicable	NA	NA	NA
Fire Extinguishers	Located throughout interior spaces Last service date in November 2013	RM	Good	Traditional
Fire Hydrants	Located along adjacent public streets	RM	Good	Traditional
Stair Wells	Painted concrete masonry unit stairwell walls Fire-rated doors and door hardware Pressurized stairwells with mechanical smoke evaluation system	RM	Good	Traditional

Smoke detectors were observed in the immediate vicinity of the bedrooms outside of the bedroom, and on all levels of the dwelling unit. The smoke detectors are hardwired operated and meet the NFPA 101 requirements.

Carbon monoxide detectors were observed in the boiler room. There is no fuel-fired combustion equipment in the dwelling units hence carbon monoxide detectors are not required at those locations.

Observations/Comments:

- Information regarding fire department inspections is included in Section 4.2.
- Per the NFPA 101 requirements, smoke detectors are not located at appropriate locations. Smoke detectors are required in every bedroom, in the immediate vicinity of the bedrooms outside of the bedroom, and on all levels of the dwelling unit. Additionally, the smoke detectors must be hard-wired, or the battery operated-type must have 10-year life, be tamper resistant, and are not interchangeable with appliances or toys. As such, smoke detector installation is required in the bedrooms. The cost for this work is included in the 20 Year Reserve Schedule as a Rehab Item. There is no Green Alternative for this item.
- The smoke detector alarms are local within each apartment unit, but not in the bedrooms.
- The fire sprinklers are inspected by a qualified contractor on a routine basis. The fire sprinklers will require routine maintenance during the reserve term. Sprinklers are not located in the apartment units.
- The fire pump has a clogged drain hole and is seeping around a joint. Repairs are required. The cost of this work is relatively insignificant and can be performed through routine maintenance.
- The fire extinguishers are serviced annually. The fire extinguishers were serviced and inspected within the last year.
- The pull stations and alarm horns will require routine maintenance during the reserve term.
- Smoke detector replacement is considered to be routine maintenance.
- Exit sign and emergency light replacement is considered to be routine maintenance.
- The central alarm panel is serviced regularly by a qualified fire equipment contractor. Equipment testing is not within the scope of a Physical Condition Assessment. Based on inspection documents displayed by the panel, the central alarm panel has been inspected within the last year. Based on the Estimated Useful Life and the observed conditions, replacement is recommended during the reserve term. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- The exit stairwells appear to have been constructed in accordance with applicable codes in force at the time of construction. The stairwells appear to be in general compliance.

- The stairwell doors and door hardware are fire-rated. Components bearing certification labels are displayed on the doors.

3.7. INTERIOR ELEMENTS

3.7.1. Common Areas

3.7.1.1 Interior Finishes

The following table identifies the interior common areas and generally describes the finishes in each common area.

Common Areas						
Renovations/FF&E	The interior finishes in the common areas have not been renovated within the last ten years. The FF&E primarily consists of chairs, desks, tables, lobby furniture and office equipment					
Area	Floor	Walls	Ceilings	Action	Condition	Replacement
Rental Office	Carpet	Painted drywall	Suspended T-bar with tiles	RM	Good to fair	Green
Lobbies	Carpet	Painted drywall	Suspended T-bar with tiles	RR	Good to fair	Green
Elevator lobbies	Carpet	Painted drywall	Suspended T-bar with tiles	RR	Good to fair	Green
Corridors	Carpet	Painted drywall	Suspended T-bar with tiles	RR	Good to fair	Green
Common Area Restrooms	Ceramic tile	Ceramic tile wainscot and painted drywall	Suspended T-bar with tiles	RM	Good	Green
Common Area Kitchen	Vinyl Composite Tile	Ceramic tile wainscot and painted drywall	Suspended T-bar with tiles	RR	Good	Green
Community Room	Vinyl Composite Tile	Painted drywall	Suspended T-bar with tiles	RR	Good to fair	Green
Laundry Room	Vinyl Composite Tile	Painted drywall	Suspended T-bar with tiles	RR	Good	Green
Laundry Equipment	4 Washers, Residential scale, Coin-Op 4 Dryers, Residential scale, electric, Coin-Op			GS	Good to fair	Green

Green Physical Condition Discussions: For all residential or commercial-grade clothes washers, purchase or lease products that are Energy Star-qualified with a modified energy factor (MEF) of at least 1.72 and a maximum water factor of 8.0. For all residential-grade clothes dryers, purchase or lease products that are

natural gas–fueled and ventless (require no exhaust). In addition, look for a dryer with a moisture sensor that automatically shuts off when your clothes are dry. This measure reduces energy and water bills.

Consider energy conservation measures, such as scheduling of operation of laundry facilities during non-peak electrical demand periods and using cold water rinse cycles in all new machines. Although warm or hot water is necessary to wash many types of clothing, cold water can be used in the rinse cycle for all applications. Converting laundries to cold rinse cycle can generate significant energy savings by cutting down on hot water use.

Observations/Comments:

- Based on the Estimated Useful Life and the observed conditions, painting of the interior walls is recommended during the reserve term. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- The common area floor finishes were observed with slight joint separation and isolated cracking. Based on the Estimated Useful Life and the observed conditions, replacement is recommended. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- Recommended replacement of the common flooring within should use a green natural linoleum product, as this material has an extended useful life and natural anti-microbial properties. Similar green flooring should be installed within the common laundry room. The recommendation is made for future improvements and replacement to use linoleum with no-VOC adhesive; as well as a recycled carpet (e.g. Shaw). The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- The public restrooms have been renovated since the building was constructed. The estimated Remaining Useful Life (RUL) of the finishes indicates that some replacement of fixtures, flooring, wall and ceiling finishes will be necessary during the reserve term. The cost of this work is relatively insignificant and can be performed through routine maintenance. See Section 3.4.1.2 for toilet replacement costs included with residential units.
- The building's laundry room contains washers and dryers owned and maintained by the property. The washers and dryers are approximately five years old. Due to the estimated Remaining Useful Life (RUL) replacement of the washers and dryers is anticipated during the reserve term. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item. The Green Alternative is recommended.
- EMG recommends the common laundry facilities are modified to a cold water rinse cycle in an effort to conserve energy. The washing machines are owned by the property, conversion of the laundry rinse cycle to cold water can be done by maintenance staff or an outside service person.

3.7.1.2 Building Electrical Service and Lighting

Item	Description	Action	Condition	Recommendation
Service Type	Underground lines to pad-mounted transformers			
Service Size	1,200 and 2,500 and 3,000-Amp, 120/208-Volt, three-phase, four-wire, alternating current (AC)			
Electric Meters and Equipment	Meters in electrical room Circuit breaker panels located inside	RM	Good	Traditional
Wiring	Copper wire in metallic conduit	RM	Good	Traditional

Item	Description	Action	Condition	Recommendation
Common Area Lighting	Standard and Energy Efficient Fluorescent Light Fixtures 4 foot linear T-12 fixtures, 40 Watt (5) – tuck-in parking, (5) boiler, (2) elevator equipment, (1 each) common restrooms, (28) community room 2 foot U shape T-12, 34 Watt – mailbox area and (17) office 34 Watt Compact Fluorescent bulbs – trash rooms T-8 corridors	GS	Good	Green
Emergency generator	Diesel powered 125 KVA emergency electrical generator with exterior, steel, double walled, aboveground fuel tank at 300 gallons.	RR	Good	Traditional

Observations/Comments:

- The electrical power was reported to be adequate for the building demands common area lighting was replaced in all units 10 months ago.. Based on the results of this assessment, no further actions appear to be required at this time.
- The switchgear, circuit breaker panels and electrical meters appeared to be in good condition. Based on the results of this assessment, no further actions appear to be required at this time.
- The emergency generator is reportedly exercised weekly and appeared to be in good condition. This equipment will require routine maintenance. The fuel pump was rebuilt two years ago. Based on the Estimated Useful Life, replacement is recommended. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- A payback analysis was completed for replacement of the existing common area fluorescent lighting with Energy Star rated Super T-8 light bulbs and electronic ballasts. The payback period is 13.9 years and early replacement is recommended. The cost for this work is included in the 20 Year Reserve Schedule as a Rehab Item.

3.7.2. Dwelling Units**3.7.2.1 Cabinetry and Countertops**

The kitchen cabinets are constructed of plastic-laminated wood. The countertops are wood and have a plastic-laminated finish.

Green Physical Condition Discussions: Cabinet and countertop replacement projects should specify durable, formaldehyde-free materials, which will increase indoor air quality. Cabinets should feature hardwood assemblies and doors, or exterior-grade plywood or formaldehyde-free MDF boxes assembled with adhesives, screws, and bolts. Many composite woods are produced with formaldehyde binders that off-gas after installation. Formaldehyde glues in composite wood products come in two forms: urea and phenol. Urea-formaldehyde binders are more common.

Observations/Comments:

- The kitchen cabinets and countertops are generally replacements at 10 to 12 years old. Based on their Estimated Useful Life and the observed conditions, replacement of the units is recommended during the reserve term. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.

3.7.2.2 Appliances

Each apartment unit kitchen typically includes the following appliances:

Appliance	Comment
Refrigerator	Frost-free
Range	Electric
Hood	Ductless (wall-mounted vents)
Dishwasher	Not provided
Disposal	Not provided

Green Physical Condition Discussions: Rehabilitation projects should encourage the use of EnergyStar rated refrigerators, dishwashers, and clothes washers as part of any appliance replacement. EnergyStar® appliances save water, energy, and money. EnergyStar is a joint program of the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE). It is a voluntary labeling program that aims to reduce greenhouse gas emissions by helping consumers to purchase the most energy-efficient products available. EnergyStar sets standards for energy efficiency that roughly target the upper 20 percent of current off-the-shelf technologies. Products that meet the energy efficiency requirements are eligible for the EnergyStar label. In addition to saving energy, many qualified products also save water. The planned rehabilitation project should include replacement of all refrigerators within the dwelling units and community room. In addition, the community room dishwasher should be replaced. The recommendation is made to ensure that EnergyStar compliant refrigerators be installed. Electric ranges are not rated by EnergyStar.

Observations/Comments:

- Approximately 90 percent of the refrigerators are four years old. The remaining are 16 years old. Apartment appliances are reportedly replaced on an "as needed" basis. The ranges vary in age.
- The refrigerators are not Energy Star rated. Based on their estimated Remaining Useful Life (RUL) and their observed condition, the refrigerators will require replacement during the reserve term.
- A payback analysis was completed for replacement of the existing refrigerators with Energy Star rated refrigerators. The payback period is 214.6 years and early replacement is not recommended for the older units. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- The ranges appear to be well maintained. Based on their estimated Remaining Useful Life (RUL) and their observed condition, the ranges will require replacement during the reserve term. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.

3.7.2.3 Interior Finishes

The following table generally describes the interior finishes in apartment units:

Typical Apartment Finishes			
Room	Floor	Walls	Ceiling
Living room	Carpet	Painted drywall	Painted drywall

Typical Apartment Finishes			
Room	Floor	Walls	Ceiling
Kitchen	Vinyl tile	Painted drywall with ceramic tile backsplash	Painted drywall
Bedroom	Carpet	Painted drywall	Painted drywall
Bathroom	Ceramic tile	Painted drywall and ceramic tile tub surround	Painted drywall

The interior doors in each apartment unit are painted hollow-core wood doors set in wood frames. Wardrobe closets are accessed by bi-fold doors.

Green Physical Condition Discussions: Flooring products may emit formaldehyde and other VOCs. As part of any flooring replacement, specify flooring products that have been tested and approved for low emissions according to the California "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small Scale Environmental Chambers," also known as Specification 01350. Any adhesives used in installing flooring materials should be under 50 gm/VOCs). This measure will improve indoor air quality for occupants and reduce environmental damage associated with VOCs. In addition, to improve indoor air quality, alternate flooring materials should be explored (e.g. natural linoleum, bamboo, wool, natural grasses/fibers and ceramic tile). Vinyl flooring is often referred to as "linoleum;" however, does not feature the same physical properties of linoleum. The use of natural linoleum will reduce replacement costs, increase durability, and minimize the impact on the environment. Natural linoleum is made from rapidly renewable materials including linseed oil (from flax), powdered wood and/or cork, ground limestone, resin binders, and dry pigments with a natural jute fiber backing. Where carpet is installed or replaced, specification of low-VOC carpet (Carpet and Rug Institute (CRI) "Green Label"), and a "green" installation method (e.g. no adhesives for carpet padding or carpet, air changes after installation, etc.) is recommended.

Observations/Comments:

- The residential units are typically renovated upon tenant turnover. The renovation generally consists of floor finish cleaning or replacement, interior painting, general cleaning, and repair or replacement of any damaged items.
- The interior finishes in the apartment units are not original. Based on estimated Remaining Useful Life (RUL), apartment unit painting will be required during the reserve term. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- The floor coverings in the apartment units are in good to fair condition. Some of the carpet is stained – approximately 15%. Based on its estimated Remaining Useful Life (RUL), the carpet and vinyl flooring will require replacement during the reserve term. The recommendation is made for future improvements and replacement to use linoleum with no-VOC adhesive; as well as a recycled carpet (e.g. Shaw). The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- The interior doors and door hardware have been damaged and will require replacement. It was reported that the panels are too heavy for the tracks and fall out easily. The tracks should be replaced with a heavy duty system or the doors replaced with lighter weight material. A cost allowance for this work is included in the 20 Year Reserve Schedule as a Rehab Item.

3.7.2.4 In-Unit Electrical Service and Lighting

Item	Description	Action	Condition
Apartment Service Size	60-Amps, 120/208-Volt, three-phase, four-wire, alternating current (AC)		

Item	Description	Action	Condition
Electric Equipment	Circuit breaker panels at each apartment	RM	Good
Wiring	Copper wire in non-metallic sheathed cable	RM	Good

Lighting fixtures in the apartments are a mixture of residential-style fixtures. The following table describes the lighting configuration in each apartment unit type.

Apartment Unit Type	Fluorescent (T-12, 40 Watt) Fixtures/Bulbs Kitchen	Fluorescent (CFL, 26 Watt) Fixtures/Bulbs Bathroom and hall
1-Bedroom	1/2 - 2'	1/2 - (1 each space)
2-Bedroom	1/2 - 2'	1/2 - (1 each space)
TOTALS	95/190	190/380

An intercom system located in each unit provides remote access at the front entry.

Ground fault circuit interrupters (GFCI) were observed in the kitchen and bathroom in each unit.

Observations/Comments:

- The electrical service to the tenant units is adequate. The observed wiring was copper.
- The interior light fixtures appeared to be in good condition. Based on the Estimated Useful Life and the observed conditions, replacements are recommended during the reserve term. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.
- The intercom system is still in use by the residents. Equipment testing is beyond the scope of work. It was reported to be operational and repair parts are able to be found. Based on the Estimated Useful Life and the observed conditions, replacements are recommended during the reserve term. The cost for this work is included in the 20 Year Reserve Schedule as a Reserve Item.

3.8. OTHER STRUCTURES

Item	Description	Action	Condition
Storage building	Pre-manufactured wood set of a concrete slab with vinyl siding and shingle roof	RM	Good

Observations/Comments:

- The storage building was observed to be in good condition requiring routine maintenance.

4. CODE COMPLIANCE AND ACCESSIBILITY

4.1. ENERGY CONSERVATION CODE REVIEW

The Energy Conservation Code applies to new construction and is utilized as minimum requirement standard. The methodology of this report offers assurance that recommended “green” replacements exceed the requirements of the local energy conservation code.

The 2009 version of the New Jersey Energy Conservation Construction Code was formally adopted on September 7, 2010. All projects permitted after this date will require compliance with the code. The ECC is based upon the 2009 version of the International Energy Conservation Code (IECC). Based upon the current interpretation of the IECC, and the original date of construction of the property built in 1982, regulations regarding energy efficiency cannot be retroactively applied to the property. However, the recommended green replacements within the 12-month repair schedule of this report exceed the performance requirements set by the IECC as outlined in the following table:

Energy Conservation Code (ECC)			
Equipment Type	Subcategory or Rating Condition	Local ECC Minimum Efficiency	EMG Green Replacement Recommendation
Heating	Gas Furnace	90% AFUE	AFUE \geq 95 or EnergyStar Rated
Cooling	Central Air-conditioning	13 SEER	> 13 SEER or EnergyStar
Appliances	Appliances	No Standard	EnergyStar Rated
Insulation	Ceiling /Attic	R Value 38	R Value 40 and meet 2009 IECC & Amendments
Insulation	Floor above crawlspace or unfinished basement	R Value 30	R Value 38 and meet 2009 IECC & Amendments
Window	Double Glazed	U Factor 0.35	U factor \leq 0.30 or EnergyStar Rated
Water heater	Natural Gas	In accordance with prevailing federal minimum standards	EnergyStar Rated
Water heater	Electric	In accordance with prevailing federal minimum standards	Energy Factor \geq 0.82 or a thermal efficiency of at least 90%.

4.2. BUILDING, ZONING, AND FIRE CODE COMPLIANCE

According to the New Jersey State Bureau of Housing Inspection, the Bureau does not have an annual inspection program for the Housing Authority. The Housing Authority performs self-inspections. A copy of the original Certificates of Occupancy were requested but were not available.

According to George Beck at the Borough of Palisades Park Building Department, the Department does not inspect government owned properties and has never inspected the subject building since initial construction. A copy of the original Certificates of Occupancy were requested but were not available.

A message was left with the Borough of Palisades Park Fire Department, pertinent information will be forwarded upon receipt.

According to the Flood Insurance Rate Map, published by the Federal Emergency Management Agency (FEMA) and dated September 30, 2005, the property is located in Zone X, defined as an area outside the 500-year flood plain with less than 0.2% annual probability of flooding. Annual Probability of Flooding of Less than one percent.

According to the 1997 Uniform Building Code Seismic Zone Map of the United States, the property is located in Seismic Zone 2A, defined as an area of low to moderate probability of damaging ground motion.

4.3. ACCESSIBILITY

Section 504 of the Rehabilitation Act of 1973 is a Federal accessibility law that was enacted on June 2, 1988. Section 504 applies to multi-family properties that have or are currently receiving funding from a Federal source. In the case of new construction, substantial rehabilitation (15 or more units with the cost of alteration is 75 percent or more of the replacement cost of the completed facility), and Other Alterations (modernizations and alterations to the property), the property must have a minimum of five percent mobility accessible units and two percent of the units for visual / audio hearing impairments. The percentage can be increased by HUD involved at their discretion. In the case of Other Alterations, exceptions can be considered due to undue financial burdens or structural restrictions. However, the exceptions do not relieve the recipients from compliance utilizing other units/buildings or other methods.

Reasonable Accommodations as described in 24 CFR 8.4(b)(i), 8.24 and 8.33 are described as follows: When a family member requires an accessible feature(s) or policy modification to accommodate a disability, property owners must provide such feature(s) or policy modification unless doing so would result in a fundamental alteration in the nature of its program or result in a financial and administrative burden.

The Uniform Federal Accessibility Standard (UFAS) 24 CFR part 40 was adopted by HUD and made effective October 4, 1984. The UFAS applies only to new construction or to alterations to the existing buildings. Alterations are defined as work that costs 50 percent or more of the building's value when the work performed occurs within a twelve month period.

Attachment B of the M2M Program Operating Procedures Guide indicates that Accessibility for Persons with Disabilities should be assessed when required by the program or for newly built properties.

The Fair Housing Amendments Act (FHA) of 1988 amended Title VIII of the Civil Rights Act of 1968 to aid in the prohibitions against discrimination in housing on the basis of disability and familial status. The Fair Housing Act also made it unlawful to design and construct certain "covered multi-family dwellings" for first occupancy after March 13, 1991, in a manner that makes them inaccessible to persons with disabilities. The Fair Housing Act also established design and construction requirements to make such dwellings readily accessible to, and usable by, persons with disabilities.

Covered multi-family structures meeting the FHA criteria, and first occupied on or after March 13, 1991, are required to comply fully with FHA. Existing facilities constructed prior to this date are not addressed by FHA unless the property receives federal subsidies. EMG provides a general assessment of the property's construction as it pertains to FHA. EMG does not assess FHA accessibility as it pertains to discrimination against persons as outlined in the Civil Rights Act.

Fair Housing Act FHA requires that certain "covered multi-family buildings" be accessible. FHA indicates that all ground floor units on a property, be upgradeable to accommodate persons that are mobility impaired. The elements as defined by FHA for accessibility are outlined on EMG's Accessibility Checklist included in the Appendices.

Generally, Title III of the Americans with Disabilities Act (ADA) prohibits discrimination by entities to access and use of "areas of public accommodations" and "commercial facilities" on the basis of disability. Regardless of their age, these areas and facilities must be maintained and operated to comply with the Americans with Disabilities Act Accessibility Guidelines (ADAAG).

Buildings completed and occupied after January 26, 1992 are required to comply fully with ADAAG. Existing facilities constructed prior to this date are held to the lesser standard of complying to the extent allowed by structural feasibility and the financial resources available; otherwise a reasonable accommodation must be made.

During the Green PCA, a limited visual observation for accessibility was conducted. The scope of the visual observation was limited to those areas set forth in the EMG Accessibility Checklist provided in Appendix F. It is understood by the Client that the limited observation described herein does not comprise a full Accessibility Compliance Survey, and that such a survey is beyond the scope of EMG's undertaking. Only a representative sample of areas were observed and, other than as shown on the accessibility checklist, actual measurements were not taken to verify compliance.

Based on the date of construction, 1978, the accessibility standards that apply to the Project are 504 and the ADA Guidelines. However, as the property is not new construction, or completing substantial rehabilitation or other rehabilitation, the property is only required to complete reasonable accommodations. Property management stated that Section 504 requests are completed on an individual case-by-case basis. Based on EMG's observations and interview of the Property Manager, the property is generally non-compliant with Section 504. Presently, eleven percent of the units are accessible for individuals with mobility impairments according to property management. There are no units at present which have visual / audio modifications, thus not meeting the two percent accessible requirements of 504. Based on EMG's assessment, additional units should be made accessible to the hearing impaired during rehabilitation projects. All units have strobes with the smoke alarms; although, there are no strobes associated with the doorbell or phone line. It was reported that the property would accommodate on an as needed basis.

Based on EMG's observations, the facility did not appear to be accessible with Section 504 and ADA. Elements observed at the property that were not accessible are as follows:

Parking

- An adequate number of designated parking stalls and signage for van access were not provided.

Estimated Cost: 1 @ \$200 each = \$200

Exterior Accessible Route

- Access aisles adjacent to parking spaces, crossing hazardous vehicle areas, and from main roadways or public transportation stops to the accessible building sidewalks and entrances are not provided. EMG recommends relocating the ADA stall to the northeast corner where the two adjacent stalls are located and are the originally designated ADA stalls. The current location cannot accommodate an access aisle.

Estimated Cost: 20 ft. @ \$5 LF = \$100

Common Area Restrooms

- Modify existing toilet room accessories and mirrors. The mirrors are mounted too high.

Estimated Cost: 2 @ \$200 each = \$400

Unit Accessible Route

- Existing entrance doors are not wide enough to accommodate wheelchair access and clear floor space beside the door swing is lacking.

Unit Bathrooms

- Existing toilet grab bars are not compliant in length.

A full Accessibility Survey may reveal further aspects of the facility which are not in compliance.

The cost to address the achievable items noted above is included as an Accessibility item in the Rehab Cost Tables. These corrective actions are not design standards and should not be interpreted as all inclusive. Building and structural design elements need to be reviewed by a local licensed architect or professional engineer for appropriate remedial action.

4.4. INDOOR AIR QUALITY AND MOLD

EMG performed a limited visual assessment of indoor air quality improvement opportunities in readily accessible interior areas of the property. EMG recommends that property owners and tenants consider implementing the following methods to improve indoor air quality:

- Utilize non-toxic cleaning products can often be made with products you already have in your home, including baking soda, vinegar, and lemon juice
- Designate an outside area, away from doors, windows, and air intakes for your HVAC system for smoking
- Minimize allergy and asthma triggers from pests like cockroaches and mice, keep food tightly sealed, and allow eating only in certain areas. Clean those areas daily.
- When dusting, wipe down surfaces with a damp cloth to keep the dust down. Mop regularly.
- Carpets hold a lot of dust and can also hold moisture. Clean up spills immediately and get the area very dry to reduce the possibility of mold growth.
- If you have hardwood floors or other smooth surfaces underneath the carpet, consider removing carpeting completely.
- Eliminate “dust catchers” from sleeping areas. These include fabric curtains, and stuffed animals.
- Plants can purify some toxins from the air, but also can hold a lot of dust, and if overwatered, mold. Dust your plants regularly and don’t overwater. Remove plants from rooms where sensitive individuals spend a lot of time, especially the bedroom.
- Wash bedding at least weekly in hot water to eliminate dust mites. Cold water washes designed to eliminate dust mites can also be found in online stores.
- Check your temperature and humidity levels. High temperatures and humidity levels can lead to mold growth.
- Consider carpeting that comes from sources that are naturally void of VOCs and other toxins. Moving away from petrochemical-based products, even if they are recycled, and are using natural fibers such as wool, jute, sisal, hemp, or coir (from coconut husks) benefit both environmentally-sensitive tenants and the environment.
- Install rubber “walk-off” mats or rugs for inside or outside of apartment unit doorways that can be washed in hot water (to eliminate dust and other particulate).
- Install rubber stair treads on common area stairways that can be easily swept, vacuumed and washed to eliminate dust and other particulate.

EMG performed a limited visual assessment for the presence of mold, conditions conducive to mold, and evidence of moisture in readily accessible interior areas of the property. EMG did not note obvious visual indications of the presence of mold, conditions conducive to mold, or evidence of moisture in readily accessible interior areas of the property. No further action or investigation is recommended regarding mold at the property.

Observations/Comments:

- EMG recommends installing rubber “walk-off” mats or rugs for inside or outside of apartment unit doorways that can be washed in hot water (to eliminate dust and other particulate). Wash the mats regularly and install a durable mat outside, in front of main building entry doorways.

- Install rubber stair treads on common area stairways that can be easily swept, vacuumed and washed to eliminate dust and other particulate. Wash the mats regularly and install a durable mat outside, in front of main building entry doorways.

4.5. FOLLOW UP RECOMMENDATIONS

No follow up recommendations are recommended.

5. ENVIRONMENTAL CONCERNS

The Environmental Restrictions Checklist was completed by an EMG Registered Architect or Professional Engineer through interviewing a knowledgeable person associated with the Project (e.g., a Project manager, maintenance person or owner who has been involved with the Project for a sufficient period of time so as to be familiar with any environmental issues); followed by a walk-through assessment, providing a cursory observation of representative areas of the Project and surrounding properties viewed from the Project. The information provided by the knowledgeable person associated with the Project is assumed to be complete and correct.

Based solely upon review of the information obtained from the Environmental Restrictions Checklist, the following are discussion of the positive responses:

Transformers potentially containing PCB's are located on the Project. EMG was not able to verify the contents. EMG assumes, per the *OHMAR Environmental Guidance*, that the transformers are PCB containing. As such, EMG recommends that an Operations & Maintenance Program be implemented. The cost for this work is included in the Twelve Month Physical Needs cost estimate (Table 1).

The property maintains two hydraulically-operated elevators. Documentation regarding the PCB content of the hydraulic oil was not available. EMG recommends that the property owner contact the elevator contractor to determine the PCB content of the hydraulic fluid. If the hydraulic fluid is determined to have PCB's, EMG recommends that the fluid be removed and disposed of in accordance with applicable regulations by a licensed contractor.

The property was built in 1978; although, it was reported that there is no lead paint.

Based on review of this information, further inquiry is needed to assess the environmental conditions for the purposes of appropriate inquiry.

RAD Environmental Restrictions Checklist

Project Name and Location (Street, City, County, ST, Zip Code): Highland View Apartments 300 Highland Avenue Palisades Park, New Jersey 07650	Owner Name, Address (Street, City, ST, Zip Code), and Phone: Housing Authority of Bergen County One Bergen County Plaza, Floor 2 Hackensack, New Jersey 07601 201.569.7454 George Stavrou	
Project Description: The multi-family property has one, six-story apartment building containing a total of 95 rental apartment units on a site of approximately 0.82 acres. Construction of the property was completed in 1978. On site amenities consist of outdoor seating areas, laundry facilities and community room which also serves the greater community as cooling and heating centers during emergencies.		
ENVIRONMENTAL REVIEW FINDINGS	YES	NO
FLOOD PLAIN		
Is the project located in a FEMA Special Flood Hazard Area?		√
Identify Map Panel and Date		
Does the project currently carry Flood Insurance?		
Do any structures appear to be within or close to the floodplain?		
HISTORIC PRESERVATION		
Is the property listed on the National Register of Historic Places?		√
Is the property located in a historic district listed on the National Register of Historic Places?		
Is the property located in a historic district determined to be eligible for the National Register?		
AIRPORT HAZARDS		
Is the project located in the clear zone of an airport? (24 CFR Part 51 D).		√
HAZARDOUS OPERATIONS		
Is there any evidence or indication of manufacturing operations utilizing or producing hazardous substances (paints, solvents, acids, bases, flammable materials, compressed gases, poisons, or other chemical materials) at or in close proximity to the site?		√
Is there any evidence or indication that past operations located on or in close proximity to the property used hazardous substances or radiological materials that may have been released into the environment?		√
EXPLOSIVE/FLAMMABLE OPERATIONS/STORAGE (24 CFR Part 51C)		
Is there visual evidence or indicators of above ground storage tanks (fuel oil, gasoline, propane etc.) or operations utilizing explosive/flammable material at or in close proximity to the property?		√
FOR YES RESPONSES, SUMMARIZE RESTRICTIONS BELOW:		
The above ground storage tank holds diesel fuel only		

ENVIRONMENTAL REVIEW FINDINGS	YES	NO
TOXIC CHEMICALS AND RADIOACTIVE MATERIALS		
Petroleum Storage		
Is there any evidence or indication of the presence of commercial or residential heating activities that suggest that underground storage tanks may be located on the property?		√
If yes, are any such tanks being used? If yes, indicate below whether the tank is registered, when it was last tested for leaks, the results of that test, and whether there are any applicable state or local laws that impose additional requirements beyond those required under federal law.		
Are there any out-of-service underground fuel storage tanks? If yes, indicate whether the tank was closed out in accordance with applicable state, local and federal laws.		
Is there any evidence or indication that any above ground storage tanks on the property are leaking?		
Polychlorinated Biphenyls (PCB)		
Is there any evidence or indication that electrical equipment, such as transformers, capacitors, or hydraulic equipment (found in machinery and elevators, installed prior to July 1, 1984) are present on the site?	√	
If yes, is any such equipment (a) owned by anyone other than a public utility company; and (b) not marked with a "PCB Free" sticker?	√	√
If yes, indicate below whether such equipment has been tested for PCBs, the results of those tests, and (if no testing has been performed) the proposed testing approach. (Electrical equipment need not be tested but will be assumed to have PCBs)		√
If PCBs are found in non-electrical equipment over 50ppm it must be replaced or retrofitted, otherwise any equipment with PCBs or assumed to have PCBs require an O&M Plan.		
Asbestos-containing Materials (ACM)		
Is there any evidence or indication of ACM insulation or fire retardant materials such as boiler or pipe wrap, ceiling spray, etc. within the buildings on the property? If yes, the property is required to have an Operations and Maintenance Plan for asbestos-containing materials.		√
Lead Based Paint		
Are there residential structures on the property that were built prior to 1978?		√
If yes, has the property been certified as lead-free?		√
If property has not been certified as lead-free, has a Risk Assessment been completed?		√
If yes, has the owner developed a plan including Interim Controls to address the findings of the Risk Assessment including Tenant notifications and an Operations and Maintenance plan?		
If yes, has a qualified Risk Assessor reviewed the Owner's plan and O&M plan for compliance with 24 CFR 35?		
OTHER RESTRICTIONS		
Are there any other restrictions, including easements, on this property that you are aware of (other than those included above) (e.g. pipeline, aviation, microwave, utility, rights of way (ROW), ingress/egress etc.)		√

FOR YES RESPONSES, SUMMARIZE RESTRICTIONS BELOW:

Transformers potentially containing PCB's are located on the Project. EMG was not able to verify the contents. EMG assumes, per the *OHMAR Environmental Guidance*, that the transformers are PCB containing. As such, EMG recommends that an Operations & Maintenance Program be implemented. The cost for this work is included in the Twelve Month Physical Needs cost estimate (Table 1).

The property maintains two hydraulically-operated elevators. Documentation regarding the PCB content of the hydraulic oil was not available. EMG recommends that the property owner contact the elevator contractor to determine the PCB content of the hydraulic fluid. If the hydraulic fluid is determined to have PCB's, EMG recommends that the fluid be removed and disposed of in accordance with applicable regulations by a licensed contractor.

6. GREEN BUILDING PRINCIPLES

Green Building or sustainable building is the practice of reducing the impact of buildings on the environment, both during construction and as part of the operation of the building systems. Their use of water, energy, and materials should be reduced through the use of new planning methods and material usage.

EMG's goal was to identify all opportunities to: 1) improve energy efficiency, 2) minimize water use, 3) use recycled or recyclable materials, 4) protect the indoor air quality, 5) reduce the 'carbon footprint' of the buildings and site, and 6) proper disposal of replaced materials.

The available Green Building Alternatives have been evaluated and are described in terms of cost and specification in the Mark to Market Underwriting tool. Where available, the Green Alternatives evaluated exceed the requirements of the current local energy conservation code. We compare the cost of traditional replacements and compare them to "green" replacements. The anticipated benefits of green approaches are discussed along with increased short term costs for the long term benefits of choosing "Green" or sustainable alternatives.

PART II - ENERGY AUDIT

1. EXECUTIVE SUMMARY

The Client contracted with EMG to conduct an Energy Audit consisting of field observations, utility review, benchmarking, and energy saving recommendations for the subject property, Highland View Apartments located at 300 Highland Avenue in Palisades Park, Bergen County, New Jersey 07650. The GRPCA was performed on March 6, 2014.

The multi-family property has one, six-story apartment building containing a total of 95 rental apartment units on a site of approximately 0.82 acres. Construction of the property was completed in 1978.

On site amenities consist of outdoor seating areas, laundry facilities and community room which also serves the greater community as cooling and heating centers during emergencies.

Many of the items covered in the Green PCA also provide useful information to the energy audit. In lieu of redundant reporting on these items, the following table provides report references to relevant items in the Green PCA:

Component	PCA Report Reference Section	Comments
Insulation (Wall, Attic, and Basement)	4.1	New construction code requirements outlined in Section 4.1. Upgrade to R-30
Exterior Doors	3.3.3	Energy Star replacements recommended at end of EUL.
Storm Doors	Not applicable	The property does not have storm doors.
Dishwashers	Not applicable	The property does not have dishwashers
Windows	3.3.3	Existing windows are double paned. Energy Star replacements recommended at end of EUL.
Sliding Glass Doors	Not applicable	The property does not have sliding glass doors.
Thermostats	3.4.2.1, 3.4.2.2	Setback thermostats are recommended.
Domestic Water Heaters	3.4.1.1, 3.4.1.2	Tanks are indirect fired tanks piped to the boilers.
Refrigerators	3.7.2.2	Replacement with Energy Star units recommended at end of EUL.
Water (Flow, Temperature)	3.4.1.2	Water testing outlined in section 3.4.1.2.
Ventilation	3.4.2.2	Replacement with Energy Star equipment recommended. See Green Comparison table.
Interior Lighting	3.7.2.4	CFL retrofit is recommended.
Common Areas	3.7.1.2	T-8 ballasts/bulbs recommended, Occupancy sensors recommended.
Exterior Lighting	3.2.6	Replace MH wall packs with LED wall packs.
Furnaces	3.4.2.1, 3.4.2.2	Property does not have furnaces.
Boilers (natural gas)	3.4.2.1, 3.4.2.2	Replacement with high efficiency models recommended. See Green Comparison table.
Heat Pump	3.4.2.1, 3.4.2.2	Property does not have heat pumps.
PTAC	3.4.2.1, 3.4.2.2	Replacement with high efficiency models recommended. See Green Comparison table.

Component	PCA Report Reference Section	Comments
AC (thru-the-wall)	3.4.2.1, 3.4.2.2	Residents supply their own Replacement with high efficiency models recommended. See Green Comparison table.
Laundry Area	3.7.1	Energy Star washers with cold rinse restriction recommended from vendor.
Other Commercial Space	Not applicable	Property does not have commercial spaces.
HVAC system conversion	3.4.2	System conversion not recommended.
Utility Rate Options	1.1 (Energy Audit)	Current utility rates were reviewed and appear acceptable. The existing utility rates are similar to the typical rates observed at similar properties.

2. UTILITIES & BENCHMARKING

2.1. UTILITY METERING

On site Utilities

The following is a summary of relevant information, addressed within the Utilities Data Sheet. See Section 3.2.7 for a listing of Utility Service providers.

Question	Answer
Water	
Identify the provider of water to the property.	United Water
Is gray water or well water is used for some purposes	No
How is the water usage measured	One meter for the entire building
Is the water paid by the residents via a separate meter?	No
Are there separate meters at the unit level	No
Is there a single water intake for each unit with unit specific water heaters	No
Where are the water meters physically located?	Sprinkler room
What is the number of water meters	Residential: 0 Common: 0 Master Meters: 1 Commercial: NA
Electric	
Are there any site generating activities to supplement (wind, solar)	No
What is the meter configuration? (How many covering what usage	One meter per apartment unit
Is the electricity paid by the residents via a separate meter?	Yes
Where are the electric meters physically located?	Meter rooms in main mechanical room
Are property and residential unit use separately metered?	Yes
Are there unit level electric meters or unit level breaker boxes?	Yes
What is the number of electrical meters	Residential: 95 Common: 1 Mixed Residential & Common: 96 Commercial: NA
Heating Fuel	
How is the property heated?	Electric baseboard, resistance heaters and PTAC, rooftop unit, air handlers
What is the heat source	Electric
Are there individual heating units for each unit?	Yes
Are there individual meters for the heating fuel?	NA

Question	Answer
Heating Fuel	
Are there separate heat sources for common areas/commercial areas?	Yes
Are all units/areas heated the same way?	No
Is the heating fuel included in a utility paid by the tenant via a separate meter	NA
For natural gas heat source, what is the number of heating fuel meters?	Residential: 0 Common: 0 Mixed Residential & Common: 0 Commercial: NA
Additional Utility Use Questions	
Are stoves electric or gas?	Electric
Are water heaters electric or gas?	Gas
Are there individual unit water heaters?	No
Are there different utility uses by building (rental or office/community use) due to renovations or scattered sites?	No

2.2. UTILITY RATES

Based upon the utility information provided about the Highland View Apartments, the following energy rates were utilized in determining existing and proposed energy costs.

Electricity (Blended Rate)	Natural Gas	Water / Sewer
\$0.11/kWh	\$0.57/therms	\$4.64/ccf

The data analyzed provides the following information: breakdown of utilities by consumption, cost and annual profile, baseline consumption in terms of energy/utility at the facility, the Energy Use Index, or Btu/sq ft, and cost/sq ft. For multiple water meters, the utility data was combined to illustrate annual consumption for each utility type.

2.3. ELECTRICITY

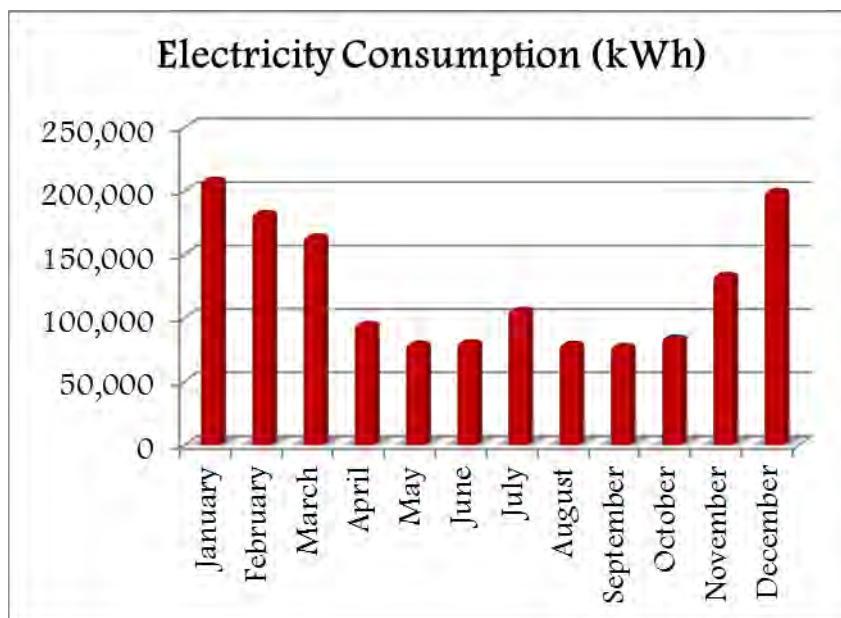
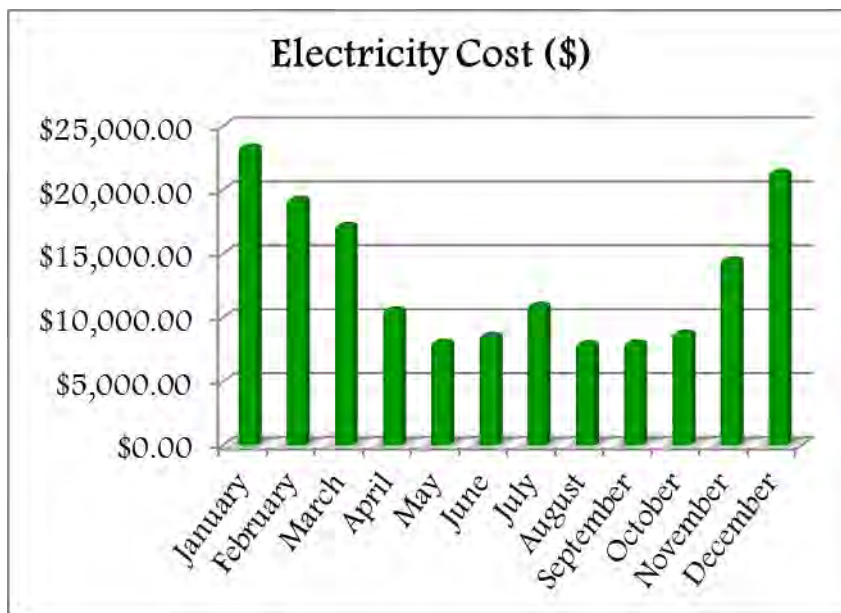
The electricity requirements of the facility are satisfied by **Direct Energy** and **PSE&G**.

Based on the electric usage and cost information provided, the average price paid during the past 12 months was \$0.11 per kWh. The total annual electricity consumption for the 12-month period analyzed is 1,494,446 kWh for a total cost of \$159,459.13.

The following table details in monthly electricity consumption and cost for the property:

Start Date	Consumption (kWh)	Unit Cost	Total Cost
January	208,921	\$0.11	\$23,428.63
February	182,568	\$0.11	\$19,304.19
March	164,297	\$0.11	\$17,270.47
April	95,349	\$0.11	\$10,653.51
May	79,769	\$0.10	\$8,117.95
June	80,890	\$0.11	\$8,681.05
July	106,422	\$0.10	\$11,030.75
August	79,643	\$0.10	\$8,023.04
September	78,011	\$0.10	\$8,081.53
October	84,624	\$0.10	\$8,841.89
November	133,990	\$0.11	\$14,593.68
December	199,966	\$0.11	\$21,432.45
Total	1,494,446	\$0.11	\$159,459.13

Average	124,537	\$0.11	\$13,288.26
Maximum	208,921	\$0.11	\$23,428.63
Minimum	78,011	\$0.10	\$8,023.04



2.4. NATURAL GAS

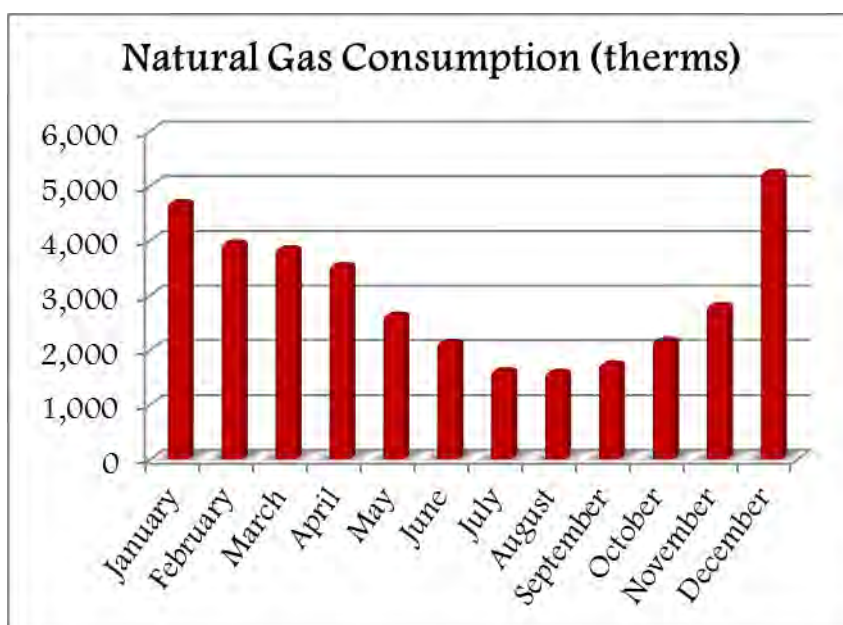
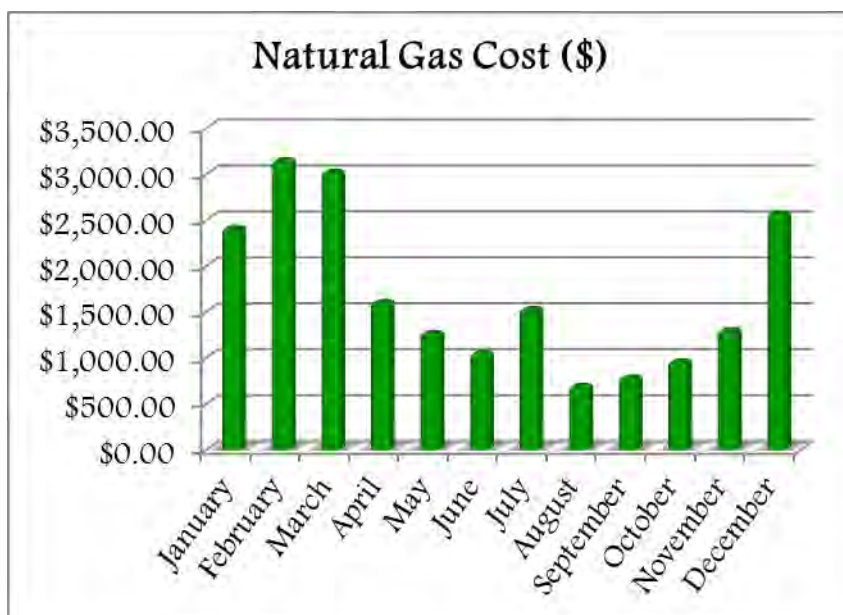
The natural gas requirements of the facility are satisfied by Woodruff Energy and PSE&G.

Based on the provided natural gas usage and cost data, the average price paid during the past 12 months was \$0.17 per therm. The total annual natural gas consumption for the 12-month period analyzed is 36,089 therms for a total cost of \$20,399.13.

The following table details in monthly natural gas consumption and cost for the property:

Start Date	Delivery (Therms)	Unit Cost	Total Cost
January	4,701	\$0.51	\$2,417.36
February	3,964	\$0.80	\$3,153.47
March	3,859	\$0.78	\$3,028.36
April	3,547	\$0.45	\$1,610.32
May	2,643	\$0.48	\$1,272.04
June	2,144	\$0.49	\$1,054.22
July	1,626	\$0.94	\$1,534.26
August	1,598	\$0.44	\$699.20
September	1,750	\$0.45	\$790.04
October	2,184	\$0.44	\$963.77
November	2,819	\$0.46	\$1,304.96
December	5,253	\$0.49	\$2,571.13
Total	36,089	\$0.57	\$20,399.13

Average	3,007	\$0.56	\$1,699.93
Maximum	5,253	\$0.80	\$3,153.47
Minimum	1,598	\$0.44	\$699.20



2.5. DOMESTIC WATER

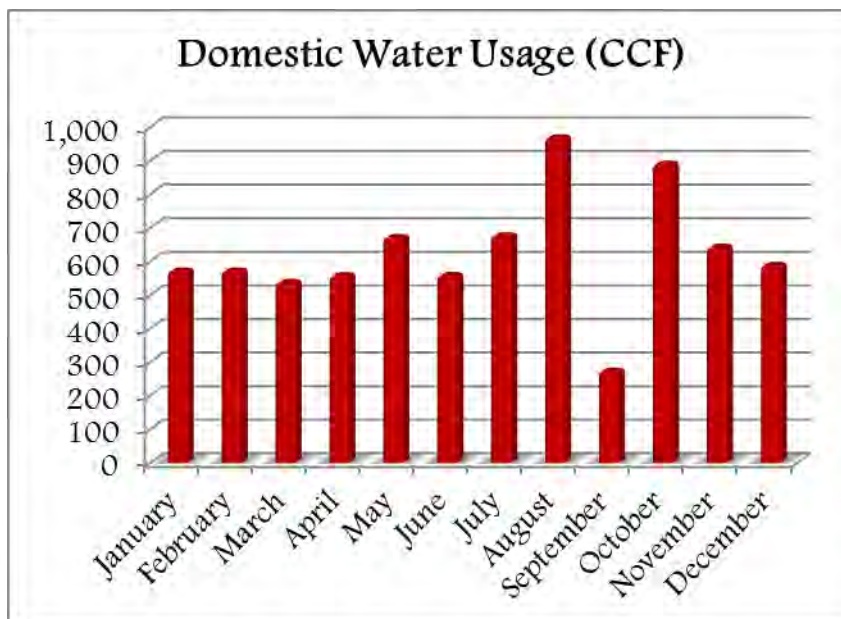
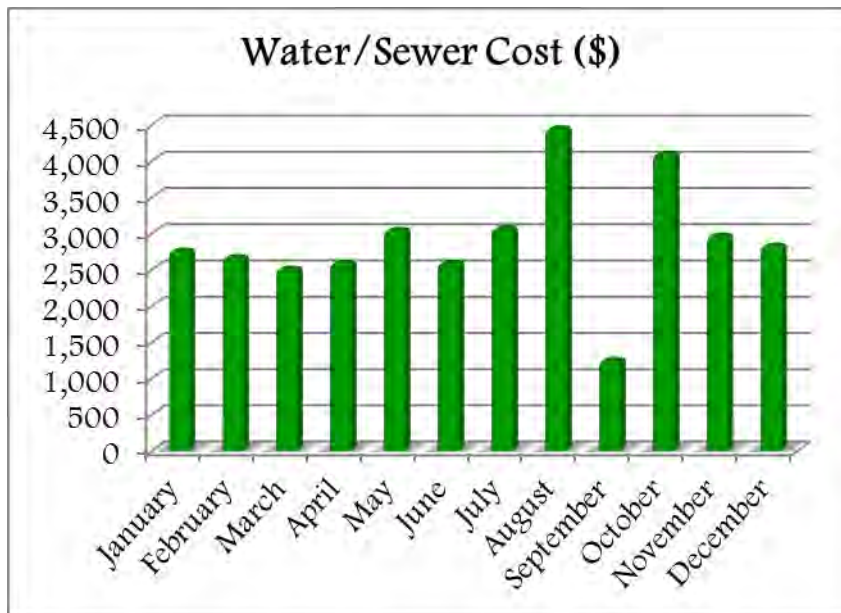
The domestic water requirements of the facility are satisfied by **United Water**.

Based on the provided domestic water usage and cost data, the average price paid during the past 12 months was \$4.64 per thousand gallons. Domestic water is billed on a monthly basis. The total annual domestic water consumption for the 12-month period analyzed is 7,513 ccf for a total cost of \$34,877.63.

The following table details in monthly water consumption and cost for the property:

Start Date	Consumption (CCF)	Unit Cost	Total Cost
January	572	\$4.83	2,763
February	572	\$4.67	2,673
March	538	\$4.67	2,515
April	558	\$4.65	2,594
May	672	\$4.53	3,047
June	559	\$4.65	2,598
July	677	\$4.54	3,071
August	969	\$4.59	4,453
September	274	\$4.58	1,256
October	890	\$4.61	4,104
November	643	\$4.62	2,972
December	589	\$4.81	2,833
Total	7,513	\$4.64	\$34,877.63

Minimum	274	\$4.53	\$1,256.25
Maximum	969	\$4.83	\$4,452.55
Average	626	\$4.64	\$2,906.47



2.6. BENCHMARKING

The following table lists the building's area and its total energy and cost indices. The total energy index is a measure of energy intensity, or annual energy usage per square foot of building area. Similarly, the energy cost index is a measure of annual energy costs per square foot of building area. This data is primarily used to measure a facility's energy intensity against that of other similar buildings. EMG researched data from the Energy Information Administration and reviewed the Energy Star Portfolio Manager Tool and found inapplicable information on subsidized rental housing. Based on EMG's experience and data from the Handbook of Energy audits, 7th edition by Albert Thumann, P.E., and C.E.M. and William J. Younger, C.E.M. published by the Association of Energy Engineers, the mix of similar housing units typically have an energy intensity of between 60 and 200 KBtuh/SF/yr. Highland View Apartments is at this range.

Heated Area (SF)	Total Annual Cost Of Energy (\$)	Energy Cost Intensity \$/SF-Year	Total Energy Intensity (KBTU/SF-YR)
77,379	\$159,459.13	\$2.06	112.5

Although regression model-based benchmarking is not a perfect science, it serves as a good initial indication of whether a particular building or project currently uses more or less water than would normally be expected for that size and type of building in that climate.

The results from the utility analysis and the HUD Water Benchmarking Tool indicate that the subject property is slightly below the average benchmark for water consumption performance with a 23 out of 100 as scored against peers.

The results from the utility analysis and the HUD Energy Benchmarking Tool indicate that the subject property is below average for energy consumption performance with a 1 out of 100 as scored against peers.

HUD Residential Energy Use Benchmarking Tool

For single-family, semi-detached, row/townhouse, multi-family walk-up, and elevator buildings.

The HUD Residential Energy Use Benchmarking Tool quantifies the performance of a user-defined building relative to the family of HUD residential buildings. A score of 75 denotes performance at the top 25th percentile of HUD residential buildings. A score of 50 denotes performance at the 50th percentile (in the middle) of HUD residential buildings. For definitions or help on the terms below, simply click on any underlined text. Click on "Return" to come back to this page.

Directions: Provide entries in ALL the grey spaces that apply for your **Building Description** and **Annual Energy Consumption**.

Building Description

Preliminary: 9/17/07

Building Name: Highland View

(optional entry)

5-digit Zip Code: 07650

Not Sure?

Heating Degree Days: 4888

Mapping Location: Hackensack, NJ

Cooling Degree Days: 1201

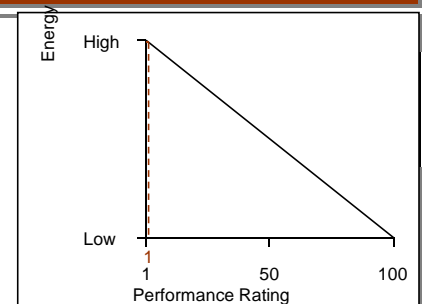
	<u>Gross Floor Area (ft2)</u>	<u>Total Number of Units</u>	<u>Is This a Multifamily Building with Central Laundry? (Y/N)</u>	<u>Is this a Multi-Family Walkup Building? (Y/N)</u>	<u>Heated Floor Area (ft2)</u>	<u>Year Built</u>
Building Description:	77,379	95	Y	N	77,379	1978

Annual Consumption

	<u>Electricity</u>	<u>Gas</u>	<u>#2 Fuel Oil</u>	<u>#4 Fuel Oil</u>	<u>District Steam</u>	<u>District Hot Water</u>	<u>Propane</u>
Select Units:	kWh	Therms	Gal	Gal	kLbs	MMBtu	Gal
Energy	1,494,446	36,089					
Cost (\$)	159,459	20,399					
Calculated unit cost:	\$0.11 \$/kWh	\$0.57 \$/therm					

Results

	<u>Your Building</u>	<u>HUD Typical</u>
<u>Score Against Peers</u>	1	50
Building Site Energy Use (kBtu/year)	8,707,950	4,179,282
Site Energy Use Intensity (kBtu/ft2-year)	112.5	54.0
Energy Cost Intensity (\$/ft2-year)	2.32	1.12
Total Annual Energy Cost (\$/year)	179,858	86,321



HUD Residential Water Use Benchmarking Tool

For single-family, semi-detached, row/townhouse, multi-family walk-up and elevator buildings.

The HUD Residential Water Use Benchmarking Tool quantifies the performance of a user-defined building relative to the family of HUD residential buildings. A score of 75 denotes performance at the top 25th percentile of HUD residential buildings. A score of 50 denotes performance at the 50th percentile (in the middle) of HUD residential buildings. For definitions or help on the terms below, simply click on any underlined text. Click on "Return" text to come back to this page.

Directions: Provide entries in the gray spaces below with your **building description** and **annual water consumption**.

Building Description

ORNL 8/22/2007

Building Name: Highland View

(optional entry)

5-digit Zip Code: 07650

[Not Sure?](#)

Mapping Location: Hackensack, NJ

	<u>Gross Floor Area of Building(s) (ft2)</u>	Building(s) is Single-Family Detached or Semi- Detached? (Y/N)	Is Residents Water Use Paid Directly by the PHA? (Y/N)	<u>Number of Units in Building(s)</u>	<u>Number of Units in Building(s) with In-Unit Laundry Hookups or Central Laundry Access?</u>	How Many Buildings share this Water Meter?
Building Description:	77,379	N	Y	95	95	1

Annual Consumption

Building Annual Water Use: 5,619,724 (gallons/year)

Building Annual Water Use Cost: 34,878 (\$/year)

Average Annual Water Cost: \$0.6 (\$/100 gallons)

Results

	Your Building	HUD Typical
Score Against Peers	23	50
Annual Water Use (gal/year)	5,619,724	3,770,940
Annual Water Use Intensity (gal/ft2-year)	72.6	48.7
Annual Water Cost Intensity (\$/ft2-year)	0.45	0.30
Total Annual Water Cost (\$/year)	34,878	23,404

3. LOAD SIZING

3.1. HVAC SIZING RESULTS

The majority of the ducting system for the forced air HVAC system is concealed by finished walls and ceilings. EMG was able to observe a limited amount of ducting in close proximity to the air handling unit. Based on the limited observations of the type and level of duct work installation materials and methods EMG does not suspect more than 6 percent leakage loss during heating and cooling seasons.

The following is the efficiency information on the existing heating system:

Location Served	Description	Estimated Efficiency
Community room	Outside unit - Trane TTA180E300AA – date 8/2010	100%
Community room	Indoor unit - Trane TWE180E300AA – date 8/2010	100%
Corridors 1-5	Trane YHC120E3RMA09H0C0C1B0B000 – date 8/2010	80%
1 bedroom	Marley Electric baseboard heaters 1004D	100%
2 Bedroom	Marley Electric baseboard heaters 1004D	100%

The following is the efficiency information on the existing cooling system:

Location Served	Description	Estimated SEER Rating
Office	PTAC Amana	
Common area	Trane TTA090D300AA – date 8/2010	11.2 SEER/EER
Community room	Outside unit - Trane TTA180E300AA – date 8/2010	9.7 EER
Corridors 1-5	Trane YHC120E3RMA09H0C0C1B0B000 – date 8/2010	10.2 EER
1 bedroom	Tenant supplied thru wall AC	8.0 EER
2 Bedroom	Tenant supplied thru wall AC	8.0 EER

Manual J calculations estimate the building heat gain or loss based on the construction materials, level of insulation, door and window types and building orientation. The existing system appears to be appropriately sized based on the Manual J calculations. Future replacements should have an output rating that matches the current ratings.

Unit Type	Calculated Cooling Load	Calculated Heating Load
1 bedroom	0.8 tons	14,960 btu/hr
2 Bedroom	1.4 tons	22,533 btu/hr

3.2. DOMESTIC WATER HEATER SIZING RESULTS

A sizing analysis was completed for the existing domestic water heating system, using Bradford-White's RightSpec® Sizing Software. The sizing analysis indicates that the existing equipment is appropriately sized for the projected hot water demands. It is recommended that the equipment be replaced with similar sized domestic water heaters.

The results of the analysis are summarized in the table below. The sizing calculations are included in Appendix D.

Equipment	Input Capacity	Storage Capacity
Sizing Calculations	(3) 250,000 btu	(3) 120,000 gallons
Existing Domestic Water Heating System	(3) 180,000 btu	(3) 140 gallons

4. GREEN ENERGY TECHNOLOGY

4.1. SOLAR ENERGY FEASIBILITY

A photovoltaic array is a linked collection of photovoltaic modules, which are in turn made of multiple interconnected solar cells. The cells convert solar energy into direct current electricity via the photovoltaic effect. The power that one module can produce is seldom enough to meet requirements of a home or a business, so the modules are linked together to form an array. Most PV arrays use an inverter to convert the DC power produced by the modules into alternating current that can plug into the existing infrastructure to power lights, motors, and other loads. The modules in a PV array are usually first connected in series to obtain the desired voltage; the individual strings are then connected in parallel to allow the system to produce more current. Solar arrays are typically measured by the peak electrical power they produce, in watts, kilowatts, or even megawatts.

When determining if a site is suitable for a solar application, two basic considerations must be evaluated:

- At minimum, the sun should shine upon the solar collectors from 9 AM to 3 PM. If less, the application may still be worthwhile, but the benefit will be less.
- The array should face south and be free of any shading from buildings, trees, rooftop equipment, etc. If the array is not facing directly south, there will be a penalty in transfer efficiency, reducing the overall efficiency of the system.

Solar Arrays can be mounted on the ground and used as fencing, etc. or on the roof of a building. If the solar system is to be roof-mounted, a rough rule of thumb is that 200 to 400 square feet of roof space is needed for a 2 kilowatt (kW) installation. On flat surfaces (roofs or ground), tilted panel mounting can orient the PV panels to maximize energy generation and ensure visibility of the panels. The angle of the tilt is generally equal to the latitude of the location. Solar systems produce energy for as low 1.5-2¢ per kilowatt hour or \$4-6 per million BTU delivered. Most electric utility customers spend about 7-15¢ per kilowatt hour (\$20-44 per million BTU). Solar electricity costs about \$10 to \$12 a watt installed. Each standard solar panel is typically 4' by 8' and has a power generation capability between 185 watts/8 SF and 225 watts/8 SF. Typically, 200 watts/8 SF or 25 watts / SF are a good estimate to use.

Element	Response
Does the property have a south facing roof or available land of more than 250 square feet per required Solar Array Panel?	Yes - roof
Is the area free from any shading such as trees, buildings, equipment etc throughout the whole day?	Yes - roof
Is the property in an area with acceptable average monthly sunlight levels? http://www.verdeenergy.com/InsolationMap.pdf	Yes - roof
Has the roofing been replaced within the past 3-5 years?	No
Is the roof structure sufficient to hold solar panels?	Yes

Element	Response
Is the property located in a state eligible for net metering? http://www.verdeenergy.com/SolarNetMetering.pdf	No

Solar collectors gather the sun's energy, transform its radiation into heat, and then transfer that heat to water, solar fluid, or air. The solar thermal energy can be used in solar water-heating systems, solar pool heaters, and solar space-heating systems.

Most solar water-heating systems for buildings have two main parts: a solar collector and a storage tank. There are four main types of solar collectors, integral collector-storage collector, evacuated-tube collector, and most common collector is called a flat-plate collector. The flat-plate collector is mounted on the roof and it consists of a thin, flat, rectangular box with a transparent cover that faces the sun. Small tubes run through the box and carry either water or other freeze resistant fluid, such as an antifreeze solution, to be heated. The tubes are attached to an absorber plate, which is painted black to absorb the heat. As heat builds up in the collector, it heats the fluid passing through the tubes. The heated glycol circulates through seamless copper coils to a separate storage hot water tank. Water in the tank passes over the coils and is heated to be used for residential and commercial domestic hot water or potential space heating use through a custom design HVAC system.

Solar Hot Water Questionnaire	Response
Does the property have a south, east, or west facing roof or available land of more than 100 square feet per required Solar Collector Panel?	Yes - roof
Is the area free from any shading such as trees, buildings, equipment etc throughout the whole day?	Yes - roof only
Can the collectors be mounted at an incline of roughly 25-45 degrees? (equal to latitude of property)	Yes
Is the property in an area with acceptable average monthly sunlight levels?	Yes - roof only
Has the roofing been replaced within the past 3-5 years?	No
Is the roof structure sufficient to hold solar thermal collectors?	Yes & verify with contractor
Does the property have a central domestic hot water system?	Yes
Is there potential for solar pool heating?	Not Applicable
Is sufficient mechanical room space available to fit additional solar hot water storage tanks?	No

The annual performance of a solar water heating system with a storage tank is dependent on system characteristics, solar radiation available, ambient air temperature and on heating load characteristics which require further in depth analysis.

4.2. WIND ENERGY FEASIBILITY

Wind energy (or wind power) refers to the process by which wind turbines convert the movement of wind into electricity. Winds are caused by the uneven heating of the atmosphere by the sun, the irregularities of the earth's surface, and rotation of the earth. Humans use this wind flow for many purposes: sailing boats, pumping water, and also generating electricity. Wind turbines convert the kinetic energy of the moving wind into electricity. A small wind energy system can provide a practical and economical source of electricity if all the following apply to the project:

Element	Response
Property has a good wind resource? <i>Based on a review of the windpower resource map at http://www.windpoweringamerica.gov/wind_maps.asp</i>	No
Project is located on at least one acre of land in a rural area?	No
Increased noise levels from the turbines is not a factor for the site and neighboring sites?	No
Project site has large amounts of undeveloped land that can be utilized for wind energy towers?	No

4.3. COMBINED HEAT AND POWER (CHP) FEASIBILITY

The average efficiency of the fossil-fueled power plants in the U.S. is 33% and has remained virtually unchanged for 40 years. This means that two-thirds of the energy in the fuel is lost as heat, and 8% of the remainder is lost in transmission and distribution over wires. Combined Heat and Power (CHP)—also known as “cogeneration”—is the sequential production of two or more useful forms of energy from a single fuel consuming device. CHP systems recycle waste heat and convert it to useful energy, and they can achieve overall efficiencies of over 80%.

CHP can significantly reduce a multi-family building’s annual energy costs. Instead of buying all the building’s electricity from a utility and separately purchasing fuel for its heating (mechanical) equipment, most—or even all—of the electricity and heat can be produced for less money by a small on site power plant operating at a higher combined efficiency. The best economic prospects for CHP are single buildings with at least 100 units, master metered for utilities, with access to natural gas. The type of CHP system commonly applied to multi-family housing uses a “prime mover,” that is, a reciprocating engine similar to that found in a car or truck, or a microturbine, that drives a generator to produce electricity. The heat (thermal energy) produced by this process is recovered and used to produce hot water or steam, operate a chiller or serve as a desiccant, instead of being exhausted from the engine and transferred through the engine radiator. CHP systems also often lead to increased ability to handle electric loads during power outages.

The following is a preliminary analysis to explore if CHP is an option that should be further investigated for the project. If three are answered "yes," the next step in assessing the potential of an investment in CHP is to perform a Level 1 Feasibility analysis to estimate the preliminary return on investment. The EPA CHP Partnership offers comprehensive Level 1 analysis services for qualifying projects and can provide contact information to others who perform these types of analyses.

Element	Response
Project pays more than \$.07/ kWh on average for electricity (including generation, transmission and distribution)?	Yes
Is there concern about the impact of current or future energy costs on the property?	No
Is your building located in a deregulated electricity market?	Yes
Are there concerns about power reliability? Is there a substantial financial impact to your building or residents if the power goes out for 1 hour? For 5 minutes?	No
Does the project have thermal loads throughout the year (including hot water, chilled water, hot air, steam, etc.)?	Yes
Does the building have an existing central plant?	Yes
Is there a plan to replace, upgrade or retrofit central plant equipment within the next 3-5 years?	No
Is there a plan for a significant building expansion or new construction project within the next 3-5 years?	No
Has the project already implemented energy efficiency measures and still have high energy costs?	No

4.4. GEOTHERMAL ENERGY FEASIBILITY

Geothermal systems utilize the relatively constant temperature of the earth as a heat sink to reject or absorb heat for a heating or cooling system. The predominate use of energy in such a system is the pumping energy used to circulate the fluid medium. Geothermal system configurations require wells to be bored into the ground to accommodate a pipe loop. A geotechnical survey of the property is required in order to estimate the cost of a geothermal installation. Generally multiple wells are required for multi-family applications and the costs become prohibitive if the electricity rate is reasonable.

4.5. FUEL CELL TECHNOLOGY

Fuel cell technology is in the early stages of development and to date is only being utilized in large commercial and industrial applications. EMG does not recommend the further exploration of fuel cell technology for the subject property based on high development cost, lack of technology for small scale applications and potential safety concerns in residential applications.

4.6. GREEN ENERGY TECHNOLOGY RECOMMENDATIONS

Observations/Comments:

- Since there was a positive response to three or more of the preliminary CHP analysis questions. EMG recommends assessing the potential of an investment in CHP and performance of a Level One Feasibility Analysis to estimate the preliminary return on investment. The cost for this analysis is included in the Twelve Month Physical Needs cost estimate (Table 1).
- Since there was a negative response to preliminary Wind Energy analysis questions EMG concludes that further investigation of feasibility is not warranted at the subject property.
- Since there was a negative response to preliminary Solar Energy analysis questions EMG concludes that further investigation of feasibility is not warranted at the subject property.
- Geothermal systems are not recommended for further study at this property. The cost of obtaining a geotechnical survey of the property and drilling the multiple wells required is likely prohibitive considering the reasonable electricity rate in the area.
- Since fuel cell technology is primarily used on large commercial and industrial applications, EMG concludes that further investigation of feasibility is not warranted at the subject property. No further action is needed at this time.

5. ENERGY CONSERVATION MEASURES

5.1. ENERGY CONSERVATION RECOMMENDATIONS

EMG has identified Energy Conservation Measures (ECM) for this property. The basis for an ECM recommendation is a payback of less than the remaining useful life of the system or component. Recommended energy efficiency improvements and the installed cost estimates for recommended energy efficiency measures are provided in the following table:

Priority	Brief description of ECM	Initial Investment	Annual Savings	Payback Period (yrs)	Component EUL (yrs)
1	Install Setback Thermostats	\$8,075	\$6,315	1.3	15
2	Replace Older Plumbing Fixtures with Low Flow Devices	\$39,245	\$4,576	8.6	20
3	Replace Newer PTAC Units with PTHP Units	\$3,460	\$290	11.9	15
3	Replace Fluorescent Fixtures in Common Areas with T-8 Bulbs & Electronic Ballasts	\$4,680	\$336	13.9	15

5.2. ENERGY CONSERVATION DESCRIPTIONS

The following descriptions provide a summary of each energy savings recommendation, along with specific implementation considerations for High Point Apartments. These energy conservation measures are recommended for implementation as part of the Green Rehabilitation Significant Additions.

ECM: Install Programmable Thermostats

Thermostats regulate temperature in a dwelling unit by controlling the heating system. A programmable thermostat is a special type of wall-mounted thermostat that automatically lowers the temperature setting at night, raising it back to the daytime setting in the morning. In addition to lowering the temperature at night, temperature-limiting programmable thermostats limit daytime temperature to a pre-determined setting (generally 72 degrees in family housing and 75 degrees in housing for the elderly).

Resident energy education is crucial when replacing non-programmable thermostats with temperature limiting programmable thermostats. At the time of installation, residents should be informed about why the thermostats were selected and how they operate. In buildings where heat had been unlimited, residents may find the lower temperatures uncomfortable at first. A resident education program should stress the importance of keeping windows closed and should include information about how to dress appropriately at home in the winter.

This ECM recommends programmable thermostats at the property. This property is mostly elderly and it has been reported that programmable thermostats are not preferred by the property. Refer to the ECM Worksheet in Appendix D for energy savings calculations.

ECM: Install Low-Flow Plumbing Fixtures (Aerators, Showerheads, Toilets)

About half the hot water consumed in a typical household is for bathing, and another 7 to 14 percent is used in the sink. By reducing the flow of water coming from the shower and faucets, water efficient showerheads and faucet aerators can generate significant energy savings at low cost and with easy installation. In addition to saving energy, showerheads and aerators save on water and sewer costs, which are rising in many areas.

Older showerheads deliver as much as 5 to 10 gallons per minute (GPM). New showerheads are required to be water efficient, delivering 2.5 GPM or less at a standard water pressure. Water-efficient, or low-flow, showerheads are designed to provide an acceptable shower at a greater reduced flow rate. Most are equipped with a button to switch the water off at the showerhead, to save water while shaving or lathering. Water-efficient showerheads should not be confused with the flow restrictors used in the 1970s and early 1980s, which simply reduced the flow rate far below design level, often resulting in an unacceptable shower.

The average faucet has a flow rate of about 3 to 5 GPM. Adding a screw-in faucet aerator reduces the flow to 0.5 to 1.5 GPM in the bathroom and 2.2 GPM in the kitchen. In addition to saving energy and water, the “foamier” water that comes from faucet aerators wets objects better than water from a faucet with no aerator, which tends to bounce off the object rather than thoroughly wetting it.

In some areas, water and sewer rates have increased dramatically over the past few years and are rivaling the cost of energy. Reducing water use through conservation strategies can generate significant cost savings. Significant advances in technology over the past decade have resulted in the availability of reliable, high-quality water-saving toilets on the market.

Some water providers offer rebates and incentives for replacing inefficient toilets. Contact your provider to see if there is a program available.

This ECM recommends replacing the existing aerators with 1.5 gpm at the faucets and 2.0 gpm at the shower heads at the property. Replacements should include replacing the standard 3.5 gpf toilets with 1.6 gpf toilets. Refer to the ECM Worksheet in Appendix D for energy savings calculations.

ECM: Replace Inefficient PTAC units

Due to age or lack of proper maintenance, or both, older PTAC units may not operate as efficiently as they did when they were new. In addition, technological developments have produced great advances in air-conditioning efficiency, making many older air-conditioning systems obsolete. Replacing older air units can generate substantial electricity and cost savings for the housing authority.

This ECM recommends the installation of newer PTHP (Packaged Terminal Heat Pumps) at the property. Replacements should include all older units in each apartment. Refer to the ECM Worksheet in Appendix D for energy savings calculations.

ECM: Replace Standard Fluorescent Lamps with Energy-Saving Lamps in Common Areas, and Install Electronic Ballasts in Common Areas

Developments that have relatively old fluorescent lighting in common areas can realize modest energy savings by simply replacing the existing fluorescent lamps (tubes) with energy saving lamps which use 10 to 20 percent less electricity. Energy-savings lamps are T12 size (1.5 inches in diameter) and are designed to replace older lamps of the same size. Additionally, a very common and effective lighting improvement is to replace old fluorescent lamps and ballasts with new T8 (1 inch in diameter) lamps and electronic ballasts. “ballast” is a device that all fluorescent lights require in order to turn on and give off light. The ballast controls the light output as well as the energy use. By replacing magnetic ballasts and existing fluorescent lamps with electronic ballasts and new fluorescent lamps, significant savings can be achieved.

This ECM recommends replacing T-12 fixtures with T-8 or more efficient fixtures at the property. Refer to the ECM Worksheet in Appendix D for energy savings calculations.

5.3. ENERGY CONSERVATION MEASURES CONSIDERED

The table below is a summary of Energy Conservation Measures considered as part of EMG's review of the energy use at the property. The review of the property was not limited to the below list of ECMs; however, these are those that typically have a quantifiable payback or can be documented. The actual ECM calculations can be found in Appendix D to this report. Below is an example of the way the table needs to be modified.

	Item	Recommend	Already exists	Payback Period > EUL	Infeasible	Comment (req for all infeasible)
Architectural/Building Envelope ECMs						
1	Install Replacement Windows	✓		✓		
2	Install Window Sun Shades: South-facing windows	✓				
3	Install Window Sun Shades: East & West-facing windows	✓				
4	Install Roof Insulation: R10	✓	✓			
5	Install Roof Insulation: R20					R10 already exists; recommend R20 total
6	Install Wall Insulation	✓				
7	Control Air Leakage	✓				
Space Heating and Cooling ECMs						
8	Install Vent Dampers		✓			No boiler
9	Install Energy Management Systems (EMS)				✓	Only works on central system
10	Convert to Electronic Ignition		✓			
11	Install Boiler Controls		✓			
12	Replace Inefficient Heating Plant	✓		✓		
13	Install Programmable/ Setback Thermostats	✓			✓	Elderly residents
14	Insulate Hot Water or Steam Pipes	✓				
15	Seal and Insulate Ducts	✓				No ducts
16	Install Geothermal Heat Pumps				✓	No water source heat pumps
17	Replace Inefficient Air Conditioners/fan coils	✓		✓		
18	Install Swamp Coolers					Not Applicable for this part of the country.
Domestic Water & Heating Systems ECMs						
19	Install Water-efficient Showerheads and Faucet Aerators	✓				
20	Insulate Hot Water Tanks		✓			
21	Install Hot Water (DHW) Off-Peak Controls				✓	Needs to be part of EMS system
22	Replace Inefficient Water Heaters					Indirect water heater storage tanks only
Lighting System ECMs						
23	Replace Older Fluorescent Lamps with Energy-Saving Lamps in Apartments	✓				
24	Install Electronic Ballasts in Building		✓			
25	Install Lighting Controls in Building	✓				
26	Convert Exterior Lighting Fixtures	✓				

Item		Recommend	Already exists	Payback Period > EUL	Infeasible	Comment (req for all infeasible)
Lighting System ECMs						
27	Install Photo-Controls for Exterior Lighting		✓			
Miscellaneous ECMs						
28	Upgrade or Replace inefficient Motors	✓				
29	Install Water-Saving Toilets	✓				
30	Convert Water Supply Pumps					None at property
31	Install Check Metering or Individual Metering				✓	
Additional ECMs to Consider						
32	Convert Hot Water Heater System to Solar	✓		✓		
33	Install Soil Moisture Sensors	✓		✓		
34	Install Direct Use Geothermal System for Heating and Hot Water				✓	
35	Install Occupational Sensors for Interior Lighting	✓				
36	LED Exit Signs		✓			No exit signs at property

6. OPERATIONS AND MAINTENANCE

6.1. RESIDENT EDUCATION

A significant portion of each unit's energy consumption is also due to tenant-owned electronics and appliances. The property management should consider working with the utility providers (electricity, water, gas) to educate tenants on saving energy. Tenant behavior change could ultimately account for on average 5% to 8% energy savings per unit. Likewise, management should consider preparation of Operations and Maintenance Manuals for the maintenance staff, regarding HVAC systems, Electrical systems and Plumbing systems to ensure proper operation, future maintenance, and appropriate repair. The Green O&M plan should address the following points:

- A description of maintenance practices that use a materially lower use of chemicals thought to be harmful to humans and where practicable, that use more recycling (including construction debris removal). Should the Owner decide to proceed with the Green Initiative, any pending construction and maintenance activities are required to subscribe to construction waste minimization practices. This includes construction waste management, segregation, and the promotion of recycling and reuse. The Owner/Contractor should consider the donation of salvageable equipment/materials to non-profit entities for reuse. The future O&M plan is required to have a detailed section regarding green waste minimization practices. It is important to note that waste minimization typically saves money, as it reduces tipping charges and disposal costs.
- Specification of green cleaning products and materials that are biodegradable and contain low or no volatile organic compounds.
- Include a Resident Involvement, Outreach, and Incentive Plan, featuring Green Training which is applicable to the recommended rehabilitation items.(e.g. programmable thermostats, etc.).
- An Integrated Pest Management Plan (IPM) is to be adopted, to include periodic interior and exterior inspections and best management practices for pest control.
- Operations and maintenance inspection checklists for routine inspections by management/maintenance staff involving landscaping, building envelope penetrations, dumpster location cleanliness, litter control, and water leaks.
- Operations and maintenance requirements for routine cleaning of walk-off matting, common area recycling bins, and other Green Components warranting daily/weekly upkeep to prevent pest, odor and allergen build-up.
- Specify green landscaping methods, to include waste minimization practices (mulching and composting of yard waste), and fertilizer treatment schedules (where fertilizers are used, they should be applied in several smaller applications in lieu of one heavy application).
- Indoor Environmental Quality (IEQ) testing protocols are to be established, including routine schedules for monitoring of resident comfort (e.g. temperature and relative humidity are significant indicators of indoor air quality and for avoiding mold problems), as well as protocols for reactive testing (e.g. specialty testing to occupancy complaints).
- Energy and Water Usage Monitoring. Management is required to establish a tracking mechanism for utility consumption in order to benchmark the effects of the Green improvements.

6.2. OPERATIONS AND MAINTENANCE RECOMMENDATIONS

The following general operations and maintenance recommendations should be continued or implemented.

Building Envelope:

1. Caulking and weather stripping is functional and effective.
2. Holes are patched in the building envelope.
3. Automatic door closing mechanisms are functional.
4. Interior vestibule doors are closed.

Heating and Cooling:

1. The burners are clean and fuel/air ratios are optimized.
2. Temperature settings are reduced in unoccupied areas and set points are seasonally adjusted.
3. Control valves and dampers are fully functional.
4. Equipment is inspected for worn or damaged parts.
5. Ductwork is sealed.
6. Hot air registers, and return air ductwork are clean and unobstructed.
7. Air dampers are operating correctly.
8. Heating is uniform throughout the designated areas.
9. Evaporator and condenser coils in AC equipment are clean.
10. Air filters are clean and replaced as needed.

Domestic Hot Water:

1. Domestic hot water heater temperature is set to the minimum temperature required.
2. Tank-type water heaters are flushed as required.

Lighting:

1. Over-lit areas are managed by bi-level switching or photocell controls.
2. Only energy efficient replacement lamps are used and in-stock.
3. Lighting fixture reflective surfaces and translucent covers are clean.
4. Walls are clean and bright.
5. Timers and/or photocells are operating correctly on exterior lighting.

Tenant areas:

1. Refrigerator and freezer doors close and seal correctly.
2. Kitchen exhaust fans are only used when needed.
3. Office/ computer equipment is either in the "sleep" or off mode when not used.
4. All other recommended equipment specific preventive maintenance actions are conducted,
5. Usage demands on the building/ equipment have not changed significantly since the original building commissioning or the most recent retro-commissioning.
6. Recommend tenants use Energy Star rated computers and copiers.

Equipment Replacement:

1. All equipment replacements are not over/ undersized for the particular application.
2. All equipment replacements should be energy conserving devices.

7. APPENDICES

APPENDIX A:	Photographic Record
APPENDIX B:	Site Plan
APPENDIX C:	Energy Audit Calculations
APPENDIX D:	Manual J and Hot Water Heater Calculations
APPENDIX E:	Supporting Documentation
APPENDIX F:	EMG Accessibility Checklist
APPENDIX G:	Pre-Survey Questionnaires
APPENDIX H:	Resumes and Certifications

**APPENDIX A:
PHOTOGRAPHIC RECORD**



EMG PHOTOGRAPHIC RECORD

Project No.: 107534.13R-004.306

Project Name: Highland View Apartments



Photo #1: Front and right side elevations with signage



Photo #2: Rear and left side elevations



Photo #3: Retaining walls



Photo #4: Outdoor seating areas and exterior lighting



Photo #5: Rear entrance



Photo #6: Service area



EMG PHOTOGRAPHIC RECORD

Project No.: 107534.13R-004.306

Project Name: Highland View Apartments



Photo #7:	ADA parking without access aisle
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Photo #8:	Lobby
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Photo #9:	Elevator lobby
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Photo #10:	Elevator cab
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Photo #11:	Roof overview
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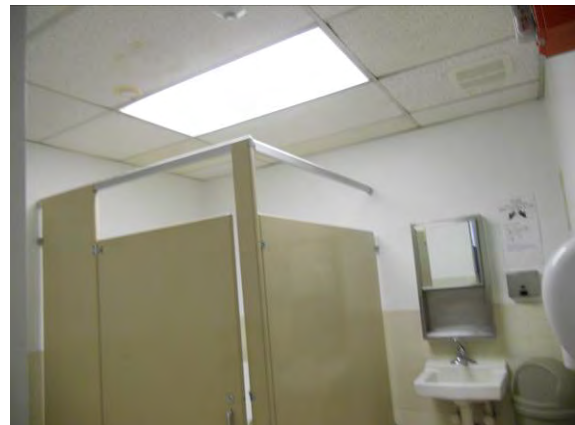


Photo #12:	Common area restroom
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EMG PHOTOGRAPHIC RECORD

Project No.: 107534.13R-004.306

Project Name: Highland View Apartments



Photo #13: Laundry room



Photo #14: Community room



Photo #15: Community room kitchen



Photo #16: Non insulated drain lines under sink in community room kitchen



Photo #17: Crack in flooring in community room

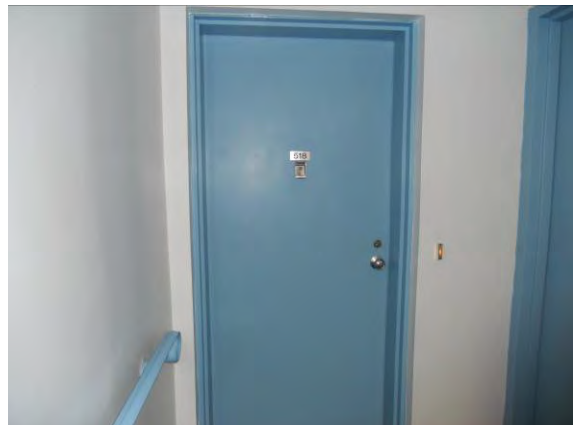


Photo #18: Apartment entrance



EMG PHOTOGRAPHIC RECORD

Project No.: 107534.13R-004.306

Project Name: Highland View Apartments



Photo #19: Apartment living room



Photo #20: Kitchen

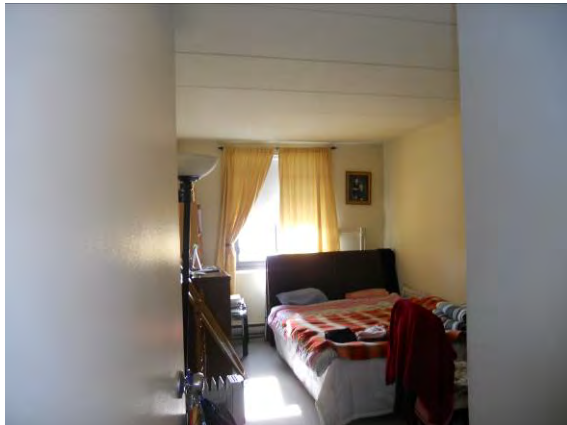


Photo #21: Bedroom



Photo #22: Bedroom closet



Photo #23: Bathroom



Photo #24: Thermostat



EMG PHOTOGRAPHIC RECORD

Project No.: 107534.13R-004.306

Project Name: Highland View Apartments



Photo #25: Living room and bedroom



Photo #26: Supply and waste lines

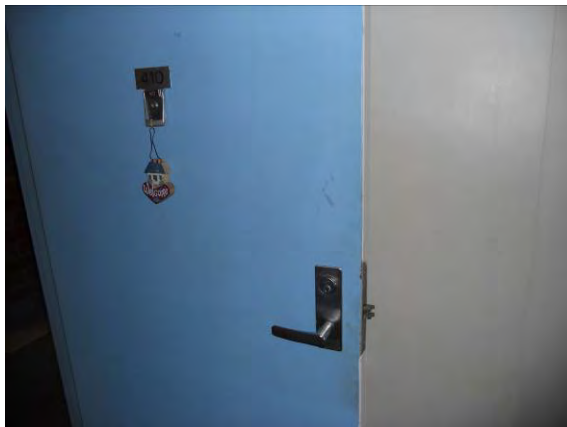


Photo #27: ADA apartment unit entrance



Photo #28: ADA apartment kitchen



Photo #29: ADA apartment kitchen and entrance with no pull side clearance

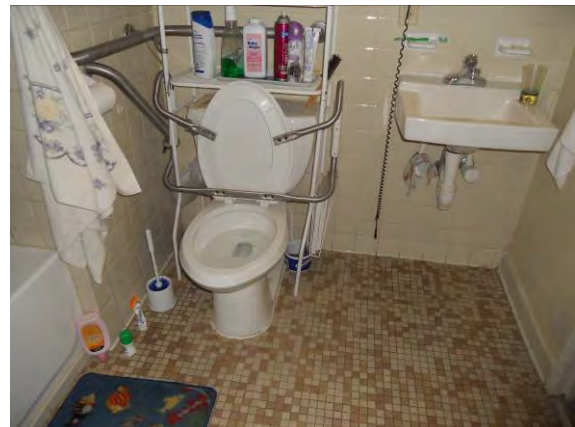


Photo #30: ADA apartment bathroom



EMG PHOTOGRAPHIC RECORD

Project No.: 107534.13R-004.306

Project Name: Highland View Apartments



Photo #31: Condensing units



Photo #32: Diesel tank for generator



Photo #33: Rooftop unit



Photo #34: Rusty fire pump

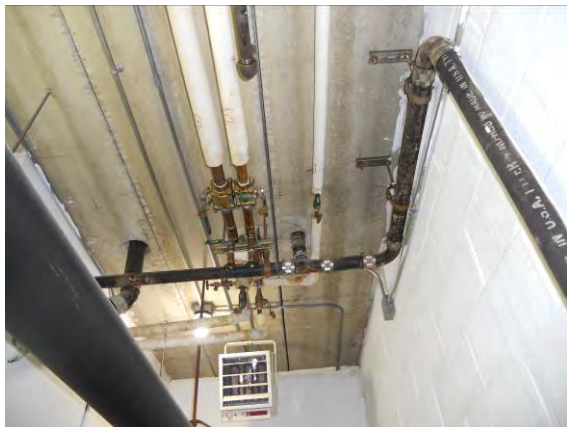


Photo #35: Uninsulated sections of piping



Photo #36: Fire alarm panel



EMG PHOTOGRAPHIC RECORD

Project No.: 107534.13R-004.306

Project Name: Highland View Apartments



Photo #37: Water storage tanks



Photo #38: Air handler



Photo #39: Generator



Photo #40: Boilers



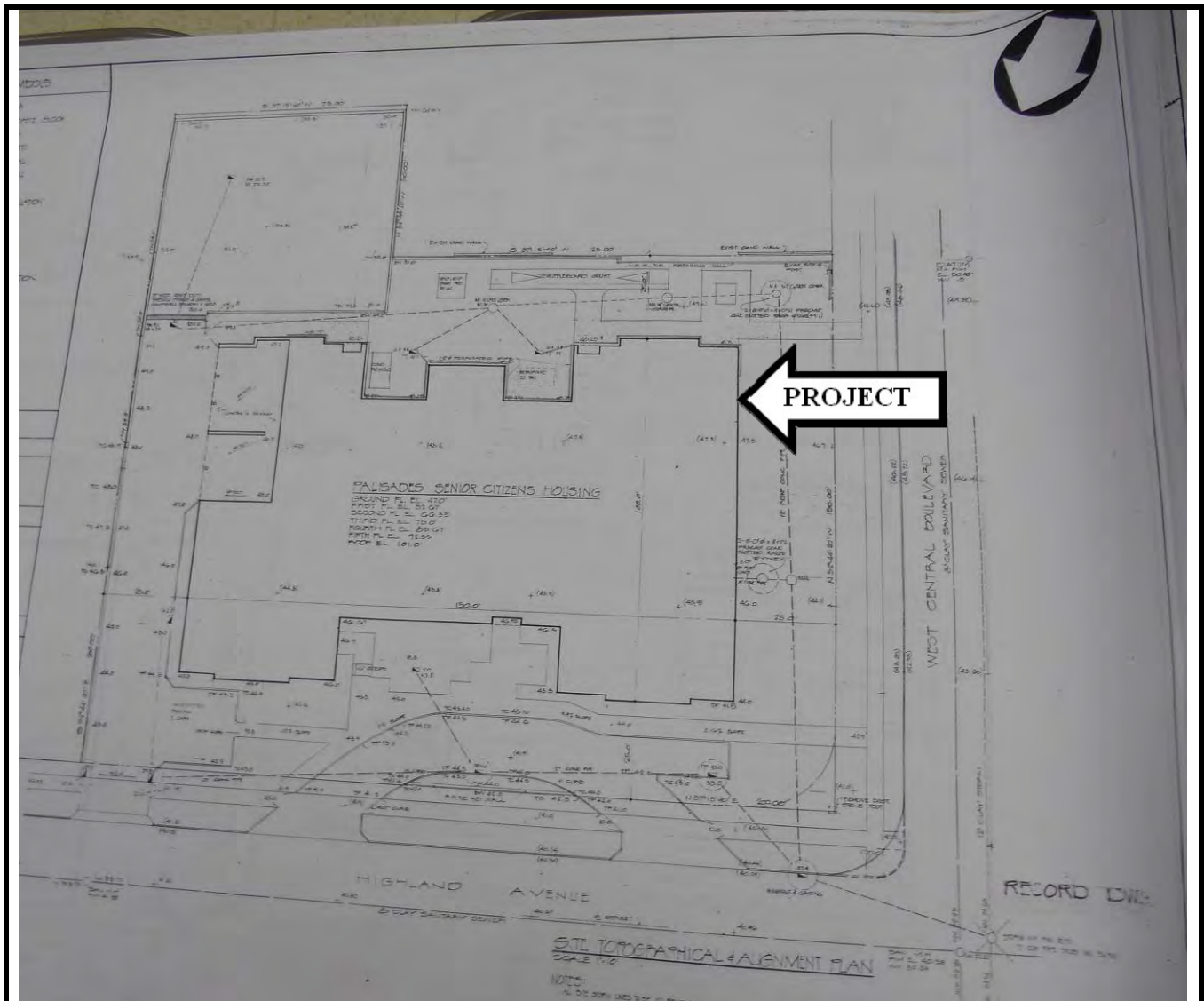
Photo #41: Elevator machinery



Photo #42: PTAC

APPENDIX B:
SITE PLAN

Site Plan



Source:

Project Number:

107534.13R-004.306



The north arrow indicator is an approximation of 0° North.

Project Name:

Highland View Apartments

On-Site Date:

March 6, 2014

APPENDIX C: ENERGY AUDIT CALCULATIONS

Energy Conservation Measure

Replace Fluorescent Fixtures in Common Areas with T-8 Bulbs & Electronic Ballasts

This analysis is for replacement of the T-12 fluorescent lighting with T-8 Lamps and Electronic Ballasts in the common areas. An average annual usage and standard replacement bulb size are assumed.

Step 1	Cost Information			
	Cost of Replacing Fixtures w/ T-8 & Electronic Ballast	4680.00	\$	
	Cost of Replacing Fixtures w/ T-12 & Electronic Ballast	3900.00	\$	
Step 2	Transfer the following information from the Survey:			
	b Total number of light fixtures to be replaced:	60		
	c Existing Watts per bulb	40		
	d Number of linear bulbs per fixture	2		
	e Average number of hours/day bulbs are in use:	12		
	f Cost of electricity:	\$0.11	\$/kWh	
Step 3	Lighting Energy Consumption			
	Traditional Consumption <i>T-12 Fluorescent - 40 Watt</i>			
	$\frac{0.040}{\text{kW/bulb}}$	$\times \frac{120}{\text{\# of bulbs}}$	$\times \frac{4380}{\text{hrs/year}}$	$= \frac{21024}{\text{kWh/yr}}$
	Traditional Consumption <i>T-12 Fluorescent - 34 Watt</i>			
	$\frac{0.034}{\text{kW/bulb}}$	$\times \frac{120}{\text{\# of bulbs}}$	$\times \frac{4380}{\text{hrs/year}}$	$= \frac{17870}{\text{kWh/yr}}$
	Green Consumption <i>T-8 Fluorescent - 28 Watt</i>			
	$\frac{0.028}{\text{kW/bulb}}$	$\times \frac{120}{\text{\# of bulbs}}$	$\times \frac{4380}{\text{hrs/year}}$	$= \frac{14717}{\text{kWh/yr}}$
Step 4	Estimate annual energy savings vs. Traditional:			
	$\frac{2a}{17870}$	$- \frac{3}{14717}$	$= \frac{3154}{\text{kWh/yr}}$	
Step 5	Calculate annual cost savings vs. Traditional:			
	$\frac{4}{3153.60}$	$\times \frac{2b}{0.11}$	$= \frac{336.49}{\text{\$/yr}}$	
	$\frac{\text{Cost Savings}}{4680.00}$	$- \frac{\text{Cost Differential}}{3900.00}$	$= \frac{780.00}{\text{\$/yr}}$	
Step 6	Calculate payback period:			
	$\frac{1}{4680.00}$	$/ \frac{5}{336.49}$	$= \frac{13.91}{\text{yrs}}$	
	Simple Payback Period			

Energy Conservation Measure
Replace Newer PTAC Units with PTHP Units

Step 1	Obtain total cost of replacing existing air conditioners with efficient units:				
	2	PTAC Units	x	\$1,730	per unit
				\$3,460	\$
Step 2	Transfer the following information from the Survey:				
	EER rating of existing PTAC units:		9.4	EER	
	Cooling capacity of existing PTAC units:		12000	Btu/hr	
	Heating capacity of existing PTAC units:		4	kW	
	Number of existing AC units:		2		
	Cost of electricity:		0.106701164	\$/kWh	
Step 3					
	Annual cooling hours		1007	hours	
	Annual heating equipment hours		1170	hours	
	Heat Pump Heating Season Time (%)		33%		
Step 4					
	Existing energy efficiency ratio:		9.4	EER	
	Replacement unit energy efficiency ratio:		11.7	EER	
	Replacement unit Coefficient of Performance:		3.4	COP	
		kW		COP	
	Heat Pump Input Power	4	/	3.4	= 1.18 kW
Step 5	Calculate existing energy use per PTAC:				
	Hours		kBtu	EER	
Cooling (DX)	1007	x	12.00	/ 9.4	= 1289 kWh
	Hours		kW		
Heating (Resistance)	1170	x	4.00	=	4680 kWh
	Total				5969 kWh
Step 6	Calculate energy use per replacement PTHP:				
	Hours		kBtu	EER	
Cooling (Heat Pump)	1007	x	12.00	/ 11.7	= 1033 kWh
	Hours		%	kW	
Heating (Heat Pump)	1170	x	0.33	x 1.2	459 kWh
	Hours		%	kW	
Heating (Resistance)	1170	x	0.67	x 4.0	3120 kWh
	Total				4612 kWh
Step 7	Estimate annual energy savings:				
	5	6	2c		
	5969	-	4612	x 2.00	= 2715 kWh/yr
Step 8	Calculate annual cost savings:				
	7	2d			
	2715	x	0.11	=	290 \$/yr
Step 9	Calculate payback period:				
	1	8			
	3460.00	/	289.65	=	11.95 yrs

Energy Conservation Measure
Install Setback Thermostats

Step 1	Obtain total cost of installing night setback thermostats			
	95	Thermostats x	\$85	per unit
			\$8,075	\$
Step 2	Transfer the following information from the Survey:			
4-8	a	Heating degree-day zone:	5122.50	
5-14	b	Annual heating fuel consumption:		
		Gas:	0	therms/yr
		Electric:	821945	kWh/yr
5-9	c	Cost of heating fuel:		
		Gas:	0.57	\$/therm
		Electric:	0.106701164	\$/kWh
Step 3	Obtain the following savings factors from Table 1:			
Table 1	Savings factor:			.072
Step 4	Estimate annual energy savings:			
		3	2b	
	Gas:	.072	x 0.00	= 0
	Electric:	.072	x 821945.30	= 59180.0616
Step 5	Calculate annual cost savings:			
		4	2c	
	Gas:	0.00	x 0.57	= \$0.00
	Electric:	59180.06	x 0.11	= \$6,314.58
Step 6	Calculate payback period:			
		1	5	
	Gas:	0.00	/ 0.00	= 0.00 years
	Electric:	8075.00	/ 6314.58	= 1.28 years

Table 1: Savings Factors for Installing Setback Thermostats
Heating Energy Savings from Nightly Setback of 8 Degrees

Instructions:

- 1) Find the appropriate heating degree day zone (DDZ) (see Step 2)
- 2) Select the appropriate savings factor and transfer it to Step 3.

Heating DDZ	Savings Factor
2.50 or less	.15
2.51-2.80	.12
2.81-3.40	.10
3.41-4.10	.093
4.11-4.80	.08
4.81-5.50	.075
5.51 or more	.072

Energy Conservation Measure

Replace Older Plumbing Fixtures with Low Flow Devices

Input Data:

Step 1	Number of residents	97			
	Total annual use days	365			
		Water closet	Sinks	Shower	
	Existing water controls in gallons per use	3.5	2.2	2.5	
	low -flow water controls in gallons per use	1.6	1.5	2	
	Low-flow replacement cost	\$320.00	\$4.00	\$75.00	
Step 2		Quantity	Daily Usage Assumption		
	Total number of old water closets	98	4.0	flushes	
	Total number of sinks to be upgraded	190	6.0	minutes	
	Total number of shower heads to be upgraded	95	10.2	minutes	
	Total Water Rate	\$ 0.0062 /gal			
Step 3		Calculations:			
	Water conservation method	Total to be replaced	Cost of replacement	Total cost	
	Replace existing with low flow water closets	98	\$320	\$31,360.00	
	Install aerators on existing faucet controls	190	\$4	\$760.00	
	Replace existing shower heads	95	\$75	\$7,125.00	
			Total	\$39,245.00	
	Results				
	Annual Savings	Annual time used	Gallons saved	Annual cost savings	Payback
	Annual water closet flushes (flushes)	141,620	269,078	\$1,669.86	18.77997081
	Annual sink use (minutes)	416,100	291,270	\$1,807.58	0.420450513
	Annual shower use (minutes)	354,050	177,025	\$1,098.59	6.485557523
		Total	737,373	\$4,576.04	
	Simple Payback		8.58	years	

**APPENDIX D:
MANUAL J AND HOT WATER HEATER
CALCULATIONS**

Apartment Load Sizing: Highland View Apartments
Heat Gain Calculations 1-Bedroom

This analysis is for calculating the heat gain during the cooling season.

Step 1 Calculated total tonnage for cooling equipment:

0.8	Tons
10089	Btu/hr

Step 2 Heat gain from Windows on North Side

a	Height of Window	5.00	ft.
b	Width of Window	6.00	ft.
c	Number of windows on north side	0	
d	Indoor Design Temperature	74	F
e	Outdoor Design Temperature	95	F
f	U-Value for Window	0.50	
g	Heat gain, $Q = (2a \times 2b \times 2c) \times 2f \times (2e - 2d)$	0	BTUH

Step 3 Heat gain from Exterior Doors on North Side

a	Height of Exterior Door	7	ft.
b	Width of Exterior Door	3	ft.
c	Number of exterior doors on north side	0	
d	Indoor Design Temperature	74	F
e	Outdoor Design Temperature	95	F
f	U-Value for Exterior Door	0.10	
g	Heat gain, $Q = (3a \times 3b \times 3c) \times 3f \times (3e - 3d)$	0	BTUH

Step 4 Heat gain from North Wall

a	Length of North wall	21.7	ft.
b	Height of North wall	9.0	ft.
c	Indoor Design Temperature	74	F
d	Outdoor Design Temperature	95	F
e	U-Value for North wall	0.071	
f	Heat gain, $Q = ((4ax4b)-(2a*2b*2c)-(3a*3b*3c)) \times 4e \times (4d - 4c)$	293	BTUH

Step 5 Heat gain from Windows on South Side

a	Height of Window	5.00	ft.
b	Width of Window	6.00	ft.
c	Number of windows on south side	0	
d	Indoor Design Temperature	74	F
e	Outdoor Design Temperature	95	F
f	U-Value for Window	0.50	
g	SHGC, Solar Heat Gain Coefficient	0.6	
h	Heat gain, $Q = ((5a \times 5b \times 5c) \times 5f \times (5e - 5d)) + (5ax5bx5cx5gx125)$	0	BTUH

Step 6 Heat gain from Exterior Doors on South Side

a	Height of Exterior Door	7	ft.
b	Width of Exterior Door	3	ft.
c	Number of exterior doors on south side	0	
d	Indoor Design Temperature	74	F
e	Outdoor Design Temperature	95	F
f	U-Value for Exterior Doors	0.10	
g	Heat gain, $Q = (6a \times 6b \times 6c) \times 6f \times (6e - 6d + 10)$	0	BTUH

Apartment Load Sizing: Highland View Apartments
Heat Gain Calculations 1-Bedroom

This analysis is for calculating the heat gain during the cooling season.

Step 7 Heat gain from South Wall

a	Length of South wall	21.7	ft.
b	Height of South wall	9.0	ft.
c	Indoor Design Temperature	74	F
d	Outdoor Design Temperature	74	F
e	U-Value for South wall	0.071	
f	Heat gain, $Q = ((7a \times 7b) - (5a \times 5b \times 5c) - (6a \times 6b \times 6c)) \times 7e \times (7d - 7c + 10)$	139	BTUH

Step 8 Heat gain from Windows on East Side

a	Height of Window	5.00	ft.
b	Width of Window	6.00	ft.
c	Number of windows on east side	2	
d	Indoor Design Temperature	74	F
e	Outdoor Design Temperature	95	F
f	U-Value for Window	0.50	
g	Heat gain, $Q = (8a \times 8b \times 8c) \times 8f \times (8e - 8d)$	630	BTUH

Step 9 Heat gain from Exterior Doors on East Side

a	Height of Exterior Door	7	ft.
b	Width of Exterior Door	3	ft.
c	Number of exterior doors on east side	0	
d	Indoor Design Temperature	74	F
e	Outdoor Design Temperature	95	F
f	U-Value for Exterior Doors	0.10	
g	Heat gain, $Q = (9a \times 9b \times 9c) \times 9f \times (9e - 9d)$	0	BTUH

Step 10 Heat gain from East Wall

a	Length of East wall	28.1	ft.
b	Height of East wall	9.0	ft.
c	Indoor Design Temperature	74	F
d	Outdoor Design Temperature	95	F
e	U-Value for East wall	0.071	
f	Heat gain, $Q = ((10a \times 10b) - (8a \times 8b \times 8c) - (9a \times 9b \times 9c)) \times 10e \times (10d - 10c)$	289	BTUH

Step 11 Heat gain from Windows on West Side

a	Height of Window	5.00	ft.
b	Width of Window	6.00	ft.
c	Number of windows on west side	0	
d	Indoor Design Temperature	74	F
e	Outdoor Design Temperature	95	F
f	U-Value for Window	0.50	
g	SHGC, Solar Heat Gain Coefficient	0.0	
h	Heat gain, $Q = ((11a \times 11b \times 11c) \times 11f \times (11e - 11d)) + (11a \times 11b \times 11c \times 11g \times 125)$	0	BTUH

Apartment Load Sizing: Highland View Apartments
Heat Gain Calculations 1-Bedroom

This analysis is for calculating the heat gain during the cooling season.

Step 12 Heat gain from Exterior Doors on West Side

a	Height of Exterior Door	7	ft.
b	Width of Exterior Door	3	ft.
c	Number of exterior doors on west side	0	
d	Indoor Design Temperature	74	F
e	Outdoor Design Temperature	95	F
f	U-Value for Exterior Doors	0.10	
g	Heat gain, $Q = (12a \times 12b \times 12c) \times 12f \times (12e - 12d + 10)$	0	BTUH

Step 13 Heat gain from West Wall

a	Length of West wall	28.1	ft.
b	Height of West wall	9.0	ft.
c	Indoor Design Temperature	74	F
d	Outdoor Design Temperature	74	F
e	U-Value for West wall	0.071	
f	Heat gain, $Q = ((13a \times 13b) - (11a \times 11b \times 11c) - (12a \times 12b \times 12c)) \times 13e \times (13d - 13c + 10)$	0	BTUH

Step 14 Heat gain from Roof

a	Length of Roof	21.7	ft.
b	Width of Roof	28.1	ft.
c	Slope Factor for Roof (1.0 for flat roofs, 1.20 for sloped roofs)	1.00	
d	Indoor Design Temperature	74	F
e	Outdoor Design Temperature	74	F
f	U-Value for Roof	0.067	
g	Heat gain, $Q = (14a \times 14b \times 14c) \times 14f \times (14e - 14d + 30)$	1,217	BTUH

Step 15 Heat gain from Ground Floor

a	Length of ground floor	21.7	ft.
b	Width of ground floor	28.1	ft.
c	Indoor Design Temperature	74	F
d	Outdoor Design Temperature	75	F
e	U-Value for ground floor	0.000	
f	Heat gain, $Q = (15a \times 15b) \times 15e \times (15d - 15c)$	0	BTUH

Step 16 Heat gain from Infiltration

a	Length of Building or Unit	21.7	ft.
b	Width of Building or Unit	28.1	ft.
c	Height of Building or Unit	9.0	
d	Indoor Design Temperature	74	F
e	Outdoor Design Temperature	95	F
f	ACH, Air Change Per Hour	1.0	
g	Enthalpy, H	10.0	
h	Heat gain, $Q = ((16a \times 16b \times 16c) / 60) \times 16f \times 4.5 \times 16g$	4,107	BTUH

Step 17 Heat gain from electrical heat

a	Kilowatt of continuous power (per hour)	1.0	kW
b	Heat gain, $Q = 3414 \times 17a$	3,414	BTUH

Apartment Load Sizing: Highland View Apartments
Heat Loss Calculations 1-Bedroom

This analysis is for calculating the heat loss during the winter heating season.

Step 1 Calculated total BTUH for heating equipment:

14960	BTUH
4.4	kW

Step 2 Heat loss from Windows on North Side

a	Height of Window	5.0	ft.
b	Width of Window	6.0	ft.
c	Number of windows on north side	0	
d	Indoor Design Temperature	76	F
e	Outdoor Design Temperature	0	F
f	U-Value for Window	0.50	
g	Heat Loss, $Q = (2a \times 2b \times 2c) \times 2f \times (2d - 2e)$	0	BTUH

Step 3 Heat loss from Exterior Doors on North Side

a	Height of Exterior Door	7.0	ft.
b	Width of Exterior Door	3.0	ft.
c	Number of exterior doors on north side	0	
d	Indoor Design Temperature	76	F
e	Outdoor Design Temperature	0	F
f	U-Value for Exterior Door	0.10	
g	Heat Loss, $Q = (3a \times 3b \times 3c) \times 3f \times (3d - 3e)$	0	BTUH

Step 4 Heat loss from North Wall

a	Length of North wall	21.7	ft.
b	Height of North wall	9.0	ft.
c	Indoor Design Temperature	76	F
d	Outdoor Design Temperature	76	F
e	U-Value for North wall	0.071	
f	Heat Loss, $Q = ((4ax4b)-(2a*2b*2c)-(3a*3b*3c)) \times 4e \times (4c - 4d)$	0	BTUH

Step 5 Heat loss from Windows on South Side

a	Height of Window	5.0	ft.
b	Width of Window	6.0	ft.
c	Number of windows on south side	0	
d	Indoor Design Temperature	76	F
e	Outdoor Design Temperature	0	F
f	U-Value for Window	0.50	
g	Heat Loss, $Q = (5a \times 5b \times 5c) \times 5f \times (5d - 5e)$	0	BTUH

Step 6 Heat loss from Exterior Doors on South Side

a	Height of Exterior Door	7.0	ft.
b	Width of Exterior Door	3.0	ft.
c	Number of exterior doors on south side	0	
d	Indoor Design Temperature	76	F
e	Outdoor Design Temperature	0	F
f	U-Value for Exterior Doors	0.10	
g	Heat Loss, $Q = (6a \times 6b \times 6c) \times 6f \times (6d - 6e)$	0	BTUH

Apartment Load Sizing: Highland View Apartments
Heat Loss Calculations 1-Bedroom

This analysis is for calculating the heat loss during the winter heating season.

Step 7 Heat loss from South Wall

a	Length of South wall	21.7	ft.
b	Height of South wall	9.0	ft.
c	Indoor Design Temperature	76	F
d	Outdoor Design Temperature	0	F
e	U-Value for South wall	0.071	
f	Heat Loss, $Q = ((7a \times 7b) - (5a \times 5b \times 5c) - (6a \times 6b \times 6c)) \times 7e \times (7c - 7d)$	1,059	BTUH

Step 8 Heat loss from Windows on East Side

a	Height of Window	5.0	ft.
b	Width of Window	6.0	ft.
c	Number of windows on east side	0	
d	Indoor Design Temperature	76	F
e	Outdoor Design Temperature	0	F
f	U-Value for Window	0.50	
g	Heat Loss, $Q = (8a \times 8b \times 8c) \times 8f \times (8d - 8e)$	0	BTUH

Step 9 Heat loss from Exterior Doors on East Side

a	Height of Exterior Door	7.0	ft.
b	Width of Exterior Door	3.0	ft.
c	Number of exterior doors on east side	0	
d	Indoor Design Temperature	76	F
e	Outdoor Design Temperature	0	F
f	U-Value for Exterior Doors	0.10	
g	Heat Loss, $Q = (9a \times 9b \times 9c) \times 9f \times (9d - 9e)$	0	BTUH

Step 10 Heat loss from East Wall

a	Length of East wall	28.1	ft.
b	Height of East wall	9.0	ft.
c	Indoor Design Temperature	76	F
d	Outdoor Design Temperature	76	F
e	U-Value for East wall	0.071	
f	Heat Loss, $Q = ((10a \times 10b) - (8a \times 8b \times 8c) - (9a \times 9b \times 9c)) \times 10e \times (10c - 10d)$	0	BTUH

Step 11 Heat loss from Windows on West Side

a	Height of Window	5.0	ft.
b	Width of Window	6.0	ft.
c	Number of windows on west side	2	
d	Indoor Design Temperature	76	F
e	Outdoor Design Temperature	0	F
f	U-Value for Window	0.50	
g	Heat Loss, $Q = (11a \times 11b \times 11c) \times 11f \times (11d - 11e)$	2,280	BTUH

Apartment Load Sizing:	Highland View Apartments
Heat Loss Calculations	1-Bedroom

This analysis is for calculating the heat loss during the winter heating season.

Step 12 Heat loss from Exterior Doors on West Side

a	Height of Exterior Door	7.0	ft.
b	Width of Exterior Door	3.0	ft.
c	Number of exterior doors on west side	0	
d	Indoor Design Temperature	76	F
e	Outdoor Design Temperature	0	F
f	U-Value for Exterior Doors	0.10	
g	Heat Loss, $Q = (12a \times 12b \times 12c) \times 12f \times (12d - 12e)$	0	BTUH

Step 13 Heat loss from West Wall

a	Length of West wall	28.1	ft.
b	Height of West wall	9.0	ft.
c	Indoor Design Temperature	76	F
d	Outdoor Design Temperature	0	F
e	U-Value for West wall	0.071	
f	Heat Loss, $Q = ((13a \times 13b) - (11a \times 11b \times 11c) - (12a \times 12b \times 12c)) \times 13e \times (13c - 13d)$	1,046	BTUH

Step 14 Heat loss from Roof

a	Length of Roof	21.7	ft.
b	Width of Roof	28.1	ft.
c	Slope Factor for Roof (1.0 for flat roofs, 1.20 for sloped roofs)	1.00	
d	Indoor Design Temperature	76	F
e	Outdoor Design Temperature	0	F
f	U-Value for Roof	0.067	
g	Heat Loss, $Q = (14a \times 14b \times 14c) \times 14f \times (14d - 14e)$	3,083	BTUH

Step 15 Heat loss from Ground Floor

a	Length of ground floor	21.7	ft.
b	Width of ground floor	28.1	ft.
c	Indoor Design Temperature	76	F
d	Outdoor Design Temperature	68	F
e	U-Value for ground floor	0.000	
f	Heat Loss, $Q = (15a \times 15b) \times 15e \times (15c - 15d)$	0	BTUH

Step 16 Heat loss from Infiltration

a	Length of Building or Unit	21.7	ft.
b	Width of Building or Unit	28.1	ft.
c	Height of Building or Unit	9.0	
d	Indoor Design Temperature	76	F
e	Outdoor Design Temperature	0	F
f	ACH, Air Change Per Hour	1.0	
g	Heat Loss, $Q = ((16a \times 16b \times 16c) / 60) \times 16f \times 1.08 \times (16d - 16e)$	7,492	BTUH

Apartment Load Sizing: Highland View Apartments
Heat Gain Calculations 2-Bedroom

This analysis is for calculating the heat gain during the cooling season.

Step 1 Calculated total tonnage for cooling equipment:

1.4	Tons
17008	Btu/hr

Step 2 Heat gain from Windows on North Side

a	Height of Window	5.00	ft.
b	Width of Window	6.00	ft.
c	Number of windows on north side	0	
d	Indoor Design Temperature	74	F
e	Outdoor Design Temperature	95	F
f	U-Value for Window	0.50	
g	Heat gain, $Q = (2a \times 2b \times 2c) \times 2f \times (2e - 2d)$	0	BTUH

Step 3 Heat gain from Exterior Doors on North Side

a	Height of Exterior Door	7	ft.
b	Width of Exterior Door	3	ft.
c	Number of exterior doors on north side	0	
d	Indoor Design Temperature	74	F
e	Outdoor Design Temperature	95	F
f	U-Value for Exterior Door	0.10	
g	Heat gain, $Q = (3a \times 3b \times 3c) \times 3f \times (3e - 3d)$	0	BTUH

Step 4 Heat gain from North Wall

a	Length of North wall	37.0	ft.
b	Height of North wall	9.0	ft.
c	Indoor Design Temperature	74	F
d	Outdoor Design Temperature	74	F
e	U-Value for North wall	0.071	
f	Heat gain, $Q = ((4ax4b)-(2a*2b*2c)-(3a*3b*3c)) \times 4e \times (4d - 4c)$	0	BTUH

Step 5 Heat gain from Windows on South Side

a	Height of Window	5.00	ft.
b	Width of Window	6.00	ft.
c	Number of windows on south side	0	
d	Indoor Design Temperature	74	F
e	Outdoor Design Temperature	95	F
f	U-Value for Window	0.50	
g	SHGC, Solar Heat Gain Coefficient	0.4	
h	Heat gain, $Q = ((5a \times 5b \times 5c) \times 5f \times (5e - 5d)) + (5ax5bx5cx5gx125)$	0	BTUH

Step 6 Heat gain from Exterior Doors on South Side

a	Height of Exterior Door	7	ft.
b	Width of Exterior Door	3	ft.
c	Number of exterior doors on south side	0	
d	Indoor Design Temperature	74	F
e	Outdoor Design Temperature	95	F
f	U-Value for Exterior Doors	0.10	
g	Heat gain, $Q = (6a \times 6b \times 6c) \times 6f \times (6e - 6d + 10)$	0	BTUH

Apartment Load Sizing: Highland View Apartments
Heat Gain Calculations 2-Bedroom

This analysis is for calculating the heat gain during the cooling season.

Step 7 Heat gain from South Wall

a	Length of South wall	37.0	ft.
b	Height of South wall	9.0	ft.
c	Indoor Design Temperature	74	F
d	Outdoor Design Temperature	95	F
e	U-Value for South wall	0.071	
f	Heat gain, $Q = ((7a \times 7b) - (5a \times 5b \times 5c) - (6a \times 6b \times 6c)) \times 7e \times (7d - 7c + 10)$	737	BTUH

Step 8 Heat gain from Windows on East Side

a	Height of Window	5.00	ft.
b	Width of Window	6.00	ft.
c	Number of windows on east side (1 window + 1 set of french doors)	0	
d	Indoor Design Temperature	74	F
e	Outdoor Design Temperature	95	F
f	U-Value for Window	0.50	
g	Heat gain, $Q = (8a \times 8b \times 8c) \times 8f \times (8e - 8d)$	0	BTUH

Step 9 Heat gain from Exterior Doors on East Side

a	Height of Exterior Door	7	ft.
b	Width of Exterior Door	3	ft.
c	Number of exterior doors on east side	0	
d	Indoor Design Temperature	74	F
e	Outdoor Design Temperature	95	F
f	U-Value for Exterior Doors	0.10	
g	Heat gain, $Q = (9a \times 9b \times 9c) \times 9f \times (9e - 9d)$	0	BTUH

Step 10 Heat gain from East Wall

a	Length of East wall	27.9	ft.
b	Height of East wall	9.0	ft.
c	Indoor Design Temperature	74	F
d	Outdoor Design Temperature	74	F
e	U-Value for East wall	0.071	
f	Heat gain, $Q = ((10a \times 10b) - (8a \times 8b \times 8c) - (9a \times 9b \times 9c)) \times 10e \times (10d - 10c)$	0	BTUH

Step 11 Heat gain from Windows on West Side

a	Height of Window	5.00	ft.
b	Width of Window	6.00	ft.
c	Number of windows on west side	3	
d	Indoor Design Temperature	74	F
e	Outdoor Design Temperature	95	F
f	U-Value for Window	0.50	
g	SHGC, Solar Heat Gain Coefficient	0.4	
h	Heat gain, $Q = ((11a \times 11b \times 11c) \times 11f \times (11e - 11d)) + (11a \times 11b \times 11c \times 11g \times 125)$	5,445	BTUH

Apartment Load Sizing: Highland View Apartments
Heat Gain Calculations 2-Bedroom

This analysis is for calculating the heat gain during the cooling season.

Step 12 Heat gain from Exterior Doors on West Side

a	Height of Exterior Door	7	ft.
b	Width of Exterior Door	3	ft.
c	Number of exterior doors on west side	0	
d	Indoor Design Temperature	74	F
e	Outdoor Design Temperature	95	F
f	U-Value for Exterior Doors	0.10	
g	Heat gain, $Q = (12a \times 12b \times 12c) \times 12f \times (12e - 12d + 10)$	0	BTUH

Step 13 Heat gain from West Wall

a	Length of West wall	27.9	ft.
b	Height of West wall	9.0	ft.
c	Indoor Design Temperature	74	F
d	Outdoor Design Temperature	95	F
e	U-Value for West wall	0.071	
f	Heat gain, $Q = ((13a \times 13b) - (11a \times 11b \times 11c) - (12a \times 12b \times 12c)) \times 13e \times (13d - 13c + 10)$	-1,621	BTUH

Step 14 Heat gain from Roof

a	Length of Roof	37.0	ft.
b	Width of Roof	27.9	ft.
c	Slope Factor for Roof (1.0 for flat roofs, 1.20 for sloped roofs)	1.00	
d	Indoor Design Temperature	74	F
e	Outdoor Design Temperature	74	F
f	U-Value for Roof	0.067	
g	Heat gain, $Q = (14a \times 14b \times 14c) \times 14f \times (14e - 14d + 30)$	2,065	BTUH

Step 15 Heat gain from Ground Floor

a	Length of ground floor	37.0	ft.
b	Width of ground floor	27.9	ft.
c	Indoor Design Temperature	74	F
d	Outdoor Design Temperature	75	F
e	U-Value for ground floor	0.000	
f	Heat gain, $Q = (15a \times 15b) \times 15e \times (15d - 15c)$	0	BTUH

Step 16 Heat gain from Infiltration

a	Length of Building or Unit	37.0	ft.
b	Width of Building or Unit	27.9	ft.
c	Height of Building or Unit	9.0	
d	Indoor Design Temperature	74	F
e	Outdoor Design Temperature	95	F
f	ACH, Air Change Per Hour	1.0	
g	Enthalpy, H	10.0	
h	Heat gain, $Q = ((16a \times 16b \times 16c) / 60) \times 16f \times 4.5 \times 16g$	6,968	BTUH

Step 17 Heat gain from electrical heat

a	Kilowatt of continuous power (per hour)	1.0	kW
b	Heat gain, $Q = 3414 \times 17a$	3,414	BTUH

Apartment Load Sizing: Highland View Apartments
Heat Loss Calculations 2-Bedroom

This analysis is for calculating the heat loss during the winter heating season.

Step 1 Calculated total BTUH for heating equipment:

22533	BTUH
6.6	kW

Step 2 Heat loss from Windows on North Side

a	Height of Window	5.0	ft.
b	Width of Window	6.0	ft.
c	Number of windows on north side	0	
d	Indoor Design Temperature	76	F
e	Outdoor Design Temperature	0	F
f	U-Value for Window	0.50	
g	Heat Loss, $Q = (2a \times 2b \times 2c) \times 2f \times (2d - 2e)$	0	BTUH

Step 3 Heat loss from Exterior Doors on North Side

a	Height of Exterior Door	7.0	ft.
b	Width of Exterior Door	3.0	ft.
c	Number of exterior doors on north side	0	
d	Indoor Design Temperature	76	F
e	Outdoor Design Temperature	0	F
f	U-Value for Exterior Door	0.10	
g	Heat Loss, $Q = (3a \times 3b \times 3c) \times 3f \times (3d - 3e)$	0	BTUH

Step 4 Heat loss from North Wall

a	Length of North wall	37.0	ft.
b	Height of North wall	9.0	ft.
c	Indoor Design Temperature	76	F
d	Outdoor Design Temperature	0	F
e	U-Value for North wall	0.071	
f	Heat Loss, $Q = ((4ax4b)-(2a*2b*2c)-(3a*3b*3c)) \times 4e \times (4c - 4d)$	1,808	BTUH

Step 5 Heat loss from Windows on South Side

a	Height of Window	5.0	ft.
b	Width of Window	6.0	ft.
c	Number of windows on south side	0	
d	Indoor Design Temperature	76	F
e	Outdoor Design Temperature	0	F
f	U-Value for Window	0.50	
g	Heat Loss, $Q = (5a \times 5b \times 5c) \times 5f \times (5d - 5e)$	0	BTUH

Step 6 Heat loss from Exterior Doors on South Side

a	Height of Exterior Door	7.0	ft.
b	Width of Exterior Door	3.0	ft.
c	Number of exterior doors on south side	0	
d	Indoor Design Temperature	76	F
e	Outdoor Design Temperature	0	F
f	U-Value for Exterior Doors	0.10	
g	Heat Loss, $Q = (6a \times 6b \times 6c) \times 6f \times (6d - 6e)$	0	BTUH

Apartment Load Sizing: Highland View Apartments
Heat Loss Calculations 2-Bedroom

This analysis is for calculating the heat loss during the winter heating season.

Step 7 Heat loss from South Wall

a	Length of South wall	37.0	ft.
b	Height of South wall	9.0	ft.
c	Indoor Design Temperature	76	F
d	Outdoor Design Temperature	0	F
e	U-Value for South wall	0.071	
f	Heat Loss, $Q = ((7a \times 7b) - (5a \times 5b \times 5c) - (6a \times 6b \times 6c)) \times 7e \times (7c - 7d)$	1,808	BTUH

Step 8 Heat loss from Windows on East Side

a	Height of Window	5.0	ft.
b	Width of Window	6.0	ft.
c	Number of windows on east side	0	
d	Indoor Design Temperature	76	F
e	Outdoor Design Temperature	0	F
f	U-Value for Window	0.50	
g	Heat Loss, $Q = (8a \times 8b \times 8c) \times 8f \times (8d - 8e)$	0	BTUH

Step 9 Heat loss from Exterior Doors on East Side

a	Height of Exterior Door	7.0	ft.
b	Width of Exterior Door	3.0	ft.
c	Number of exterior doors on east side	0	
d	Indoor Design Temperature	76	F
e	Outdoor Design Temperature	0	F
f	U-Value for Exterior Doors	0.10	
g	Heat Loss, $Q = (9a \times 9b \times 9c) \times 9f \times (9d - 9e)$	0	BTUH

Step 10 Heat loss from East Wall

a	Length of East wall	27.9	ft.
b	Height of East wall	9.0	ft.
c	Indoor Design Temperature	76	F
d	Outdoor Design Temperature	0	F
e	U-Value for East wall	0.071	
f	Heat Loss, $Q = ((10a \times 10b) - (8a \times 8b \times 8c) - (9a \times 9b \times 9c)) \times 10e \times (10c - 10d)$	1,363	BTUH

Step 11 Heat loss from Windows on West Side

a	Height of Window	5.0	ft.
b	Width of Window	6.0	ft.
c	Number of windows on west side	3	
d	Indoor Design Temperature	76	F
e	Outdoor Design Temperature	0	F
f	U-Value for Window	0.50	
g	Heat Loss, $Q = (11a \times 11b \times 11c) \times 11f \times (11d - 11e)$	3,420	BTUH

Apartment Load Sizing:	Highland View Apartments
Heat Loss Calculations	2-Bedroom

This analysis is for calculating the heat loss during the winter heating season.

Step 12 Heat loss from Exterior Doors on West Side

a	Height of Exterior Door	7.0	ft.
b	Width of Exterior Door	3.0	ft.
c	Number of exterior doors on west side	0	
d	Indoor Design Temperature	76	F
e	Outdoor Design Temperature	0	F
f	U-Value for Exterior Doors	0.10	
g	Heat Loss, $Q = (12a \times 12b \times 12c) \times 12f \times (12d - 12e)$	0	BTUH

Step 13 Heat loss from West Wall

a	Length of West wall	27.9	ft.
b	Height of West wall	9.0	ft.
c	Indoor Design Temperature	76	F
d	Outdoor Design Temperature	0	F
e	U-Value for West wall	0.071	
f	Heat Loss, $Q = ((13a \times 13b) - (11a \times 11b \times 11c) - (12a \times 12b \times 12c)) \times 13e \times (13c - 13d)$	875	BTUH

Step 14 Heat loss from Roof

a	Length of Roof	37.0	ft.
b	Width of Roof	27.9	ft.
c	Slope Factor for Roof (1.0 for flat roofs, 1.20 for sloped roofs)	1.00	
d	Indoor Design Temperature	76	F
e	Outdoor Design Temperature	68	F
f	U-Value for Roof	0.067	
g	Heat Loss, $Q = (14a \times 14b \times 14c) \times 14f \times (14d - 14e)$	551	BTUH

Step 15 Heat loss from Ground Floor

a	Length of ground floor	37.0	ft.
b	Width of ground floor	27.9	ft.
c	Indoor Design Temperature	76	F
d	Outdoor Design Temperature	68	F
e	U-Value for ground floor	0.000	
f	Heat Loss, $Q = (15a \times 15b) \times 15e \times (15c - 15d)$	0	BTUH

Step 16 Heat loss from Infiltration

a	Length of Building or Unit	37.0	ft.
b	Width of Building or Unit	27.9	ft.
c	Height of Building or Unit	9.0	
d	Indoor Design Temperature	76	F
e	Outdoor Design Temperature	0	F
f	ACH, Air Change Per Hour	1.0	
g	Heat Loss, $Q = ((16a \times 16b \times 16c) / 60) \times 16f \times 1.08 \times (16d - 16e)$	12,710	BTUH

APPENDIX E:
SUPPORTING DOCUMENTATION

BUILDING DEPARTMENT FOIA

To: Frank Recanati
East Rutherford Building Department
199 Paterson Avenue
East Rutherford, New Jersey 07073

Date: March 6 and 7, 2014
Phone #: 201.933.5649
email: borough@eastrutherfordnj.net

Re: Highland View Apartments
300 Highland Avenue
Palisades Park, New Jersey 07650

EMG Project No.: 107534.13R-004.306

Project Manager: Jill Orlov

Dear Mr. Recanati:

EMG is an engineering firm currently conducting a property condition survey of the above-referenced property. As part of the due-diligence process, we are submitting this letter through the Freedom of Information Act to obtain information specific to the property. We request your assistance by providing us with the following information concerning the site and buildings:

1. Date of last building department inspection ____/____/____
mo. day year
2. Are there any OUTSTANDING building code violations? YES / NO
(circle one)
3. How often is the subject property inspected? annually, biennially, other
(circle one)
4. Is the original Certificate of Occupancy or Permit on file? YES / NO
If such documents are on file, please fax them to the number noted below.

Responses may be faxed directly to our office, at (410) 785-6220, or mailed to our corporate offices:

EMG
Attn: Senior Engineering Consultant
222 Schilling Circle, Suite 275
Hunt Valley, Maryland 21031

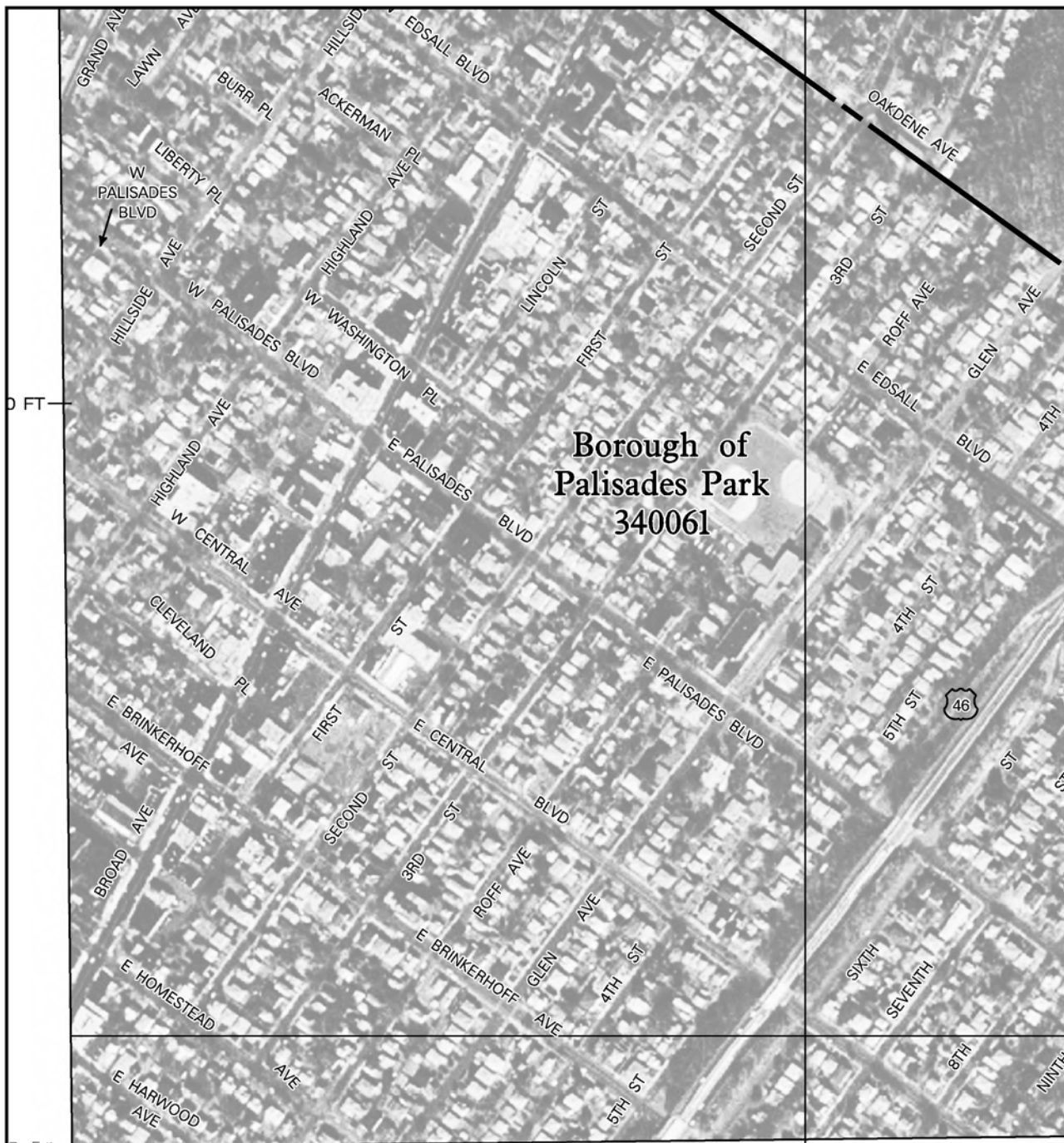
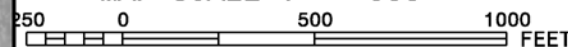
If **outstanding** violations are on file, please provide copies of the reports/citations. Please note the EMG Project Number and the Senior Engineering Consultant's name on all correspondence. If you need additional information to complete this request, please contact me at (800) 733-0660. Thank you for your prompt attention to this matter.

Sincerely,

Jill Orlov
Project Manager



MAP SCALE 1" = 500'



NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0276G

FIRM

FLOOD INSURANCE RATE MAP

BERGEN COUNTY,

NEW JERSEY

(ALL JURISDICTIONS)

PANEL 276 OF 332

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EDGEWATER, BOR OF	340029	0276	G
ENGLEWOOD, CITY OF	340031	0276	G
LEONIA, BOR OF	340045	0276	G
PALISADES PARK, BOR OF	340061	0276	G
TEANECK, TWP OF	340075	0276	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.



MAP NUMBER
34003C0276G

MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

7.5"

74° 00' 00"

585000 M



RightSpec® Commercial Water Heater Sizing Recommendations

Job Specifications

Date:	5/20/2014
Application:	Apartments/Condominiums
Installation Type:	Indoor
Fuel:	Natural Gas
VentType:	Standard Atmospheric
Ultra Low NOx:	No
Altitude:	Less than 2000 ft.
Shower Heads:	2.5 GPM
Inlet Temp:	40°F
Stored Temp:	140°F
Number of Heaters Specified:	3
Number of Storage Tanks Specified:	3
Tank Style Specified:	Vertical - Jacketed and Insulated
Tank Capacity Specified:	119 Gallons
General Requirements:	95 Units with 1 Bath
Laundry Requirements:	4 Washers (20 Pound Capacity)

	Energy Saver Recommendation # 1	Energy Saver Recommendation # 2	Ultra High Efficiency Recommendation
Heaters Required:	3	3	3
Heater Model No.:	D-100L-250-3N(A)	D-100L-270-3N(A)	EF-100T-250E-3N(A)
Alternate Model No.:	DM-100L-250-3N(A)	DM-100L-270-3N(A)	
Vent Type:	Std	Std	Std/PDV/PV/DV
Heater Capacity:	100 Gallons Each	100 Gallons Each	100 Gallons Each
Input per Hour:	250,000 BTU Each	270,000 BTU Each	250,000 BTU Each
Storage Tanks Required:	3	3	3
Storage Tank Model No.:	M-3-ST120R5(A)	M-3-ST120R5(A)	M-3-ST120R5(A)
Storage Tank Capacity:	119 Gallons Each	119 Gallons Each	119 Gallons Each
Usable Storage:	495 Gallons	495 Gallons	495 Gallons
Recovery:	726 GPH @ 100°F Rise	786 GPH @ 100°F Rise	882 GPH @ 100°F Rise
1st Hour Delivery:	1221 Gallons	1281 Gallons	1377 Gallons
3 Hour Average Delivery:	891 GPH	951 GPH	1047 GPH
Approx. Storage Recovery:	54 Minutes	50 Minutes	45 Minutes
% of Demand Satisfied:	100%	107%	118%
Heater Top Vent Height:	75"	75"	77 5/8"
Heater Diameter:	30 1/4"	30 1/4"	28 1/4"
Heater Vent Diameter:	6"	6"	3 or 4"

	Volume Water Heater Recommendation	Brute Elite Volume Water Heater Recommendation	Brute Magnum Volume Water Heater Recommendation
Heaters Required:			
Heater Model No.:			
Heater Capacity:	No recommendation for requirements entered	Coming Soon	Coming Soon
Input per Hour:			
Output per Hour:			
Storage Tanks Required:			
Storage Tank Model No.:			
Storage Tank Capacity:			
Usable Storage:			
Recovery:			
1st Hour Delivery:			
3 Hour Average Delivery:			
Approx. Storage Recovery:			
% of Demand Satisfied:			
Heater Height:			
Heater Width:			
Heater Depth:			
Heater Vent Diameter:			

(A) - ASME Available - Check Local Codes

A - ASME Standard

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 725 Talamore Drive, Ambler, PA 19002-1815
 Email: info@bradfordwhite.com or Phone: 800.523.2931

**APPENDIX F:
EMG ACCESSIBILITY CHECKLIST**

Date Completed: April 21, 2014

Property Name: Highland View Apartments

EMG Project Number: 107534.13R-004.306

	Building History	Yes	No	Unk	Comments
1	Has an ADA survey previously been completed for this property?	✓			
2	Have any ADA improvements been made to the property?	✓			
3	Does a Transition Plan / Barrier Removal Plan exist for the property?		✓		
4	Has building ownership or management received any ADA related complaints that have not been resolved?		✓		
5	Is any litigation pending related to ADA issues?		✓		
	Parking	Yes	No	NA	Comments
1	Are there sufficient accessible parking spaces with respect to the total number of reported spaces?		✓		
2	Are there sufficient van-accessible parking spaces available?		✓		
3	Are accessible spaces marked with the International Symbol of Accessibility? Are there signs reading "Van Accessible" at van spaces?		✓		
4	Is there at least one accessible route provided within the boundary of the site from public transportation stops, accessible parking spaces, passenger loading zones, if provided, and public streets and sidewalks?	✓			
5	Do curbs on the accessible route have depressed, ramped curb cuts at drives, paths, and drop-offs?	✓			
6	If required does signage exist directing you to accessible parking and an accessible building entrance?	✓			
	Ramps	Yes	No	NA	Comments
1*	Do all ramps along accessible path of travel appear to meet slope requirements? (1:12 or less)	✓			
2	Are ramps that appear longer than 6 ft complete with railings on both sides?	✓			
3	Does the width between railings appear at least 36 inches?	✓			

	Ramps (cont.)	Yes	No	NA	Comments
4	Is there a level landing for approximately every 30 ft horizontal length of ramp, at the top and at the bottom of ramps and switchbacks?	✓			
	Entrances/Exits	Yes	No	NA	Comments
1	Do all required accessible entrance doorways appear at least 32 inches wide and not a revolving door?	✓			
2	If the main entrance is inaccessible, are there alternate accessible entrances?			✓	
3	Is the door hardware easy to operate (lever/push type hardware, no twisting required and not higher than approximately 48 inches above the floor)?	✓			
	Paths of Travel	Yes	No	NA	Comments
1	Are all paths of travel free of obstruction and wide enough for a wheelchair (appear at least 36 inches wide)?	✓			
2	Are wheelchair-accessible facilities (toilet rooms, exits, etc.) identified with signage?	✓			
3	Is there a path of travel that does not require the use of stairs?	✓			
	Elevators	Yes	No	NA	Comments
1	Do the call buttons have visual and audible signals to indicate when a call is registered and answered when car arrives?	✓			
2	Are there visual and audible signals inside cars indicating floor change?	✓			
3	Are there standard raised and Braille marking on both jambs of each hoist way entrance as well as all cab/call buttons?	✓			
4	Do elevator doors have a reopening device that will stop and reopen a car door if an object or a person obstructs the door?	✓			
5	Are elevator controls low enough to be reached from a wheelchair (appears to be between 15 and 48 inches)?	✓			
6	If a two-way emergency communication system is provided within the elevator cab, is it usable without voice communication?	✓			

	Toilet Rooms	Yes	No	NA	Comments
1	Are common area public restrooms located on an accessible route?	✓			
2	Are pull handles push/pull or lever type?	✓			
3	Are there audible and visual fire alarm devices in the toilet rooms?	✓			
4	Are toilet room access doors wheelchair-accessible (appear to be at least 32 inches wide)?	✓			
5	Are public restrooms large enough to accommodate a wheelchair turnaround (appear to have 60" turning diameter)?	✓			
6	In unisex toilet rooms, are there safety alarms with pull cords?			✓	
7	Are toilet stall doors wheelchair accessible (appear to be at least 32" wide)?	✓			
8	Are grab bars provided in toilet stalls?	✓			
9	Are sinks provided with clearance for a wheelchair to roll under (appear to have 29" clearance)?	✓			
10	Are sink handles operable with one hand without grasping, pinching or twisting?	✓			
11	Are exposed pipes under sink sufficiently insulated against contact?	✓			
	Guest Rooms	Yes	No	NA	Comments
1	How many total accessible sleeping rooms does the property management report to have? Provide specific number in comment field. Are there sufficient reported accessible sleeping rooms with respect to the total number of reported guestrooms? See attached hot sheet.			✓	

	Guest Rooms (cont.)	Yes	No	NA	Comments
2	How many of the accessible sleeping rooms per property management have roll-in showers? Provide specific number in comment field. Are there sufficient reported accessible rooms with roll-in showers with respect to the total number of reported accessible guestrooms? See attached hot sheet.			✓	
3	How many assistive listening kits and/or rooms with communication features are available per property management? Provide specific number in comment field. Are there sufficient reported assistive listening devices with respect to the total number of rooms? See attached hot sheet.			✓	
	Pools	Yes	No	NA	Comments
1	Are public access pools provided? If the answer is no, please disregard this section.			✓	
2	How many accessible access points are provided to each pool/spa? Provide number in comment field. Is at least one fixed lift or sloped entry to the pool provided?			✓	
	Play Area	Yes	No	NA	Comments
1	Has the play area been reviewed for accessibility? All public playgrounds are subject to ADAAG standards.			✓	
	Exercise Equipment	Yes	No	NA	Comments
1	Does there appear to be adequate clear floor space around the machines/equipment (30" by 48" minimum)?			✓	

**Based on visual observation only. The slope was not confirmed through measurements.*

**APPENDIX G:
PRE-SURVEY QUESTIONNAIRES**



PROPERTY CONDITION ASSESSMENT: PRE-SURVEY QUESTIONNAIRE

This questionnaire must be completed by the property owner, the owner's designated representative, or someone knowledgeable about the subject property. **The completed form must be presented to EMG's Field Observer on the day of the site visit.** If the form is not completed, EMG's Project Manager will require **additional time** during the on-site visit with such a knowledgeable person in order to complete the questionnaire. During the site visit, EMG's Field Observer may ask for details associated with selected questions. This questionnaire will be utilized as an exhibit in EMG's final Property Condition Report.

Name of person completing questionnaire: Jim Giel

Association with property: Public Housing Manager

Length of association with property: 4+ years

2/14/14

Phone Number: 201-954-4582

Property Name: Highland View Apts

EMG Project Number: 107534.13R-004.306

Directions: Please answer all questions to the best of your knowledge and in good faith. Please provide additional details in the Comments column, or add backup documentation for any Yes responses.

INSPECTIONS		DATE LAST INSPECTED	LIST ANY OUTSTANDING REPAIRS REQUIRED
1	Elevators	2/12/13	Scheduled for a hydrolic pressure test
2	HVAC, Mechanical, Electric, Plumbing	Fall 2013	None
3	Life-Safety/Fire	Monthly	None
4	Roofs	Monthly	None
QUESTION			RESPONSE
5	List any major capital improvement within the last three years.		None
6	List any major capital expenditures planned for the next year.		Common area carpeting
7	What is the age of the roof(s)?		12 yrs
8	What building systems (HVAC, roof, interior/exterior finishes, paving, etc.) are the responsibilities of the tenant to maintain and replace?		Apartment carpeting/vct within 10 yrs/20yrs respectively

Mark the column corresponding to the appropriate response. Please provide additional details in the Comments column, or backup documentation for any Yes responses. (**NA** indicates "Not Applicable", **Unk** indicates "Unknown")

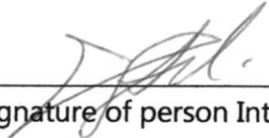
QUESTION		RESPONSE				COMMENTS
		Y	N	Unk	NA	
9	Are there any unresolved building, fire, or zoning code issues?		x			
10	Are there any "down" or unusable units?		x			
11	Are there any problems with erosion, stormwater drainage or areas of paving that do not drain?		x			
12	Is the property served by a private water well?		x			
13	Is the property served by a private septic system or other waste treatment systems?		x			
14	Are there any problems with foundations or structures?		x			
15	Is there any water infiltration in basements or crawl spaces?		x			
16	Are there any wall, or window leaks?		x			
17	Are there any roof leaks?		x			
18	Is the roofing covered by a warranty or bond?			x		
19	Are there any poorly insulated areas?	x				Possibly 103, '03 line?
20	Is Fire Retardant Treated (FRT) plywood used?		x			
21	Is exterior insulation and finish system (EIFS) or a synthetic stucco finish used?		x			
22	Are there any problems with the utilities, such as inadequate capacities?		x			
23	Are there any problems with the landscape irrigation systems?		x			
24	Has a termite/wood boring insect inspection been performed within the last year?		x			
25	Do any of the HVAC systems use R-11, 12, or 22 refrigerants?		x			

Mark the column corresponding to the appropriate response. Please provide additional details in the Comments column, or backup documentation for any Yes responses. (**NA** indicates "Not Applicable", **Unk** indicates "Unknown")

QUESTION		RESPONSE				COMMENTS
		Y	N	Unk	NA	
26	Has any part of the property ever contained visible suspect mold growth?		x			
27	Is there a mold Operations and Maintenance Plan?	x				
28	Have there been indoor air quality or mold related complaints from tenants?		x			
29	Is polybutylene piping used?		x			
30	Are there any plumbing leaks or water pressure problems?		x			
31	Are there any leaks or pressure problems with natural gas service?		x			
32	Does any part of the electrical system use aluminum wiring?		x			
33	Do Residential units have a less than 60-Amp service?		x			
34	Do Commercial units have less than 200-Amp service?		x			
35	Are there any recalled fire sprinkler heads (Star, GEM, Central, Omega)?		x			
36	Is there any pending litigation concerning the property?		x			
37	Has the management previously completed an ADA review?		x			
38	Have any ADA improvements been made to the property?	x				
39	Does a Barrier Removal Plan exist for the property?		x			
40	Has the Barrier Removal Plan been approved by an arms-length third party?			x		
41	Has building ownership or management received any ADA related complaints?			x		
42	Does elevator equipment require upgrades to meet ADA standards?		x			

Mark the column corresponding to the appropriate response. Please provide additional details in the Comments column, or backup documentation for any Yes responses. (**NA** indicates "Not Applicable", **Unk** indicates "Unknown")

QUESTION		RESPONSE				COMMENTS
		Y	N	Unk	NA	
43	Are there any problems with exterior lighting?		x			
44	Are there any other significant issues/hazards with the property?		x			
45	Are there any unresolved construction defects at the property?		x			



 Signature of person Interviewed or completing form

_____ 2/24/14

 Date



ENERGY AUDIT : PRE-SURVEY QUESTIONNAIRE

This questionnaire must be completed by the property owner, management point of contact or other person knowledgeable about the subject property.

The completed form must be presented to EMG's Field Observer on or before the site visit.

If the form is not completed, EMG's Project Manager will require additional time during the on-site visit in order to complete the questionnaire. During the site visit, EMG's Field Observer may ask for details associated with selected questions. This questionnaire will be utilized as an exhibit in EMG's final report.

Housing Authority: Housing Authority of Bergen County	Address: One Bergen County Plaza-2 nd Floor Hackensack, New Jersey, 07601
Owner, if other than Authority: Same	Address:
Name of Subject Site: Highland View Apartments	Residential Buildings: Residential Common Buildings: Other Buildings:
Address 300 Highland Ave	City, State, Zip Palisades Park New Jersey, 07650
Building Manager Jim Giel	Phone cf 201 954 4582
Maintenance Manager Wayne Moe	Phone cf 201 927 4264
Energy Management Coordinator NA	Phone
Building Description (circle all that apply) Masonry -X Wood framed – Steel framed – Curtain wall Detached – Townhouse – Low-rise – Mid-rise – High-rise Basement – Crawl Space – Attic X- Flat Roof -- Slope Roof Number of: _0_ Efficiencies _94_ One BR _1_ Two BR _0_ Three BR _0_ Four BR _0_ Five BR _0_ Six BR _0_ SRO Date of original completion _____ 1978____ Dates of significant renovations: Roof replacement-2004, Boilers -2009, HVAC-3-2010, Windows-1999, Hot Water storage tanks-2009-2010,2011, Repoint masonry-2000, Building exhaust fans-2001, Rebuild Elevator Systems-2004 did not include hydraulics, Electric Panel replacement, inc switch gear 2011, Reconfigure entrance-1995, Reconfigure Com Rm entrance-1998 <i>100%</i> <i>main gear we FPE</i> <i>controllers & entire box of cabs not just interior</i> <i>inc Apt panels & lower msa panels meters still FPE no detection plug replaced</i>	
Other uses on this site <input checked="" type="checkbox"/> Rental Office <input checked="" type="checkbox"/> Community Service Offices <input checked="" type="checkbox"/> Common Laundry <input checked="" type="checkbox"/> Common Meeting-Activity <input checked="" type="checkbox"/> Common Kitchen Residential or Commercial <input type="checkbox"/> Daycare <input type="checkbox"/> Training Education <input type="checkbox"/> Gym Fitness Recreation <input checked="" type="checkbox"/> Maintenance Storage <input type="checkbox"/> Other, Specify: Common Bath Rm, General Programs of Com Rm Service Coordinator	
Anticipated Modifications or Changes In Use in the next 15 yrs: None	
Have there been previous Energy Audits or Retrofit Programs? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Date _____ 2010____ Agency _____ In House____	

Scope Upgrade Common area lightning to T-8 fixtures, motion sensors in Bath rm. Common area_

Are related Energy Audit or Retrofit documents available? Previous cna

Any additional Energy Investment Programs? _____

Does the Institution Have an ongoing energy management program? ___Yes _X_No

Utilities			
	Utility Supplier to the Site	Master Metered	Tenant Metered
Electric	Yes		Yes
Natural/LP Gas	Yes	Yes	
Fuel Oil	Yes	Yes-generator	
Other _____			
Domestic Water		Yes	
Sewer		Yes	

- Utility data is required for the most recent available 12 month period. EMG can provide you with Excel form to assist you in supplying this data. Request this form from your Program Manager.
- Tenant paid data is required for best evaluation results. At minimum a representative sample of actual tenant consumption and cost is required for the 12 month period.

Tenant Utility Cost Paid By		
	Landlord or Housing Authority	Tenant
Heating		Yes
Cooling		Yes
Domestic Hot Water	Yes	
Water Supply	Yes	
Sewer	Yes	

Unk = Unknown, NA = Not Applicable	Yes	No	Unk	NA	Comments
1. Does the boiler or furnaces seem to be oversized for the property (i.e. – cycles on and off often)?		X			
2. Do any of the gas fired boilers, furnaces, or water heaters have vent or flue dampers?	X				
3. Does the boiler have outdoor reset controls?		X			
4. Does the County pay for the tenant gas or oil consumption?	X				
5. Are low-flow faucet aerators and shower heads installed on all or most faucets	X				

Unk = Unknown, NA = Not Applicable	Yes	No	Unk	NA	Comments
and showers?					
6. Are the water closets low-flow (1.6 gpf)?	X	X			Replacing flush valves
7. Are the motors used for the elevators high-efficiency motors?			x		
8. Are the motors used for the ventilation systems (i.e. - air handlers, fan coils, etc.) high-efficiency motors?	x	x			Some are
9. Are the motors used for the hydronic heating system (i.e. – pumps) high-efficiency motors?	x	x			Some are
10. Are the motors used for the hydronic cooling system (i.e. – pumps, chillers, cooling tower fan) high-efficiency motors?				x	
11. Is there any uninsulated heating water, chilled water, or domestic hot water piping in unconditioned spaces such as mechanical rooms, basements, or storage areas?		x			
12. Is a booster pump required to maintain water pressure at the property?		x			
13. Are laundry room washing machines fixed to cold rinse only?		x			
14. Are there any wall or window leaks?		x			
15. Are there any poorly insulated areas?	x				
16. Do the utilities (electric, gas, sewer, water) provide adequate service?	x				
17. Are HVAC systems at the property inspected and maintained, at a minimum, annually?	x				
18. Is the HVAC equipment more than ten years old?		x			
19. Are the water heaters/boilers more than ten years old?		x			
20. Are there any leaks or pressure problems with natural gas service?		x			
21. Is the electrical service adequate?	x				
22. Are there any emergency electrical generators?	x				
23. Are there any large UPS battery systems?		x			
24. Are there any vacant buildings or		x			

Unk = Unknown, NA = Not Applicable	Yes	No	Unk	NA	Comments
significant building areas?					
25. Is there anything else that EMG should know about when assessing this property? If so, what?	x				Lateral drainage from apts

APPENDIX H: RESUMES AND CERTIFICATIONS

EMG RESUME

EDWARD BEEGHLY

Quality Assurance Manager

Education

- Pursuing Masters of Engineering in Project Management – UMD College Park
- Ohio Northern University; Bachelor of Science, Civil Engineering, May 1995
- Valley Forge Military College; Associate Degree in Business, May 1991

Project Experience

- **Charlottesville Department of Public Works, Charlottesville, NC –** Mr. Beeghly, as the Program Manager on this project, which includes the assessment of eight sites encompassing over 161,000 SF. Projects under this contract include office buildings, a county health center, a fire station, an historic center and an opera house. EMG was responsible for assisting the DPW in developing their capital facilities plan for major rehabilitation projects at these buildings. EMG performed ADA assessments, facility assessments, and completed cost estimates per the RS Means model, adjusted to the location of the projects. Mr. Beeghly was responsible for management of the assessment teams and technical review of deliverables.
- **Atlanta Housing Authority, Atlanta, GA –** Mr. Beeghly is serving as the Program Manager for this ADA and Section 504 Assessment. He is responsible for managing the EMG team, as well as technical oversight and facilitating communication between EMG and AHA. Mr. Beeghly's knowledge of multifamily housing will lead the team to provide ADA assessments. EMG will provide AHA with design solutions to bring each facility in compliance with UFAS, and HUD Section 504 standards.
- **MDSHA District 3, Greenbelt, MD (Chief of Engineering Systems)**
– Mr. Beeghly served as the Chief of Engineering. During this time he managed a staff of seven, including four project managers, two engineering technicians, and one administrative assistant. Their projects included 10 consulting contracts valued at \$12 million dollars. Additionally, he served as Program Manager for District 3's (Suburban Washington D.C.) system preservation programs. He was fiscally responsible for multiple programs valued upwards to \$90 million dollars. He tracked asset management performance goals, program budget, network condition, and public commitments in determining individual project scope and program priority.

Industry Tenure

- A/E: 1995
- EMG: October, 2006

Related Experience

Industry Experience

- Government
- Office
- Industrial
- Affordable/Multi-family Housing
- Healthcare
- Retail
- Hospitality

Active Licenses/Registration

- Engineer in Training – Maryland

Special Skills & Training

- Dean L. H Archer Senior Design Award (Ohio Northern University)
- Geometric Design
- Highway Materials
- Pavement Design
- Project Management

Memberships

- Association of State Highway Engineers

ANDREW R. HUPP

Project Manager

Education

- BS, Architectural Engineering, University of Cincinnati College of Applied Science, 1997

Project Experience

- ***Project Manager, Physical Needs Assessment – Housing Authorities Nationwide***

Mr. Hupp performed Physical Needs Assessments (PNA) and in many instances, Energy Audits for housing authority portfolios across the county. The scopes of work included the evaluation of single-family, multi-family, and commercial structures belonging to the housing authorities. The PCAs included evaluations of the Civil/Site, Pavement, Roof, Structure, Foundation, Exterior Wall, Mechanical, Electrical, Plumbing and developing a 20 year replacement reserves budget. The projects included the cities of Detroit, MI; Chicago, IL; Dallas, TX; Pittsburgh, PA; HighPoint, NC; and Keansburg, NJ.

- ***Senior Consultant, Hotel Portfolio Property Condition Assessment – Nationwide***

Mr. Hupp coordinated and performed Property Condition Assessments (PCA) as well over 40 full service hotels nationwide such as Sheraton, Hilton, Marriott, Renaissance, Westins, Embassy Suites and others in order to assist HEI Hotels and Resorts in making decisions about purchasing the properties. The hotels ranged in ages from approximately 3 to 60 years, containing up to 350 guest rooms each. The PCAs included evaluations of the Civil/Site, Pavement, Roof, Structure, Foundation, Exterior Wall, Mechanical, Electrical, Plumbing, Fire Protection systems, and compliance with the Americans with Disabilities Act.

- ***Project Manager, HUD Project Capital Needs Assessments – Nationwide***

Mr. Hupp performs HUD Project Capital Needs Assessments throughout Ohio, Kentucky and Indiana including senior care facilities and multi-family properties. This works includes PCNA's per HUD MAP and LEAN guidelines for HUD approved lenders. Assessments have been completed within all of the various HUD programs including: 223(f), 202/223(f), 232/223(f).

Industry Tenure

- A/E: 1993
- EMG: 2009
- Commercial Real Estate Due Diligence: 2009

Related Experience

- Multifamily Condition Assessment reports: 2009
- Mark-to-Market Property Condition Assessment: 2009
- Green Retrofit Property Condition Assessment: 2009
- Commercial/Warehouse Property Condition Assessments: 2009
- Capital Needs Assessments: 2009
- Energy Audits: 2009
- Construction Review/Monitoring
- ADA Consulting: 2007
- Building Forensics/Consulting: 2007
- Executive Project Management: 2007
- Multifamily Architectural Design/Engineering: 2000
- Single-family Residential Design: 1993

Industry Experience

- Office
- Commercial
- Housing/Multi-family
- K-12
- Higher Education
- Hospitality
- Healthcare/Senior Housing
- Retail/Wholesale

Special Skills & Training

- Active in building code adoption/amendments
- Trained in HUD protocol

Regional Location

- Cincinnati, OH

Project Manager, Fay Apartments – Cincinnati, OH

Mr. Hupp was the project manager overseeing the Green Retrofit Property Condition Assessment for Fay Apartments which consisted of 1100 one, two and three bedroom townhomes on 17 acres. The PCA included evaluations of fire and water damaged buildings, condemned buildings, as well as building with significant structural damage due to a compromised underground railroad tunnel. In addition, this project included working with a team of architects and engineers to incorporate substantial renovations to the apartments.

Project Manager, City Link Center – Cincinnati, OH

Mr. Hupp was the project manager overseeing the construction monitoring of the City Link Center in Cincinnati, OH. The scope of work included monthly site visits of the 80,000 square foot, two story office and commercial space. Mr. Hupp reviewed the payment/draw requests, invoices, change orders, and scopes of work; then made payment recommendations based on the quantity and quality of work completed.

Executive Project Manager, University of Kentucky Patient Care Facility – Lexington, KY

Mr. Hupp served as the executive project manager overseeing the construction of the new \$600,000,000 hospital in Lexington, Kentucky. In this role, Mr. Hupp was responsible for management of the construction administration teams; both internal and external, to ensure project issues were identified and recommendations made and implemented in a timely, cost efficient manner while maintaining a high level of customer satisfaction. Mr. Hupp worked directly with the client and construction teams to review scopes, contracts, and bids in order to deliver the project under budget.

Project Manager, Cincinnati Public Schools – Cincinnati, OH

Mr. Hupp served as the corporate project manager for Cincinnati Public Schools as the Owner's Representative for all projects under construction in Cincinnati. In this role, Mr. Hupp was responsible for the selection of the structural and MEP subcontractors and identifying strategic partnerships for integrated project delivery. He also oversaw the preparation and presentation of weekly and monthly financial and project summary reports as presented to the Board of Directors and the Cincinnati Public School Board.

Senior Project Manager, Fischer Homes – Crestview Hills, KY

Mr. Hupp was responsible for the investigation of high liability service and litigation claims, including water intrusion, fire, structural and code related issues. This investigation and analysis would occur for isolated instances such as a fire or wind damage; in which case Mr. Hupp was responsible the evaluation of the condition and making recommendations to remedy the situation. This investigation also pertained to design, construction, or material flaws in which the underlying issue would be identified and design, construction, or material changes would be made.

JILL E. ORLOV

Technical Report Reviewer

Education

- Master of Architecture - University of Pennsylvania
- Bachelor of Science, Architecture - University of Virginia

Project Experience

- **Hotel Property; Pittsburgh, PA** – As Project Manager, Ms. Orlov performed a Property Condition Assessment of this 132 unit, six-story hotel property. She reviewed the condition of the building structure and systems and developed a thorough report, delivered on time and on budget.
- **Nursing Home; Charleston, SC** – Ms. Orlov completed a Property Condition Assessment of this 89,900 square feet building consisting of 148 units. Her findings included information on existing building conditions, site improvements, mechanical and electrical systems and code accessibility information.
- **Office Building; Richmond, VA** – Ms. Orlov completed a Property Condition Assessment on this 31,000 square feet, two and three story office building located in Richmond. She conducted interviews with the property manager and maintenance staff. Findings included information on existing building conditions, site improvements, mechanical and electrical systems and code and accessibility information.
- **Higher Education Stadium; Fairfax, VA** – Ms. Orlov completed a Property Condition Assessment on this 162,221 square feet, three story sports arena building located in Fairfax. Findings included information on existing building conditions, site improvements, mechanical and electrical systems and code and accessibility information. The client found her structural and roof observations critical to their final business decision. This project was a part of a large portfolio of projects EMG completed for our client.
- **Accessibility Study of Office Building** – New Orleans, Louisiana – Ms. Orlov completed a detailed handicapped accessibility study of a large hotel conference center.
- **Multi-Family; Northeast** – Ms. Orlov performed Property Condition Assessments on a large scale multi-family property converted from an historic mill complex. The site comprised a variety of past use buildings which had undergone major gut renovations.

Industry Tenure

- A/E: 1991 - 2004
- EMG: July, 2004 to present
- Commercial Real Estate Due Diligence: 2004

Industry Experience

- Government Facilities; 2004
- Office; 2004
- Industrial/Warehouse Facilities; 2004
- Housing/Multi-family; 2004
- Affordable Housing/HUD; 2004
- K-12; 2004
- Higher Education; 2004
- Hospitality; 2004
- Healthcare/Senior Living; 2004
- Retail; 2004
- Level 1 Energy Audit; 2004
- Level 3 ADA Audit; 2013

Active Licenses/Registration

- Architectural, Maryland
- Architectural, Pennsylvania - pending

Special Skills & Training

- AUTOCAD, 2000

Regional Location

- Baltimore, Maryland

KEVIN M. LANTRY, CEM

Lead Project Manager

Education

- Bachelor of Science, Mechanical Engineering - Purdue University School of Mechanical Engineering, 2003.

Project Experience

- **Indianapolis Housing Agency, Indianapolis, IN** – Lead Project Manager. Completed Physical Needs Assessments and Energy Assessments at 11 multifamily and senior living properties in the City of Indianapolis. Provided subsequent comprehensive update assessments for Tax Credit Rehabilitation purposes. Reports included life/safety concerns, deferred maintenance, capital planning, and ADA issues. Compiled capital plan into EMG's AssetCALC database software for client use.
- **Ann Arbor Housing Commission, Ann Arbor, MI** – Lead Project Manager. Completed Physical Needs Assessments and Energy Audits at 17 multifamily and senior living properties in the City of Ann Arbor. Compiled PNA Reports along with energy benchmarking, conservation measures, and financial calculations.
- **Housing Authority of the City of Paterson, Paterson, NJ** – Project Manager. Completed Energy Audits at office, residential, and recreational properties owned and operated by the Housing Authority of Paterson. Energy Audits included physical assessment, plan review, utility consumption analysis, and energy conservation recommendations.
- **Mark to Market Green PCAs; Various Locations** – Project Manager. Completed multiple Mark to Market Green PCAs per Housing and Urban Development (HUD) protocol. Reports included standard mark to market assessments with energy audits including ECMs and recommendations for sustainability.
- **Alan Bible Federal Building; Las Vegas, NV** – Project Manager. Completed a Level IV Building Engineering Report (BER) for the US Government General Services Administration. Evaluated the mechanical, plumbing, and elevator systems as part of the assessment team sent by EMG to analyze all building components.
- **First Energy Facility Assessments; Multiple Sites, PA** - Project Manager. Performed facility assessments on over forty sites in central and eastern Pennsylvania. Evaluated district offices, regional headquarters and maintenance facilities. Compiled results into Facility Condition Reports and AssetCALC software.

Industry Tenure

- A/E: 2001
- EMG: 2004

Related Experience

- GSA Assessment Team

Industry Experience

- Industrial
- Commercial
- Multi-family Residential
- Affordable Housing
- Condition Assessment
- Energy Auditing

Active Licenses/Registration

- Engineer in Training (EIT)
Indiana ET 31011662
- Association of Energy Engineers
Certified Energy Manager
CEM #16678

Special Skills & Training

- Certified Multifamily Building Analyst by Building Performance Institute (BPI)
- Training Program for Energy Managers by the Association of Energy Engineers (AEE)
- AutoCAD
- VFA.Facility Certified
- Cross Trained for Environmental Assessments

Memberships

- ASHRAE
- U.S. Green Building Council

Regional Location

- Indianapolis, Indiana



The Association of Energy Engineers
certifies that

Kevin M. Lantry

*has completed the prescribed standards for certification,
has demonstrated a high level of competence and ethical fitness
for energy management, and is hereby granted the title of*

CERTIFIED ENERGY MANAGER

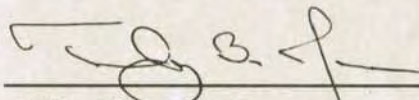
Expiration Date:

December 31, 2014

CEM

16678




CEM Board Chairman


CEM Director