Draft - For Discussion Purposes Only

Physical Needs Assessment and Energy Audit

Cuyahoga Metropolitan Housing Authority

8120 Kinsman Road
Cleveland, Ohio 44104

Physical Needs Assessment and Energy Audit

of

Woodhill Homes

2488 Morris Black Place
Cleveland, Ohio 44104

Prepared by:

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Date of Report: April 22, 2015
On site Date: March 16 - 19, 2015

Replacement Reserves Report

4/22/2015

Location	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	Total Escalated Estimate
907 - Eastside-Woodhill Homes / Commercial	$0	$146,339	$27,303	$8,812	$52,384	$1,569	$11,952	$0	$3,572	$3,914	$601,845	$57,636	$66,358	$0	$113,853	$346,804	$205,704	$13,329	$0	$0	**$1,661,375**
907 - Eastside-Woodhill Homes / General Site	$41,186	$940,525	$0	$232,882	$0	$394,124	$69,924	$0	$11,274	$0	$0	$137,061	$0	$13,070	$0	$4,752	$553,423	$0	$321,504	$0	**$2,719,725**
907 - Eastside-Woodhill Homes / Public Housing	$1,163,857	$3,075,935	$5,597,851	$248,626	$0	$9,881,879	$155,227	$1,786,115	$2,934,895	$0	$2,369,072	$547,260	$0	$255,525	$0	$1,026,314	$923,737	$5,548,044	$387,351	$349,824	**$36,251,512**
GrandTotal	**$1,205,043**	**$4,162,799**	**$5,625,154**	**$490,320**	**$52,384**	**$10,277,572**	**$237,103**	**$1,786,115**	**$2,949,742**	**$3,914**	**$2,970,917**	**$741,958**	**$66,358**	**$268,595**	**$113,853**	**$1,377,869**	**$1,682,864**	**$5,561,373**	**$708,856**	**$349,824**	**$40,632,612**

907 - Eastside-Woodhill Homes / Commercial

Report Section	Location Description	ID	Cost Description	Lifespan (EUL)	EAge	RUL	Quantity	Unit	Unit Cost	Subtotal	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	Deficiency Repair Estimate
6.3	Maintenance garage and Old Administration Building	326112	B3011D Modified bitumen, Total roof replacement	25	23	2	36	SQ	$631.54	$22,735			$22,735																			**$22,735**
6.3	Community Center - Flat Roof	326110	B3011G Single Ply EPDM Roofing system with Ballast 45 mills, including demo	20	4	16	48	SQ	$634.10	$30,437																	$30,437					**$30,437**
6.6	Maintenance areas	326118	B2034 Maintenance of overhead door	7	5	2	4	EA	$750.00	$3,000			$3,000							$3,000							$3,000					**$9,000**
6.8	Community Center	326132	C3011 Paint and patch interior walls, drywall	7	4	3	9600	SF	$0.84	$8,064				$8,064								$8,064						$8,064				**$24,192**
6.8	Community Center - Gym and stage	326122	C3024 Sand and refinish hardwood floor	10	4	6	1500	SF	$5.50	$8,250							$8,250										$8,250					**$16,500**
6.8	Community Center	326119	C3024 Replace Vinyl tile	18	4	14	1111	SY	$67.75	$75,270															$75,270							**$75,270**
6.8	Community Center	326121	C3025 Replace carpet, standard commercial, medium traffic	8	4	4	777	SY	$59.90	$46,542					$46,542								$46,542									**$93,085**
6.8	Community Center - Kitchen Classroom	326123	D4094 Install Ansul System at kitchen hood	20	4	16	1	EA	$4,875.00	$4,875																	$4,875					**$4,875**
6.8	Community Center - Kitchen, break room and prep room	326124	E1093 Replace 30" Reach-In Refrigerator	20	4	16	3	EA	$3,500.00	$10,500																	$10,500					**$10,500**
6.8	Community Center - Kitchen Classroom	326125	E1093 Range, 6-burner electric with oven, 36" W	20	4	16	1	EA	$5,240.00	$5,240																	$5,240					**$5,240**
6.8	Community Center - Prep Room	326128	E1093A Replace Reach in Freezer 44 CF	15	4	11	1	EA	$4,708.13	$4,708												$4,708										**$4,708**
6.8	Community Center - Prep Room	326127	E1093A Replace Electric Convection Oven, single deck	20	4	16	1	EA	$5,412.96	$5,413																	$5,413					**$5,413**
6.8	Maintenance area - Breakroom	326129	E1094 Refrigerator	15	10	5	2	EA	$676.90	$1,354						$1,354																**$1,354**
6.8	Community Center - Kitchen and Prep Room	326126	E1094 Dishwasher	10	4	6	2	EA	$880.00	$1,760							$1,760										$1,760					**$3,520**
7.1	Boiler houses throughout the property	326361	D2023 Hydronic circulating pump,7.5 HP; Replace	20	10	10	24	EA	$12,692.30	$304,615											$304,615											**$304,615**
7.1	Boiler houses throughout the property	328653	D3021 Replace water boiler, gas 2000 to 2312 MBH	30	15	15	6	EA	$37,100.00	$222,600																$222,600						**$222,600**
7.1	Boiler houses throughout the property	328626	D3021 ECM - Replace Inefficient Heating Plant	25	24	1	6	EA	$18,314.00	$109,884	$109,884																					**$109,884**
7.1	Boiler houses throughout the property	328625	D3041 ECM - Replace Existing Motors With High Efficiency Motors	15	14	1	24	EA	$1,341.38	$32,193	$32,193																$32,193					**$64,386**
7.1	Community Center - Exterior of Building	326137	D3041 Split system unit, 5-ton, replace condenser and fan coil	15	4	11	5	EA	$6,525.00	$32,625												$32,625										**$32,625**
7.2	Community Center	326580	D2023 50-gallon commercial water heater, gas-fired, replace	12	4	8	2	EA	$1,410.00	$2,820									$2,820													**$2,820**
7.2	Boiler houses throughout the property	326139	D2023 Hot water storage tank, glass lined, 225 to 325 gallons	20	10	10	6	EA	$8,155.00	$48,930											$48,930											**$48,930**
7.2	Boiler houses throughout the property	326140	D3021 Replace water boiler, gas 320 to 440 MBH	20	10	10	6	Each	$10,925.00	$65,550											$65,550											**$65,550**
7.4	Community Center - Exterior of Building	326141	D5092 Generator, Natural Gas, 20 to 40 kW, replace	25	15	10	1	Each	$20,670.00	$20,670											$20,670											**$20,670**
7.5	Community Center - Elevator	326142	D1011 Elevator Cab Interior Renovations	20	4	16	1	Each	$8,120.00	$8,120																	$8,120					**$8,120**
7.5	Community Center	326581	D1011 Replace elevator hydraulic system, 2,500 lb capacity	20	4	16	1	Each	$18,400.00	$18,400																	$18,400					**$18,400**
7.6	Community Center	326143	D5037 Fire alarm panel	15	4	11	1	EA	$4,304.43	$4,304												$4,304										**$4,304**
Totals, Unescalated											**$0**	**$142,077**	**$25,735**	**$8,064**	**$46,542**	**$1,354**	**$10,010**	**$0**	**$2,820**	**$3,000**	**$447,829**	**$41,638**	**$46,542**	**$0**	**$75,270**	**$222,600**	**$128,188**	**$8,064**	**$0**	**$0**	**$1,209,734**
Location Factor (1.00)											**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Totals, Escalated (3.0% inflation, compounded annually)											**$0**	**$146,339**	**$27,303**	**$8,812**	**$52,384**	**$1,569**	**$11,952**	**$0**	**$3,572**	**$3,914**	**$601,845**	**$57,636**	**$66,358**	**$0**	**$113,853**	**$346,804**	**$205,704**	**$13,329**	**$0**	**$0**	**$1,661,375**

907 - Eastside-Woodhill Homes / General Site

Report Section	Location Description	ID	Cost Description	Lifespan (EUL)	EAge	RUL	Quantity	Unit	Unit Cost	Subtotal	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	Deficiency Repair Estimate
1.2	Drainage piping throughout the property and central boiler piping	326109	_0001 Engineering Review of Storm Drainage System	0	0	0	1	EA	$7,500.00	$7,500	$7,500																					**$7,500**
5.2	Sidewalks throughout the property	326097	G2012 Concrete pavement replace	30	27	3	3000	SF	$8.09	$24,270				$24,270																		**$24,270**
5.2	Tenant parking and drive aisles	326095	G2022 Crack sealing and seal coating of the asphalt	5	2	3	2500	SY	$3.56	$8,900				$8,900					$8,900					$8,900				$8,900				**$35,600**
5.2	Tenant parking areas and drive aisles	326096	G2022 Cut & Patch asphalt	10	9	1	5200	SF	$7.78	$40,456		$40,456									$40,456											**$80,912**
5.3	Landscaping throughout entire property	326098	G2052 Re-grading landscape and establishment of ground cover	25	24	1	20000	SY	$26.39	$527,800		$527,800																				**$527,800**
5.4	Landscaping throughout entire property	326100	G2054 Reseed and fertilize grass areas, push spreader	0	0	0	400	1000 SF	$76.59	$30,636	$30,636																					**$30,636**
5.4	Landscaping throughout entire property	326099	G2055 Mature tree removal or major trimming	5	4	1	60	Each	$976.00	$58,560		$58,560					$58,560					$58,560				$58,560						**$234,240**
5.5	Missing/ Broken exterior lighting throughout the property	326576	D5022 LED fixture, exterior wall pack, 30 watt, incl lamps	15	15	0	5	EA	$610.00	$3,050	$3,050														$3,050							**$6,100**
5.5	Exterior lighting throughout the property	328906	D5022 LED fixture, exterior wall pack, 30 watt, incl lamps	15	12	3	295	EA	$610.00	$179,950				$179,950													$179,950					**$359,900**
5.5	Parking areas throughout the property	326103	E1092 Dumpster, 8 CY	20	15	5	12	EA	$1,750.00	$21,000						$21,000																**$21,000**
5.5	Chain-link throughout the property	326102	G2041 3-foot high chain link fence, replace	30	25	5	2600	LF	$17.25	$44,850						$44,850																**$44,850**
5.5	Playgrounds throughout the property	326104	G2045 Replace Play Structure, Medium	20	15	5	5	EA	$31,625.00	$158,125						$158,125																**$158,125**
5.5	Exterior lighting throughout the property	328907	G4022 ECM - Replace High Intensity Discharge Lamps With LED	15	14	1	380	EA	$753.46	$286,315		$286,315														$286,315						**$572,630**
5.5	Exterior lighting throughout the property	328911	G4022 Aluminum light pole, over 15 ft. and double fixture, replace	20	15	5	40	EA	$2,900.00	$116,000						$116,000																**$116,000**
Totals, Unescalated											**$41,186**	**$913,131**	**$0**	**$213,120**	**$0**	**$339,975**	**$58,560**	**$0**	**$8,900**	**$0**	**$0**	**$99,016**	**$0**	**$8,900**	**$0**	**$3,050**	**$344,875**	**$0**	**$188,850**	**$0**	**$2,219,563**
Location Factor (1.00)											**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Totals, Escalated (3.0% inflation, compounded annually)											**$41,186**	**$940,525**	**$0**	**$232,882**	**$0**	**$394,124**	**$69,924**	**$0**	**$11,274**	**$0**	**$0**	**$137,061**	**$0**	**$13,070**	**$0**	**$4,752**	**$553,423**	**$0**	**$321,504**	**$0**	**$2,719,725**

907 - Eastside-Woodhill Homes / Public Housing

Report Section	Location Description	ID	Cost Description	Lifespan (EUL)	EAge	RUL	Quantity	Unit	Unit Cost	Subtotal	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	Deficiency Repair Estimate
3.2	Public Housing	328631	C3005 ADA renovations to 1-bedroom unit	5	4	1	10	EA	$13,000.00	$130,000		$130,000					$130,000									$130,000						**$520,000**
3.2	Public Housing	328632	C3005 ADA renovations to 2-bedroom unit	0	0	0	14	EA	$15,000.00	$210,000	$210,000																					**$210,000**
5.3, 6.3	Drainage piping throughout the property	326108	G3021A Public Storm Utility Drainage Piping, corrugated metal pipe, galvanized and bituminous coated with paved invert, 20' lengths, 16 ga., 12" diameter, excludes excavation and backfill	40	38	2	10	1000 LF	$3,200.00	$32,000			$32,000																				**$32,000**
6.1	Basement in crawl spaces - Tenant Buildings	326105	A2022 Seal penetrations in concrete foundation wall	0	0	0	67	EA	$47.60	$3,189	$3,189																					**$3,189**
6.3	Tenant unit buildings with pitched roofs	328614	B2011 ECM - Upgrade Insulation	50	49	1	90000	SF	$0.56	$50,400							$50,400															**$50,400**
6.3	Tenant Buildings - Sloped roofs	326106	B3011 Slate steep roofing, total roof replacement	50	49	1	900	SQ	$993.00	$893,700							$893,700															**$893,700**

Replacement Reserves Report

EMG

4/22/2015

Report Section	Location Description	ID	Cost Description	Lifespan (EUL)	EAge	RUL	Quantity	Unit	Unit Cost	Subtotal	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	Deficiency Repair Estimate
6.3	Tenant Buildings - Flat roofs	326107	B3011D Modified bitumen, Total roof replacement	25	24	1	1100	SQ	$631.54	$694,694		$694,694																			**$694,694**
6.4	Tenant Building - Exterior walls	326113	B2011 Repoint masonry	40	30	10	62000	SF	$7.68	$476,160											$476,160										**$476,160**
6.4	Tenant Buildings - Caulking	326114	B2011 Caulking, polyurethane,1/4"x1/4", remove and replace	15	13	2	5200	LF	$3.84	$19,968			$19,968															$19,968			**$39,936**
6.5	3 Story Walk Up Buildings	326115	C2011A Replace metal steps	0	0	0	5200	SF	$171.84	$893,568	$893,568																				**$893,568**
6.6	Tenant apartment units	329027	B2011 ECM - Add Reflective Coating To Exterior Windows	15	14	1	4330	EA	$80.63	$349,128		$349,128															$349,128				**$698,256**
6.6	All Tenant Buildings	326578	B2021 Vinyl replacement window, double hung, double glazed, 94 to 101 united inches	30	25	5	4330	EA	$583.50	$2,526,555						$2,526,555															**$2,526,555**
6.6	Tenant exterior doors	326117	B2032 Metal clad wood doors, painted, replace	25	15	10	822	EA	$991.00	$814,602											$814,602										**$814,602**
8.1	Tenant apartments	326148	C1021 Remove and replace interior hollow core wood door	25	10	15	1752	EA	$376.00	$658,752																$658,752					**$658,752**
8.1	Tenant apartments	326149	C1021 Remove and replace interior hollow core wood door	25	23	2	600	EA	$376.00	$225,600			$225,600																		**$225,600**
8.1	Tenant apartments	326145	C3024 Replace Vinyl tile	18	16	2	11111	SY	$67.75	$752,770			$752,770																		**$752,770**
8.1	Tenant apartments	326146	C3024 Replace Vinyl tile	18	10	8	31011	SY	$67.75	$2,100,995									$2,100,995												**$2,100,995**
8.2	Tenant apartments	326151	E1094 Refrigerator	15	13	2	100	EA	$676.90	$67,690			$67,690															$67,690			**$135,380**
8.2	Tenant apartments	326152	E1094 Range	20	10	10	378	EA	$475.00	$179,550											$179,550										**$179,550**
8.2	Tenant apartments	326155	E1094 Range Hood ductless	15	13	2	100	EA	$308.00	$30,800			$30,800															$30,800			**$61,600**
8.2	Tenant apartments	326153	E1094 Range Hood ductless	15	10	5	378	EA	$308.00	$116,424						$116,424															**$116,424**
8.2	Tenant apartments	326154	E1094 Range	20	18	2	100	EA	$475.00	$47,500			$47,500																		**$47,500**
8.2	Tenant apartments	326150	E1094 Refrigerator	15	8	7	378	EA	$676.90	$255,868								$255,868													**$255,868**
8.2	Tenant apartments	326160	E2012 Residential kitchen cabinets wall and base	25	18	7	2680	LF Front	$371.98	$996,906								$996,906													**$996,906**
8.2	Tenant apartments	326161	E2012 Residential kitchen countertop 10.5 ' w/new sink and disp.	15	13	2	2100	EA	$1,542.00	$3,238,200			$3,238,200															$3,238,200			**$6,476,400**
8.2	Tenant apartments	326162	E2012 Residential kitchen countertop 10.5 ' w/new sink and disp.	15	10	5	2680	EA	$1,542.00	$4,132,560						$4,132,560															**$4,132,560**
8.2	Tenant apartments	326158	E2012 Residential kitchen cabinets wall and base	25	23	2	2100	LF Front	$371.98	$781,158			$781,158																		**$781,158**
8.3	3 Story Walk Up Buildings Units	326164	D3040 Replace Boiler and Pressure Valve	20	10	10	150	EA	$1,950.00	$292,500											$292,500										**$292,500**
8.3	Tenant apartments	326166	D3042 Install bathroom exhaust fan	10	9	1	478	Each	$450.00	$215,100		$215,100										$215,100									**$430,200**
8.3	All tenant building	326579	D3044 Replace baseboard radiator finned tube 1.25" copper	35	30	5	3700	LF	$80.50	$297,850						$297,850															**$297,850**
8.4	Tenant apartments - Bathrooms	326167	D2011 Residential water closet with 1.28 GPF pressure assisted unit	20	20	0	100	EA	$571.00	$57,100	$57,100																				**$57,100**
8.4	Tenant apartment bathrooms	329025	D2011 Water closet, residential, .8 GPF	20	19	1	483	EA	$688.52	$332,555		$332,555																			**$332,555**
8.4	Tenant apartments - Bathrooms	326168	D2011 Residential water closet with 1.28 GPF pressure assisted unit	20	12	8	378	EA	$571.00	$215,838									$215,838												**$215,838**
8.4	Public Housing	328612	D2014 ECM - Install Low Flow Faucet Aerators	10	9	1	961	EA	$32.94	$31,655		$31,655										$31,655									**$63,311**
8.4	Tenant apartments - Bathrooms	326173	D2015 Refinish bath tub	15	12	3	478	EA	$476.00	$227,528				$227,528															$227,528		**$455,056**
8.4	Tenant apartments - Bathrooms	326172	D2015 Replace fiberglass tub/shower surround	15	10	5	478	EA	$1,599.00	$764,322						$764,322															**$764,322**
8.4	tenant bathrooms containing showers	328611	D2017 ECM - Install Low Flow Shower Heads	10	9	1	380	EA	$48.94	$18,597		$18,597										$18,597									**$37,194**
8.4	3 Story Walk Up Building Units	326171	D2023 30 to 40 gallon gas water heater	12	5	7	150	EA	$1,330.00	$199,500								$199,500												$199,500	**$399,000**
8.4	3 Story Walk Up Building Units	329026	D2023 30 to 40 gallon gas water heater	12	11	1	150	EA	$1,160.00	$174,000		$174,000												$174,000							**$348,000**
8.4	Tenant apartments - Bathrooms	326169	E2012 Replace vanity cabinet, counter and sink	20	18	2	100	EA	$808.25	$80,825			$80,825																		**$80,825**
8.4	Tenant apartments - Bathrooms	326170	E2012 Replace vanity cabinet, counter and sink	20	15	5	378	EA	$808.25	$305,519						$305,519															**$305,519**
8.5	Tenant apartments	326175	D5012A Breaker panel 100 amps residential	30	25	5	478	EA	$797.00	$380,966						$380,966															**$380,966**
8.5	Apartment Unit Kitchens	328912	D5021 ECM - Replace Existing Linear Fluorescent Lamps	15	14	1	694	EA	$139.07	$96,515		$96,515															$96,515				**$193,029**
Totals, Unescalated											**$1,163,857**	**$2,986,344**	**$5,276,511**	**$227,528**	**$0**	**$8,524,196**	**$130,000**	**$1,452,275**	**$2,316,833**	**$0**	**$1,762,812**	**$395,353**	**$0**	**$174,000**	**$0**	**$658,752**	**$575,642**	**$3,356,658**	**$227,528**	**$199,500**	**$29,427,789**
Location Factor (1.00)											**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Totals, Escalated (3.0% inflation, compounded annually)											**$1,163,857**	**$3,075,935**	**$5,597,851**	**$248,626**	**$0**	**$9,881,879**	**$155,227**	**$1,786,115**	**$2,934,895**	**$0**	**$2,369,072**	**$547,260**	**$0**	**$255,525**	**$0**	**$1,026,314**	**$923,737**	**$5,548,044**	**$387,351**	**$349,824**	**$36,251,512**

TABLE OF CONTENTS

CERTIFICATION

EMG has completed a Physical Needs Assessment (PNA) and an Energy Audit of the subject property, Woodhill Homes, located at 2488 Morris Black Place in Cleveland, Cuyahoga County, Ohio, 44104. The PNA and Energy Audit were performed on March 16 - 19, 2015.

The PNA and Energy Audit were performed at the Housing Authority's request using methods and procedures consistent with good commercial and customary practice conforming to ASTM E2018-08, *Standard Guide for Property Condition Assessments: Baseline Property Condition Assessment Process*. Within this Physical Needs Assessment Report, EMG's follows the ASTM guide's definition of User, that is, the party that retains EMG for the preparation of a baseline PNA of the subject property. A User may include, without limitation, a purchaser, potential tenant, owner, existing or potential mortgagee, lender, or property manager of the subject property.

This report has been prepared for and is exclusively for the use and benefit of the Client identified on the cover page of this report. 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.

This report, or any of the information contained therein, is not for the use or benefit of, nor may it be relied upon by any other person or entity, for any purpose without the advance written consent of EMG. Any reuse or distribution without such consent shall be at the client's or recipient's sole risk, without liability to 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 building design 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 arm's-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 PNA cannot wholly eliminate the uncertainty regarding the presence of physical deficiencies and the performance of a subject property's building systems. Preparation of a PNA in accordance with Public Housing Modernization Standards Handbooks 7485.2 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 PNA 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, the removal of materials, or design. 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 component's or system's performance.

Any questions regarding this report should be directed to Edward Beeghly at Ebeeghly@emgcorp.com or at 800.733.0660, x7607.

Prepared by: Cheyenne Irby,
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Reviewed by:

Beth A. Stauffer,
PNA Reviewer for
Edward Beeghly
Program Manager

1. EXECUTIVE SUMMARY

1.1. SUMMARY OF FINDINGS

The Cuyahoga Metropolitan Housing Authority contracted with EMG to conduct a Physical Needs Assessment (PNA) and Energy Audit of the subject property, Woodhill Homes, located at 2488 Morris Black Place in Cleveland, Cuyahoga County, Ohio, 44104. The PNA was performed on March 16 - 19, 2015.

Building No.	Structures Assessed:	Building Type	No. of Stories	Units Assessed	Date of Const. Phase-I	Date of Const. Phase-II	Size (Sf):
2567	Community Building	Community Building	3	N/A	1939	2011	22,000
N/A	Maintenance Building/Old Admin Building	Maintenance Building	1	N/A	1939		10,560
10516	Row Home	Multi-Family	2	1	1939		3,000 to 5,000
1060	Row Home	Multi-Family	2	1	1939		3,000 to 5,000
2443	Row Home	Multi-Family	2	1	1939		3,000 to 5,000
2463	Row Home	Multi-Family	2	1	1939		3,000 to 5,000
2474	Row Home	Multi-Family	2	1	1939		3,000 to 5,000
2477	Row Home	Multi-Family	2	1	1939		3,000 to 5,000
2479	Row Home	Multi-Family	2	1	1939		3,000 to 5,000
2479	Row Home	Multi-Family	2	1	1939		3,000 to 5,000
2489	Row Home	Multi-Family	2	1	1939		3,000 to 5,000
2493	Row Home	Multi-Family	2	1	1939		3,000 to 5,000
2495	Row Home	Multi-Family	2	1	1939		3,000 to 5,000
2496	Duplex	Multi-Family	2	2	1939		3,000 to 5,000
2505	Row Home	Multi-Family	2	1	1939		3,000 to 5,000
2508	Row Home	Multi-Family	2	3	1939		3,000 to 5,000
2513	Row Home	Multi-Family	2	3	1939		3,000 to 5,000

Building No.	Structures Assessed:	Building Type	No. of Stories	Units Assessed	Date of Const. Phase-I	Date of Const. Phase-II	Size (Sf):
2529	Row Home	Multi-Family	2	1	1939		3,000 to 5,000
2529	Row Home	Multi-Family	2	2	1939		3,000 to 5,000
2535	Row Home	Multi-Family	2	2	1939		3,000 to 5,000
2541	Row Home	Multi-Family	2	2	1939		3,000 to 5,000
2543	Row Home	Multi-Family	2	1	1939		3,000 to 5,000
2545	Row Home	Multi-Family	2	2	1939		3,000 to 5,000
2556	Row Home	Multi-Family	2	2	1939		3,000 to 5,000
2572	Row Home	Multi-Family	2	2	1939		3,000 to 5,000
2581	Row Home	Multi-Family	2	1	1939		3,000 to 5,000
10511	Row Home	Multi-Family	2	2	1939		3,000 to 5,000
10516	Row Home	Multi-Family	2	1	1939		3,000 to 5,000
10517	Row Home	Multi-Family	2	1	1939		3,000 to 5,000
10521	Row Home	Multi-Family	2	1	1939		3,000 to 5,000
10606	Row Home	Multi-Family	2	1	1939		3,000 to 5,000
10623	Duplex	Multi-Family	3	1	1939		3,000 to 5,000
10709	Row Home	Multi-Family	2	1	1939		3,000 to 5,000
10715	Row Home	Multi-Family	2	1	1939		3,000 to 5,000
10721	Row Home	Multi-Family	2	3	1939		3,000 to 5,000
10804	Duplex	Multi-Family	3	2	1939		3,000 to 5,000
10806	Duplex	Multi-Family	3	1	1939		3,000 to 5,000
10814	Row Home	Multi-Family	2	2	1939		3,000 to 5,000
10901	Row Home	Multi-Family	2	1	1939		3,000 to 5,000

The site area is approximately 28 acres.

Summary of Physical Needs Assessment:

On site amenities include children's playgrounds, splash park and community center.

Generally, the property appears to have been constructed within industry standards in force at the time of construction, to have been maintained during recent years, and is in fair overall condition.

According to property management personnel, the property has not had any capital improvement expenditure program over the past three years.

There are a number of Priority Deficiency Costs that have been identified during the evaluation period. These needs are identified in the various sections of this report and are summarized in the attached Replacement Reserves Report.

Summary of Energy Audit:

EMG has conducted an Energy Audit on the Woodhill Homes. The study included a review of the building's construction features, historical energy and water consumption and costs, review of the building envelope, HVAC equipment, heat distribution systems, lighting, and the building's operational and maintenance practices.

EMG has evaluated 17 Energy Conservation Measures (ECMs) for this property and 11 are recommended. The savings for each measure are calculated using standard engineering methods followed in the industry, and detailed calculations for ECM are provided in Appendix H for reference. A 10% discount in energy savings was applied to account for the interactive effects amongst the ECMs. In addition to the consideration of the interactive effects, EMG has applied a 15% contingency to the implementation costs to account for potential cost overruns during the implementation of the ECMs

Summary of Financial Information for Recommended Energy Conservation Measures

Item	Estimate
Total Projected Initial ECM Investment	$4,609,166 *(In Current Dollars)*
Estimated Annual Cost Savings Related to ECMs	$526,416 *(In Current Dollars)*
Net Effective ECM Payback	8.76 years
Estimated Annual Energy Savings	41.05%
Estimated Annual Cost Savings	69.58%

1.2. FOLLOW UP RECOMMENDATIONS

The following issues require additional study:

- The site is equipped with an underground drainage system that connects to the municipal drainage system. The site's underground system has collapsed in many places thus not allowing storm water from roofs adequate expulsion. Many downspouts have been retrofitted to expel water onto the landscaped areas which in turn has increased erosion issues throughout the property. The original underground water drainage system must be repaired to help mediate the water drainage issues at the property. An engineering study is required to investigate the magnitude of the drainage issue.

- The piping for the central hot water boilers are in fair to poor condition. It is reported by POC that there are areas on the site where the piping is leaking. An engineering study is required in order to investigate the extent of the issue and could be conducted with the study identified above.

1.3. OPINIONS OF PROBABLE COST

This section provides estimates for the repair and capital reserves items noted within this Physical Needs Assessment (PNA).

These estimates are based on invoice or bid documents provided either by the Owner/facility and construction costs developed from construction resources such as *R.S. Means* and *Marshall & Swift,* EMG's experience with past costs for similar properties, city cost indexes, and assumptions regarding future economic conditions.

1.4. METHODOLOGY

Physical Needs Assessment:

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 necessitate replacement. Accurate historical replacement records, if provided, are typically the best source of information. Exposure to the elements, initial quality and installation, extent of use, the quality and amount of preventive maintenance exercised, etc., are all factors that impact the effective age of a system or component. As a result, a system or component may have an effective age that is greater or less than its actual chronological age. The Remaining Useful Life (RUL) of a component or system equals the EUL less its effective age. Projections of Remaining Useful Life (RUL) are based on continued use of the Property similar to the reported past use. Significant changes in tenants and/or usage may affect the service life of some systems or components.

The evaluation period identified in this report is defined as 20 years.

The physical condition of building component to be repaired is typically defined as being in one of five categories: Priority One through Five. For the purposes of this report, the following definitions are used:

Priority One – These items are to be addressed as Immediate. Items in this category require immediate action and include corrective measures to:

1. Correct life safety and/or code hazards
2. Repair item permitting water leaks into the building or structure
3. Repair mold or mildew conditions
4. Down unit repairs
5. Further study investigations

Priority Two – These items are to be addressed within the next 1 year. Items in this category require corrective measures to:

1. Return a system to normal operation
2. Stop deterioration to other systems
3. Stop accelerated deterioration
4. Replace items that have reached or exceeded their useful service life
5. ADA/UFAS deficiencies

Priority Three – These items are to be addressed within the next 2-3 years. Items in this category, if not corrected expeditiously, will become critical in the next several years. Items in this category include corrective measures to:

1. Stop intermittent interruptions
2. Correct rapid deterioration
3. Replace items that will reach or exceed their useful service life
4. Correct functionality and/or aesthetic issues that are not critical

Priority Four – These items are to be addressed within the next 3-5 years. Items in this category include conditions requiring appropriate attention to preclude predictable deterioration or potential downtime and the associated damage or higher costs if deferred further.

Priority Five – These items are to be addressed within 6-20 years. Items in this category represent a sensible improvement to the existing conditions. These are not required for the most basic function of the facility; however, Priority 5 projects will improve overall usability and/or reduce long-term maintenance costs.

Energy Audit:

As per the proposed 24 CFR 905 Subpart- C regulations by HUD, the property is evaluated for all applicable ECMs as specified in the guideline. All the applicable ECM's are evaluated and further classified into three major categories:

- **Payback ≤ 12 Yrs**: All ECM's that are evaluated for the property and that have simple payback period of less than or equal to 12 years
- **12 > Payback ≤ 20 Yrs**: All ECM's that are evaluated for the property and that have simple payback period greater than 12 years but less than or equal to 20 years
- **Payback > 20 Yrs**: All ECM's that are evaluated for the property and that have simple payback period of greater than 20 years

Financialy methodology used to determine the payback period is as follows:

1. Simple Payback Period –The number of years required for the cumulative value of energy or water cost savings less future non-fuel or non-water costs to equal the investment costs of the building energy or water system, without consideration of discount rates. ECMs with a payback period greater than the Expected Useful Life (EUL) of the project are not typically recommended, as the cost of the project will not be recovered during the lifespan of the equipment. These ECMs are recommended for implementation during future system replacement. At that time, replacement may be evaluated based on the premium cost of installing energy efficient equipment.

$$Simple\ Payback = \frac{Initial\ Cost}{Annual\ Savings}$$

EMG screens and categorizes all the ECM's as per the 24 CFR 905 regulation requirements based on their payback, but only those ECM's are recommended for implementation that have a Savings to Investment Ratio ≥1.0.

Financialy methodology used to determine the Savings to Investment Ratio is as follows:

2. Savings-to-Investment Ratio (SIR) – The savings-to-investment ratio is the ratio of the present value savings to the present value costs of an energy or water conservation measure. The numerator of the ratio is the present value over the estimated useful life (EUL) of net savings in energy or water and non-fuel or non-water operation and maintenance costs attributable to the proposed energy or water conservation measure. The denominator of the ratio is the present value of the net increase in investment and replacement costs less salvage value attributable to the proposed energy or water conservation measure. It is recommended that energy efficiency recommendations should be based on a calculated SIR, with larger SIRs receiving a higher priority. A project is typically only recommended if SIR is greater than or equal to 1.0, unless other factors outweigh the financial benefit.

$$SIR = \frac{Present\ Value\ (Annual\ Savings, i\%, EUL)}{Initial\ Cost}$$

2. PHYSICAL NEEDS ASSESSEMENT - PURPOSE AND SCOPE

2.1. PURPOSE

The purpose of this Physical Needs Assessment (PNA) is to assist the Client in evaluating the physical aspects of this property and how its condition may affect the soundness of the Client's financial decisions over time. For this PNA, representative samples of the major independent building components were observed and their physical conditions were evaluated. This included site and building exteriors, representative interior common areas, and a representative sample of the apartment units. Apartment unit observations include a minimum of 50 percent of the vacant units and all of the down units.

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's systems and components were observed and evaluated for their present condition. EMG completed the *Systems and Conditions Table*, which lists the current physical condition and estimated remaining useful life of each system and component present on the property, as observed on the day of the site visit. The estimated costs for repairs and/or capital reserves are included in the enclosed cost tables. 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 conditions: Good, Fair, or Poor, or a combination thereof. For the purposes of this report, the following definitions are used:

Good	=	Satisfactory as-is. Requires only routine maintenance over the evaluation period. 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 required.

2.2. DEVIATIONS FROM THE ASTM E2018-08 GUIDE

ASTM E2018-08, *Standard Guide for Property Condition Assessments: Baseline Property Condition Assessment Process* requires that any deviations from the Guide be so stated within the report. EMG's probable cost threshold limitation is reduced from the Guide's $3,000 to $2,000, thus allowing for a more comprehensive assessment on smaller scale properties. Therefore, EMG's opinions of probable costs that are individually less than a threshold amount of $2,000 are omitted from this PNA. However, comments and estimated costs regarding identified deficiencies relating to life/safety or accessibility items are included regardless of this cost threshold.

In lieu of providing written record of communication forms, personnel interviewed from the facility and government agencies are identified in Section 2.5. Relevant information based on these interviews is included in Sections 2.5, 3.1, and other applicable report sections.

2.3. ADDITIONAL SCOPE CONSIDERATIONS

Items required by ASTM E2018-08 and Fannie Mae's *Exhibit III Specific Guidance to the Property Evaluator* are included within the Physical Needs Assessment (PNA). Additional "non-scope" considerations were addressed at the recommendation of EMG and subsequent contract with the Client. These additional items are identified as follows:

- Property disclosure information was obtained from the EMG's Pre-Survey Questionnaire
- An assessment of accessibility utilizing EMG's Accessibility Checklist
- A limited visual assessment and review of the property for mold growth, conditions conducive to mold growth, and evidence of moisture in accessible areas of the property
- Provide a statement on the property's Remaining Useful Life
- Provide cross reference indexing between cost tables and report text
- Determination of FEMA Flood Plain Zone for single address properties

2.4. PROPERTY'S REMAINING 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 Remaining Useful Life estimate is an expression of a professional opinion and is not a guarantee or warranty, expressed or implied. This estimate is based upon the observed physical condition of the property at the time of 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" that may occur subsequent to the date of EMG's site visit.

The Remaining Useful Life for the property is further based on the assumption that: (a) the immediate repairs, short term repairs, and future repairs for which replacement reserve funds are recommended are completed in a timely and workman-like manner, and (b) a comprehensive program of preventive and remedial property maintenance is continuously implemented using an acceptable standard of care. The Remaining Useful Life 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.

2.5. PERSONNEL INTERVIEWED

The following personnel from the facility and government agencies were interviewed in the process of conducting the PNA:

Name and Title	Organization	Phone Number
Thomas Vanover Code Enforcement Commissioner	Cleveland Department of Building and Housing	216.420.4216
Toni Allen Certificate of Occupancy Clerk	Cleveland Department of Record Administration	216.664.4355
Linda DuBose Administrative Assistant	Cleveland Fire Prevention Bureau and Code Enforcement	216.664.6664
Charles Cobb Maintenance Department: Woodhill Homes	Cuyahoga Metropolitan Housing Authority	216.231.6432

The PNA was performed with the assistance of Charles Cobb of the Maintenance Department at Woodhill Homes. The on site Point of Contact (POC) was cooperative and provided information that appeared to be accurate based upon subsequent site observations. The on site contact is completely knowledgeable about the subject property and answered all questions posed during the interview process. The POC's has been involved at the property since 1986.

2.6. DOCUMENTATION REVIEWED

Prior to the PNA, 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 PNA:

- Site plan
- Utility Bills

No other documents were available for review. The Documentation Request Form is provided in Appendix E.

2.7. PRE-SURVEY QUESTIONNAIRE

A Pre-Survey Questionnaire was sent to the POC prior to the site visit. The questionnaire is included in Appendix E. Information obtained from the questionnaire has been used in preparation of this PNA.

2.8. WEATHER CONDITIONS

Weather conditions at the time of the site visit were overcast, with temperatures in the 30s (°F) and light winds.

3. CODE INFORMATION, ACCESSIBILITY, AND MOLD

3.1. CODE INFORMATION, FLOOD ZONE AND SEISMIC ZONE

According to Thomas Vanover of the Cleveland Department of Building and Housing, there are no outstanding building code violations on file. The Building Department does not have an annual inspection program. They only inspect new construction, work that requires a building permit, and citizen complaints. A copy of the original Certificates of Occupancy were requested but were not available.

According to Linda DuBose of the Cleveland Fire Prevention Bureau and Code Enforcement, there are no outstanding fire code violations on file. The Fire Department does not have an annual inspection program. They only inspect new construction, work that requires a building permit, and citizen complaints.

According to the Flood Insurance Rate Map, published by the Federal Emergency Management Agency (FEMA) and dated December 3, 2010, 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.

3.2. ADA 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 15 or more units. The property must have a minimum of five percent mobility accessible units and two percent of the units for visual / audio hearing impairments. 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 to achieve reasonable accommodations.

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 resulting 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. Apartments modified for mobility impaired residents are to comply with UFAS.

Generally, Title III of the Americans with Disabilities Act (ADA) prohibits discrimination by entities to access and use of "areas of public accommodations" on the basis of disability. Generally the rental office and access from the site to the rental office 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 PNA, observations and sample measurements for accessibility were conducted. The scope of the observations is set forth in the EMG Accessibility Checklist provided in Appendix D. It is understood by the Client that the observations described herein does not comprise an Accessibility Compliance Survey of every unit and only those units where access was provided by the client were reviewed. 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.

The accessibility standards that apply to the Property are Section 504, UFAS and where applicable, the ADA for access to the rental office. 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 Community Center is generally compliant with Section 504, and the tenant units are generally non-compliant with Section 504. Presently, zero units are defined as accessible for individuals with mobility impairments according to property management. There are sufficient units at present which have visual / audio modifications to meet the two percent accessible requirements of Section 504.

Based on EMG's assessment, the units at the property are not in general compliance with the requirements of Section 504 and the ADA.

Based on EMG's assessment, an additional 24 units should be made accessible to residents with mobility impairments and 10 units should be modified for residents who have visual / audio impairments.

The UFAS and Americans with Disabilities Act Accessibility Guidelines concern civil rights issues as they pertain to the disabled and are not a construction code, although many local jurisdictions have adopted the Guidelines as such. The cost to address the achievable items noted above is detailed in the Replacement Reserves Report. Unless Life/Safety (Immediate Repair) is a concern, the accessible improvements are defined as short term improvements (Year 1).

3.3. MOLD

As part of the PNA, EMG completed a limited, visual assessment for the presence of visible mold growth, conditions conducive to mold growth, or evidence of moisture in readily accessible areas of the property. EMG interviewed property personnel concerning any known or suspected mold contamination, water infiltration, or mildew-like odor problems.

This assessment does not constitute a comprehensive mold survey of the property. The reported observations and conclusions are based solely on interviews with property personnel and conditions observed in readily accessible areas of the property at the time of the assessment. Sampling was not conducted as part of the assessment.

- There is visible suspected mold growth, mold odors, and/or moisture throughout various apartment units throughout the property. The suspected mold affects approximately 5 to 10 square feet of wall area in each suspected apartment unit.
- The mold appears to be the result of water intrusion from the roof and high levels of humidity from the bathrooms. The presence of mold in exterior and interior environments is normal and unavoidable. Exposure to mold or mold producing materials can be hazardous and should be avoided. The presence of mold does not necessarily constitute an exposure. This assessment does not constitute a comprehensive mold survey of the Project, and any conclusions are based solely on conditions readily observable in accessed areas.
- Based on the apparent limited extent of mold (less than 30 square feet), the mold can be abated by the on site maintenance staff as part of the property's routine maintenance program. Such persons should receive training in accordance with OSHA on proper clean-up methods, personal protection, and potential health/safety hazards.

4. EXISTING BUILDING EVALUATION

4.1. APARTMENT UNIT TYPES AND UNIT MIX

The appendices contain floor plan illustrations, which graphically represent the various unit types. The gross area measurements in the chart below are an approximation, are based on information provided by on site personnel, and are not based on actual measurements. Due to the varying methods that could be utilized by others to derive square footage, the area calculations in the chart below do not warrant, represent, or guarantee the accuracy of the measurements.

Apartment Unit Types and Mix		
Quantity	**Type**	**Floor Area**
134	1 Bedroom/ 1 Bathroom	700 SF
254	2 Bedroom/ 1 Bathroom	800 SF
85	3 Bedroom/ 1 Bathroom	900 SF
4	5 Bedroom/ 2 Bathrooms	1,100 SF
1	6 Bedroom/ 2 Bathrooms	1,200 SF
There are currently 21 vacant units.		
There are currently 0 down units.		
478	**TOTAL**	

4.2. APARTMENT UNITS OBSERVED

Over ten percent of the apartment units were observed in order to establish a representative sample and to gain a clear understanding of the property's overall condition. Other areas accessed included the exterior of the property, a representative sample of the roofs, and the interior common areas. The following apartments were observed.

Apartment Units Observed					
Building	**Unit**	**Type**	**Comments**	**CO Levels (PPM)**	**Gas Leak Detected**
10516	C	3 Bedroom/ 1 Bathroom	Vacant. Fair to poor condition.	0	No
10517	F	1 Bedroom/ 1 Bathroom	Vacant. Fair to poor condition.	0	No
10721	C	2 Bedroom/ 1 Bathroom	Vacant. Fair to poor condition.	0	No
10804	G	2 Bedroom/ 1 Bathroom	Vacant. Fair to poor condition.	0	No
10814	C	2 Bedroom/ 1 Bathroom	Vacant. Fair to poor condition.	0	No
2477	C	3 Bedroom/ 1 Bathroom	Vacant. Fair condition.	0	No

Apartment Units Observed					
Building	Unit	Type	Comments	CO Levels (PPM)	Gas Leak Detected
2505	H	2 Bedroom/ 1 Bathroom	Vacant. Fair condition.	0	No
2508	C	2 Bedroom/ 1 Bathroom	Vacant. Fair condition.	0	No
2508	H	2 Bedroom/ 1 Bathroom	Vacant. Fair to poor condition.	0	No
2541	A	1 Bedroom/ 1 Bathroom	Vacant. Fair condition.	0	No
2541	D	1 Bedroom/ 1 Bathroom	Vacant. Fair condition.	0	No
2572	C	2 Bedroom/ 1 Bathroom	Vacant. Fair to poor condition.	0	No
2572	D	2 Bedroom/ 1 Bathroom	Vacant. Fair condition.	0	No
2581	D	3 Bedroom/1 Bathroom	Vacant. Fair condition.	0	No
10516	A	2 Bedroom/1 Bathroom	Vacant. Fair condition.	0	No
10606	D	2 Bedroom/1 Bathroom	Vacant. Fair condition.	0	No
10623	F	3 Bedroom/1 Bathroom	Vacant. Fair condition.	0	No
10709	D	2 Bedroom/1 Bathroom	Vacant. Fair condition.	0	No
2496	A	1 Bedroom/1 Bathroom	Vacant. Fair condition.	0	No
2513	E	2 Bedroom/1 Bathroom	Vacant. Fair condition.	0	No
2556	A	2 Bedroom/1 Bathroom	Vacant. Fair to poor condition.	0	No
2543	A	2 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
2545	A	1 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
2545	B	1 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
1060	D	3 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
10521	D	2 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
10511	D	2 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
10511	A	2 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
10715	B	1 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No

Apartment Units Observed					
Building	Unit	Type	Comments	CO Levels (PPM)	Gas Leak Detected
2508	A	2 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
10721	G	2 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
10721	J	2 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
2496	B	1 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
2493	F	2 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
10901	A	2 Bedroom/1 Bathroom	Occupied. Fair to poor condition.	0	No
2556	B	2 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
2443	F	2 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
10814	G	2 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
2474	A	2 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
2463	G	2 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
2479	A	1 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
2489	C	2 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
2495	E	2 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
2513	A	2 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
2513	F	2 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
2529	D	2 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
2535	D	1 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
2535	A	1 Bedroom/1 Bathroom	Occupied. Fair to poor condition.	0	No
10806	A	1 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No
10804	A	1 Bedroom/1 Bathroom	Occupied. Fair condition.	0	No

All areas of the property were available for observation during the site visit.

A "down unit" is a term used to describe a non-rentable apartment unit due to poor conditions such as fire damage, water damage, missing appliances, damaged floor, wall or ceiling surfaces, or other significant deficiencies. According to the POC, there are no down units.

5. SITE IMPROVEMENTS

5.1. UTILITIES

The following table identifies the utility suppliers and the condition and adequacy of the services.

Site Utilities		
Utility	**Supplier**	**Condition and Adequacy**
Sanitary sewer	CP Water	Good
Storm sewer	CP Water	Good
Domestic water	CP Water	Good
Electric service	The Illuminating Company	Good
Natural gas service	Dominion Gas	Good

Observations/Comments:

- According to the POC, the utilities provided are adequate for the property. There are no unique, on site utility systems such as septic systems, water or waste water treatment plants, or propane gas tanks.

5.2. PARKING, PAVING, AND SIDEWALKS

Item	Description
Main Ingress and Egress	Woodland Avenue, Baldwin Road, Mount Carmel Road, East 10th Street
Access from	Woodland Avenue – South Baldwin Road – North and South Mount Carmel Road – North East 10th Street – East

Paving and Flatwork					
Item	**Material**	**Last Work Done**	**Good**	**Fair**	**Poor**
Entrance Driveway Apron	Concrete and asphalt	Over 10 years ago	☐	☐	x
Parking Lot	Concrete and asphalt	Over 10 years ago at the site, 4 years ago at the Community Center	☐	x	x
Drive Aisles	Concrete and asphalt	Over 10 years ago at the site, 4 years ago at the Community Center	☐	x	x

Paving and Flatwork					
Item	**Material**	**Last Work Done**	**Good**	**Fair**	**Poor**
Service Aisles	Concrete and asphalt	Over 10 years ago	☐	x	x
Sidewalks	Concrete	Over 5 years ago	☐	x	☐
Curbs	Concrete	Over 20 years ago	☐	x	☐
Pedestrian Ramps	Concrete	Over 4 years ago	☐	x	☐

Parking Count				
Open Lot	Carport	Private Garage	Subterranean Garage	Freestanding Parking Structure
43 (Community Center)	N/A	N/A	N/A	N/A
Number of ADA Compliant Spaces			4	
Number of ADA Compliant Spaces for Vans			4	
Total Parking Spaces			43	
Parking Ratio (Spaces/Apartments)			Not desernable due to faided stripes	
Method of obtaining parking count			Physical count	

Exterior Stairs					
Location	**Material**	**Handrails**	**Good**	**Fair**	**Poor**
Throughout the property	Concrete stairs	**Metal**	x	☐	☐

Observations/Comments:

- The parking areas are in fair to poor condition. The parking striping is faded or not visible. Due to this issue an accurate account of the number of parking stalls throughout the property was not possible. A general area of 86,000 square feet was obtained in place of a stall count. There are isolated areas of failure and deterioration, such as alligator cracking and localized depressions. The damaged areas of paving must be cut and patched in order to maintain the integrity of the overall pavement system. The cost of this work is included in the Immediate and Short Term Repairs Cost Estimate (Table 1). The fair parking areas will require pothole patching, crack sealing, seal coating, and re-striping over the assessment period. The cost of this work is included in the Replacement Reserves Report.
- The asphalt pavement in the drive aisles is in fair to poor condition. There are isolated areas of failure and deterioration, such as alligator cracking and localized depressions. The damaged areas of paving must be cut and patched in order to maintain the integrity of the overall pavement system. The cost of this work is included in the Immediate and Short Term Repairs Cost Estimate (Table 1). Crack sealing, seal coating, and re-striping of the asphalt paving will be required over the assessment period. The cost of this work is included in the Replacement Reserves Cost Estimate (Table 2).

- The concrete pavement is in fair condition. There are isolated areas of cracks, vertically-displaced concrete, settlement and concrete spalling throughout the property. The damaged areas of concrete pavement will require replacement over the assessment period. The cost of this work is included in the Replacement Reserves Cost Estimate (Table 2).
- The concrete curbs and gutters throughout the property are in good condition. Routine cleaning and maintenance will be required over the assessment period.

5.3. DRAINAGE SYSTEMS AND EROSION CONTROL

Drainage System and Erosion Control				
System	**Exists At Site**	**Good**	**Fair**	**Poor**
Surface Flow	x	☐	☐	x
Inlets	x	☐	x	☐
Swales	N/A	☐	☐	☐
Detention pond	N/A	☐	☐	☐
Lagoons	N/A	☐	☐	☐
Ponds	N/A	☐	☐	☐
Underground Piping	x	☐	☐	x
Pits	N/A	☐	☐	☐
Municipal System	x	☐	x	☐
Dry Well	N/A	☐	☐	☐

Observations/Comments:

- Ponding occurs in the landscaped areas. The affected areas must be graded to direct storm water toward the paved areas. Soil erosion occurs throughout the entire property. The affected areas must be restored to prevent additional erosion and damage. This should be accomplished within the year to maintain healthy vegetation. The cost of this work is included in the Immediate and Short Term Repairs Cost Estimate (Table 1).

5.4. TOPOGRAPHY AND LANDSCAPING

Item	**Description**						
Site Topography	Slopes gently down from the east side of the property to the west property line.						
Landscaping	Trees	Grass	Flower Beds	Planters	Drought Tolerant Plants	Decorative Stone	None
	x	x	x	x	☐	☐	☐
Irrigation	Automatic Underground		Drip		Hand Watering		None
	☐		☐		☐		x

Item	Description			
Retaining Walls				
Type	**Location**	**Good**	**Fair**	**Poor**
Reinforced Concrete	Throughout the property	☐	x	☐

Surrounding properties include residential and industrial developments.

Painted metal railings are mounted on top of the retaining walls.

Observations/Comments:

- The topography and adjacent uses do not appear to present conditions detrimental to the property.
- The landscape material is in fair condition. There are significant areas of poorly maintained trees throughout the property that threaten the integrity of surrounding structures and tree trimming is required. The cost of this work is included in the Immediate and Short Term Repairs Cost Estimate (Table 1). Future tree trimming should be performed as part of the property management's routine maintenance program.
- The lawn ground cover is in poor condition. Lack of ground cover has contributed to the erosion issues throughout the property. Landscape reseeding and fertilizing should be completed in conjunction with the landscape re-grading to mediate erosion issues throughout the property. The cost of this work is included in the Immediate and Short Term Repairs Cost Estimate (Table 1).
- The retaining walls are in good condition. Routine maintenance will be required over the assessment period.

5.5. GENERAL SITE IMPROVEMENTS

Property Signage	
Property Signage	Monument Sign
Street Address Displayed?	**Yes**

Site and Building Lighting					
Site Lighting	None	Pole-mounted	Bollard Lights	Ground Mounted	Parking Lot Pole Type
	☐	x	☐	☐	☐
Building Lighting	None		Wall-mounted		Recessed Soffit
	☐		x		☐

Site Fencing				
Type	**Location**	**Good**	**Fair**	**Poor**
Aluminum tube	Perimeter of the property	x	☐	☐
Metal chain link	Throughout the property	☐	x	☐

Other Site Amenities					
	Description	Location	Good	Fair	Poor
Playground Equipment	Metal and plastic	5 playgrounds throughout the property	☐	x	☐
Splash park	Painted concrete with metal water features	Adjacent to the community center	x	☐	☐

The splash park is surrounded by an aluminum tube fence.

Observations/Comments:

- The property identification signs are in good to fair condition. Routine maintenance will be required over the assessment period.
- The exterior site and building light fixtures are in fair to poor condition. There are missing, corroded, and damaged fixtures throughout the property. Based on the estimated Remaining Useful Life (RUL) and condition, some of the light fixtures will require replacement immediately and over the assessment period in order to provide necessary levels of night lighting for security. The cost of this work is included in the Immediate and Short Term Repairs Cost Estimate (Table 1) and Replacement Reserves Cost Estimate (Table 2).
- The aluminum site fencing is in good condition and will require routine maintenance over the assessment period. Scraping and painting is considered to be routine maintenance.
- The chain link site fencing is in fair condition. Isolated portions of the fence are damaged, deteriorated, rusted and weathered. Based on its current condition and estimated useful life the chain link fence will require replacement. The cost of this work is included in the Replacement Reserves Cost Estimate (Table 2).
- The equipment in the children's play areas is in fair condition. The equipment is weathered. Based on the estimated Remaining Useful Life (RUL) and condition, the equipment will require replacement over the assessment period. The cost of this work is included in the Replacement Reserves Cost Estimate (Table 2).
- The dumpsters are in fair to poor condition. Based on their current condition the dumpsters will require replacement over the assessment period. The cost of this work is included in the Replacement Reserves Cost Estimate (Table 2).
- The splash park equipment is around 5 years old. The equipment appears to be in good condition and will require routine maintenance over the assessment period.

Energy Conservation Measures:

- EMG recommends replacing all the exterior pole lights and building-mounted lights from 150W Metal halide to 40W LED.

6. BUILDING ARCHITECTURAL AND STRUCTURAL SYSTEMS

6.1. FOUNDATIONS

Three-story walkups - Based on structures of similar size, configuration, and geographic location, it is assumed that the foundations consist of cast-in-place concrete perimeter wall footings with concrete foundation walls. The foundation systems include reinforced concrete column pads.

Community Center - Based on structures of similar size, configuration, and geographic location, it is assumed that the foundations consist of conventional reinforced concrete spread footings which support wall and column loads.

Row homes - Based on structures of similar size, configuration, and geographic location, it is assumed that the foundations consist of reinforced concrete slabs-on-grade with integral perimeter footings, interior footings, and column pad footings bearing directly on the soil.

The basements in the three-story walkups have load-bearing concrete perimeter retaining walls. The row home buildings have a crawl space with a vinyl seal above a dirt floor.

Observations/Comments:

- The foundations and footings could not be directly observed during the site visit. There is no evidence of movement that would indicate excessive settlement.
- The basement and crawl space walls are in fair condition. There is no evidence of movement but some evidence of slight water infiltration. The basement walls and crawl spaces will require sealing to mediate the issues for moisture protection. The cost of this work is included in the Immediate and Short Term Repairs Cost Estimate (Table 1).

6.2. SUPERSTRUCTURE

Building Superstructure – Community Center				
Item	**Description**	**Good**	**Fair**	**Poor**
Framing	Concrete Frame	x	☐	☐
Upper Floors	Steel Beams	x	☐	☐
Roof Structure	Steel Beams	x	☐	☐
Roof Sheathing	Steel Decks	x	☐	☐

Building Superstructure – Pitch Roof Structures				
Item	**Description**	**Good**	**Fair**	**Poor**
Framing	Concrete Frame	x	☐	☐
Upper Floors	Light weight cast-in place concrete	x	☐	☐

Building Superstructure – Pitch Roof Structures				
Item	Description	Good	Fair	Poor
Roof Structure	Wood Trusses	x	☐	☐
Roof Sheathing	Plywood	x	☐	☐

Building Superstructure – Sloped Roof Structures				
Item	Description	Good	Fair	Poor
Framing	Concrete Frame	x	☐	☐
Upper Floors	Light weight cast-in place concrete	x	☐	☐
Roof Structure	Wood Rafters and Joists	x	☐	☐
Roof Sheathing	Plywood	x	☐	☐

Observations/Comments:

- The superstructure is concealed. Walls and floors appear to be plumb, level, and stable. There are no significant signs of deflection or movement.

6.3. ROOFING

Roof – Community Center			
Type		Finish	
Maintenance		Roof Age	
Flashing	Sheet metal	Warranties	
Parapet and Copings	Parapet with sheet metal coping	Roof Drains	Internal drains
Fascia	None	Insulation	Rigid Board
Soffits	Concealed Soffits	Skylights	No
Attics	Steel beams	Ponding	No
Ventilation Source-1	Power Vents	Leaks Observed	No
Ventilation Source-2	Parapet and Wall Vent	Roof Condition	Good

Roof – Pitched roof structures			
Type	Gable Roof	Finish	
Maintenance		Roof Age	

Roof – Pitched roof structures			
Flashing	Sheet metal	Warranties	
Parapet and Copings	None	Roof Drains	Gutters and downspouts
Fascia	None	Insulation	None
Soffits	None	Skylights	No
Attics	Wood joists with plywood sheathing	Ponding	No
Ventilation Source-1	Ridge Vents	Leaks Observed	Yes
Ventilation Source-2	Gable end vents	Roof Condition	Poor

Roof – Flat roof structures			
Type	Flat	Finish	Built-up membrane
Maintenance		Roof Age	
Flashing	Sheet metal	Warranties	
Parapet and Copings	Parapet with sheet metal coping	Roof Drains	Gutters and downspouts
Fascia	None	Insulation	None
Soffits	None	Skylights	No
Attics	Pre-cast floor slabs	Ponding	Yes
Ventilation Source-1	Power Vents	Leaks Observed	Yes
Ventilation Source-2		Roof Condition	Poor

Observations/Comments:

- Community Center - The roof finishes are original. According to the History and Status Report from the CMHA, the roofs are covered by a warranty. The fields of the roofs are in good condition. Based on the estimated Remaining Useful Life (RUL), the roof membranes will require replacement over the assessment period. The cost of this work is included in the Replacement Reserves Report.
- Community Center - According to the POC, there are no active roof leaks. There is no evidence of active roof leaks.
- Community Center - There is no evidence of roof deck or insulation deterioration. The roof substrate and insulation should be inspected during any future roof repair or replacement work.
- There is no evidence of fire retardant treated plywood (FRT) and, according to the POC, FRT plywood is not used.
- Community Center - The roof flashings are in good condition and will require routine maintenance over the assessment period.
- Community Center - The parapet walls and copings are in good condition and will require routine maintenance over the assessment period.

- Community Center - Roof drainage appears to be adequate. Clearing and minor repair of drain system components should be performed regularly as part of the property management's routine maintenance program.
- Community Center - The roof vents are in good condition and will require routine maintenance over the assessment period.
- Tenant buildings – The roof finishes vary in age from the early to mid 90s. According to the History and Status Report from the CMHA, the roofs are no longer covered by a warranty. The fields of the roofs are in fair to poor condition. Based on the estimated Remaining Useful Life (RUL), the roof finishes will require replacement over the assessment period. The cost of this work is included in the Replacement Reserves Report.
- Tenant buildings – Roof leaks have been reported by the tenant and the POC. Water staining was observed throughout many of the inspected units. The leaks occur where the roof line meets the wall. Roof repair costs associated with the leaks are not included as the roofs of the tenant buildings require replacement within the next year.
- Tenant buildings – The POC states the assumption of roof deck or insulation deterioration. The roof substrate and insulation should be inspected during the future roof repair or replacement work.
- Tenant buildings - There is no evidence of fire retardant treated plywood (FRT) and, according to the POC, FRT plywood is not used.
- Tenant buildings - The roof flashing are in fair to poor condition. There are significant areas of damaged flashing elements throughout the property. The damaged flashing elements must be replaced. This work can be performed in conjunction with the roof finish replacement repairs noted above.
- Tenant buildings - The parapet walls and copings are in good condition and will require routine maintenance over the assessment period.
- Tenant buildings - Roof drainage appears to not be adequate. The site is equipped with an underground drainage system that connects to the municipal drainage system. The site's underground system has collapsed in many places thus not allowing storm water from roofs adequate expulsion. Many downspouts have been retrofitted to expel water onto the landscaped areas which in turn has increased erosion issues throughout the property. The original underground water drainage system must be repaired to help mediate the water drainage issues at the property. An engineering study is required to investigate the magnitude of the drainage issue. The costs of the study are included in follow up studies in section 1.2. Based on conversations with the POC, EMG will provide an estimated and general cost for the drainage repair, which should then be followed up with the investigating engineer. The cost of this work is included in the Replacement Reserves Cost Estimate (Table 2).
- Tenant buildings - The roof vents are in good condition and will require routine maintenance over the assessment period.
- Tenant buildings - The attics are not accessible and it could not be determined if there is moisture, water intrusion, or excessive daylight in the attics. The POC reports that there is not any insulation in the attics. It is recommended that blown in insulation be added into the spaces with attics. The cost of this work is included in the Replacement Reserves Cost Estimate (Table 2).

Energy Conservation Measures:

- EMG recommends adding blown in insulation to tenant buildings with pitched roofs and existing attics to bring it to an R-38 level. This will ensure that the net insulation levels in the attic meet the minimum IECC2012 requirements.

6.4. EXTERIOR WALLS

Building Exterior Walls – Community Center				
Type	Location	Good	Fair	Poor
Primary Finish	Brick Veneer	x	☐	☐
Accented With	Stone Veneer	x	☐	☐
Soffits	Concealed with metal panels	x	☐	☐

Building Exterior Walls – Tenant Buildings				
Type	Location	Good	Fair	Poor
Primary Finish	Brick Veneer	☐	x	☐
Accented With	Stone Veneer	☐	x	☐

Building sealants (caulking) are located between dissimilar materials, at joints, and around window and door openings.

Observations/Comments:

- Community Center - The exterior finishes are in good condition and will require routine maintenance over the assessment period.
- The sealant is flexible, smooth, and in good condition and will require routine maintenance over the assessment period.
- The tenant buildings' brick masonry is in fair condition. Based on the estimated Remaining Useful Life (RUL), the mortar joints must be cleaned and re-pointed over the assessment period. The cost of this work is included in the Replacement Reserves Cost Estimate (Table 2).
- The sealant is in fair condition. There are significant areas of brittle, damaged and deteriorated sealant throughout the property. Based on the estimated Remaining Useful Life (RUL) and current condition, the sealant will require replacement over the assessment period. The cost of this work is included in the Replacement Reserves Cost Estimate (Table 2).

Energy Conservation Measures:

- EMG recommends controlling air leakage in the tenant buildings. One of the most commonly used methods for reducing air leakage through building structures is caulking and weather stripping. Particularly effective measures include caulking cracks around windows and door frames and weather stripping around windows and doors. Weather-stripping and caulking of doors and windows, helps in thermally isolating of the building with the outside atmosphere. This prevents the infiltration of external un-conditioned air along with moisture and humidity into the conditioned space at the same time, prevents the conditioned air from escaping out. A precisely thermally isolated building directly affects the cooling and heating load on the facilities HVAC system as it has to put in less effort in maintaining the desired temperature inside the facility. As per ASHRAE a well insulated and ventilated building should have an air change rate not more than 0.35 per hour.

6.5. EXTERIOR AND INTERIOR STAIRS

Building Exterior and Interior Stairs – Community center							
Type	Description	Riser	Handrail	Balusters	Good	Fair	Poor
Building Exterior Stairs	Concrete stairs	Close	Metal	Metal	x	☐	☐

Building Exterior and Interior Stairs – Community center							
Type	Description	Riser	Handrail	Balusters	Good	Fair	Poor
Building Interior Stairs	Steel-framed with pre-cast treads	Close	Metal	Metal	x	☐	☐

Building Exterior and Interior Stairs – Tenant buildings: Row homes							
Type	Description	Riser	Handrail	Balusters	Good	Fair	Poor
Building Interior Stairs	Steel Framed With Vinyl treads	Close	Metal	None	☐	x	☐

Building Exterior and Interior Stairs – Tenant buildings: Three-story walkup							
Type	Description	Riser	Handrail	Balusters	Good	Fair	Poor
Building Interior Stairs	Steel Framed With Vinyl treads	Close	Metal	None	☐	☐	x

Observations/Comments:

- Community Center - The exterior and interior stairs, balusters, and handrails are in good condition and will require routine maintenance over the assessment period.
- Row Homes - The interior stairs and handrails are in fair condition and will require routine maintenance over the assessment period. The vinyl treads will require replacement. Costs will be included in the general flooring finish replacement of the tenant units.
- Three-story Walkup - The interior stairs are in poor condition. There is significant evidence of corrosion on the steel risers, pan treads, and clip angles. Based on the estimated Remaining Useful Life (RUL) and current condition, the stairs will require replacement over the assessment period. The cost of this work is included in the Replacement Reserves Cost Estimate (Table 2).

6.6. WINDOWS AND DOORS

Building Windows – Community center						
Window Framing	Glazing	Location	Window Screen	Good	Fair	Poor
Metal-framed, sliding units	Double Pane	Throughout the Building	x	x	☐	☐
Metal-framed units with fixed panes	Double Pane	Throughout the Building	☐	x	☐	☐

Building Doors – Community center						
Entrance Doors	Door Type			Good	Fair	Poor
	Metal framed glazed doors			x	☐	☐
	Cylindrical Lockset	Handle	Security Chain	Deadbolts	Spy-Eyes	Door Knockers
	Yes	Pull handle	No	N/A	N/A	N/A
Service Doors	Door Type			Good	Fair	Poor
	Metal doors			x	☐	☐

Building Windows – Tenant buildings						
Window Framing	Glazing	Location	Window Screen	Good	Fair	Poor
Wooden double-hung	Single	Throughout the unit	x	☐	☐	x
Wooden double-hung	Double	Throughout the unit	x	☐	☐	x

Building Doors – Tenant buildings						
Apartment Doors	Door Type			Good	Fair	Poor
	Metal-clad Wood			☐	x	☐
	Cylindrical Lockset	Handle	Security Chain	Deadbolts	Spy-Eyes	Door Knockers
	Yes	Lever and Knob	No	Keyed	Yes	No
Apartment Screen Doors	Door Type			Good	Fair	Poor
	Screen Door			☐	x	☐
Apartment Patio Door	Metal-clad Wood			☐	x	☐

Observations/Comments:

- Community Center - The windows and doors are in good condition and will require routine maintenance over the assessment period.
- Tenant Buildings - The windows are in poor condition. There is significant evidence of water intrusion and water damaged finishes along many of the window sills, jambs, and heads. Based on the estimated Remaining Useful Life (RUL) and current condition, the windows will require replacement over the assessment period. The cost of this work is included in the Replacement Reserves Cost Estimate (Table 2).
- Tenant Buildings - The doors are in fair condition. There are a few deteriorated and damaged doors. Based on the estimated Remaining Useful Life (RUL) and their condition, the doors will require replacement over the assessment period. The cost of this work is included in the Replacement Reserves Cost Estimate (Table 2).

- Maintenance Areas - The overhead doors are in fair condition. Based on the estimated Remaining Useful Life (RUL) the doors will require replacement over the assessment period. The cost of this work is included in the Replacement Reserves Cost Estimate (Table 2).

Energy Conservation Measures:

- EMG recommends replacing the existing older windows with new energy star high efficiency double pane windows. The proposed measure is recommended to be executed in place of replacing the existing widows with in-kind windows.

6.7. PATIO, TERRACE, AND BALCONY

Not applicable. There are no patios, terraces, or balconies.

6.8. COMMON AREAS, ENTRANCES, AND CORRIDORS

The Community Center contains the administration offices, classrooms, gymnasium, common area restrooms, and a common area kitchen.

The common area kitchen is equipped with residential-style appliances, including a refrigerator, range, and dishwasher.

Three-story walk up buildings - Apartment unit entrances are accessed from a landing from a common area stairwell. The interior finishes include painted plaster walls and ceilings and vinyl tile stair landings.

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

Community Center			
Common Area	**Floors**	**Walls**	**Ceilings**
Lobby	Vinyl Tile	Painted Drywall	Suspended T-bar (Acoustic)
Administration Offices	Carpet	Painted Drywall	Suspended T-bar (Acoustic)
Gymnasium	Wood	CMU with acoustic paneling	Concrete with acoustic paneling
Corridor	Vinyl Tile	Painted Drywall	Suspended T-bar (Acoustic)
Common Area Kitchen	Vinyl Tile	Painted Drywall	Suspended T-bar (Acoustic)
Common Area Restroom	Vinyl Tile	Painted Drywall	Suspended T-bar (Acoustic)
Computer Room	Vinyl Tile	Painted Drywall	Suspended T-bar (Acoustic)

Community Center			
Common Area	**Floors**	**Walls**	**Ceilings**
Classroom	Vinyl Tile	Painted Drywall	Suspended T-bar (Acoustic)
Foyer	Carpet	Painted Drywall	Suspended T-bar (Acoustic)
Conference Room	Carpet	Painted Drywall	Suspended T-bar (Acoustic)

Observations/Comments:

- The interior finishes in the common areas are in good condition. Based on the estimated Remaining Useful Life (RUL), the common area finishes will require replacement during the assessment period. The cost of this work is included in the Replacement Reserves Report. Interior painting and wall finish replacement will also be required during the assessment period. The cost of this work is included in the Replacement Reserves Report.
- The common areas kitchen appliances are in good condition. Based on the estimated Remaining Useful Life (RUL), the kitchen appliances will require replacement over the assessment period. The cost of this work is included in the Replacement Reserves Report.

7. BUILDING MECHANICAL AND ELECTRICAL SYSTEMS

7.1. BUILDING HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

Building Central Heating System – Community Center	
Primary Heating System Type	Central Hotwater Boilers
Quantity	2
Heating Fuel	Natural Gas
Heating System Input Capacity (btuh)	250,000
Manufactured Rated Efficiency	95
Location of Equipment	Mechanical room
Space Served by System	Entire building
Age	4
Heating Plant Condition	Good

Building Central Cooling System – Community Center	
Primary Cooling System Type	Split Systems
Quantity	5
Refrigerant	R-410A
Cooling System Capacity (Tons)	5 Ton
Manufactured Rated Efficiency	13 EER
Location of Equipment	Exterior of the building
Space Served by System	Entire building
Age	4
Cooling Plant Condition	Good

Distribution System – Community Center	
Hot Distribution System	Two
Hot Water Circulation Pump Size and Qty.	1/2Hp (2X)
Chilled Water Circulation Pump Size and Qty	N/A
Air Distribution System	Constant
Air Handling Unit Location	Mechanical room
Air Handling Unit- Serving	Entire building
Location Fan Coil Unit (s)	Mechanical room
Spaces Served by Fan Coil Unit (s)	Entire building
Common Area Temperature Control	Programmable
Building Ventilation	Central AHU, With Fresh Air Intake
Distribution System Condition	Good

Building Central Heating System – Row Home Buildings	
Primary Heating System Type	Central Hotwater Boilers
Quantity	6
Heating Fuel	Natural Gas
Heating System Input Capacity (Mbtuh)	2,049
Manufactured Rated Efficiency	80
Location of Equipment	In boiler houses throughout the property and one is located in the basement of the old Administration Building.
Space Served by System	Entire property
Age	15
Heating Plant Condition	Good

Distribution System – Row Home Buildings	
Hot Distribution System	Two
Hot Water Circulation Pump Size and Qty	7.5 Hp (12X)
Chilled Water Circulation Pump Size and Qty	N/A
Air Distribution System	Constant
Air Handling Unit Location	None
Air Handling Unit- Serving	None
Location Fan Coil Unit (s)	None
Spaces Served by Fan Coil Unit (s)	None
Common Area Temperature Control	Non-Programmable
Building Ventilation	Mechanical ventilation and windows
Distribution System Condition	Fair

Community Center - Air distribution is provided to supply air registers by ducts concealed above the ceilings. The heating and cooling system are controlled by local thermostats.

The stair wells, bathrooms, and other areas are ventilated by mechanical exhaust fans. Large capacity ventilation fans are mounted on the roof and are connected by concealed ducts to each ventilated space.

Row Home Units - The central HVAC system distributes heated air through ducts to variable air volume (VAV) terminals concealed above the ceilings in each tenant unit.

Three-Story Walk-Up Units are serviced by individual systems as discussed in section 8.3.

Observations/Comments:

- Community Center - Records of the installation, maintenance, upgrades, and replacement of the HVAC equipment have been maintained since the property was first occupied.
- Community Center - The HVAC equipment is in good condition. Based on its estimated Remaining Useful Life (RUL), the equipment will require replacement during the assessment period. The cost of this work is included in the Replacement Reserves Report.
- Community Center - The mechanical ventilation system and equipment appear to be in good condition and will require routine maintenance during the assessment period. Equipment or component replacements can be performed as part of the property management's routine maintenance program.
- Tenant Units Central Boiler - The HVAC equipment appears to be in good to fair condition. Based on its estimated Remaining Useful Life (RUL), the central boiler equipment will require replacement during the assessment period. The cost of this work is included in the Replacement Reserves Report.

- The piping for the central hot water boilers are in fair to poor condition. It is reported by POC that there are areas on the site where the piping is leaking. An engineering study is required in order to investigate the extent of the issue. The study can be done in conjunction with the drainage pipe study in section 1.2.

Energy Conservation Measures:

- EMG evaluated upgrading the existing central boilers to high efficiency condensing boilers, however it did not provide sufficient return and is therefore not recommended.
- EMG recommends replacing motors on the central boiler system.

7.2. BUILDING PLUMBING

Building Plumbing System – Community Center				
Type	**Description**	**Good**	**Fair**	**Poor**
Water Supply Piping	Copper	x	☐	☐
Waste/Sewer Piping	PVC	x	☐	☐
Vent Piping	PVC Pipe	x	☐	☐
Water Meter Location	Adjacent to public streets			

Domestic Water Heater– Community Center	
Fuel	Natural Gas
Water Heater Volume	50 gal
Input Capacity	65,000 Btuh
Supplementary Storage Tanks?	Yes
Storage Tank Volume	50 gal
Quantity of Storage Tanks	2
Circulation Pump/s (HP)	N/A

Common Area Plumbing Fixtures– Community Center	
Water Closets	Commercial Grade
Water Closets Rating	1.6 GPF
Common Area Faucet, GPM	2.2 GPM

Central Domestic Water Heater – Row Homes	
Fuel	Natural Gas
Water Heater Volume	N/A
Input Capacity	320,000 Btuh
Supplementary Storage Tanks?	Yes
Storage Tank Volume	200+ gal
Quantity of Storage Tanks	6

Central Domestic Water Heater – Row Homes	
Circulation Pump/s (HP)	7.5 HP

Observations/Comments:

- The plumbing systems appear to be well maintained and in good condition. The water pressure appears to be adequate. The plumbing systems will require routine maintenance during the assessment period.
- There is no evidence that the property uses polybutylene piping for the domestic water distribution system.
- The pressure and quantity of hot water appear to be adequate.
- The water heaters appear to be in good condition. Based on their estimated Remaining Useful Life (RUL), the water heaters will require replacement during the assessment period. The cost of this work is included in the Replacement Reserves Report.
- The accessories and fixtures in the common area restrooms are in good condition and will require routine maintenance during the assessment period.
- The central domestic hot water equipment appears to be in good to fair condition. Based on their estimated Remaining Useful Life (RUL), the equipment will require replacement during the assessment period. The cost of this work is included in the Replacement Reserves Report.

Energy Conservation Measures:

- Some Energy conservation measures have already been instituted at the Community Center.
- EMG recommends replacement of the central water boilers with higher efficiency models.

7.3. BUILDING GAS DISTRIBUTION

Gas service is supplied from the gas main on the adjacent public street. The gas meters and regulators are located along the exterior walls of the buildings. The gas distribution piping within each building is malleable steel (black iron).

Observations/Comments:

- The pressure and quantity of gas appear to be adequate.
- The gas meters and regulators appear to be in good condition and will require routine maintenance during the assessment period.
- Only limited observation of the gas distribution piping can be made due to hidden conditions. The gas piping appears to be in good condition.

7.4. BUILDING ELECTRICAL

Building Electrical Systems– Community Center			
Electrical lines run	Underground	Transformer	Pad-mounted
Service size (Amps)	250 Amps	Volts	120/208 Volt, three-phase
Meter and panel location	Mechanical room	Branch wiring	Copper
Conduit	Metallic	Tenant min. Amp	N/A

Building Electrical Systems– Community Center			
Number of Buildings	Single	Circuit Breaker Panel	Mechanical room

Building Emergency System– Community Center			
Size (kVA or kW)	125 kVA	Fuel	Natural Gas
Generator Serves	Community Center	Tank location	Natural gas piping
Testing frequency	Weekly	Tank type	Natural gas piping

Observations/Comments:

- The on site electrical systems up to the meters are owned and maintained by the respective utility company.
- The electrical service and capacity appear to be adequate for the property's demands.
- The circuit breaker panels, and electrical meters appear to be in good condition and will require routine maintenance over the assessment period.
- The generator is in good to fair condition and is reportedly tested on a weekly basis. Based on its estimated Remaining Useful Life (RUL), the equipment will require replacement during the assessment period. The cost of this work is included in the Replacement Reserves Report.

7.5. BUILDING ELEVATORS AND CONVEYING SYSTEMS

Elevator	
Building Name	Community Center
Elevator Category	Passenger
Elevator Type	Hydraulic
Elevator Capacity	2,500 Lbs
Elevator Manufacturer	Schindler
Equipment Location	Mechanical room adjacent to the elevator
Elevator Safety Stop	electronic
Elevator Emergency Communication	Yes
Elevator Cab Floor	vinyl-tiled
Elevator Cab Wall	stainless steel
Elevator Cab Lighting	F42T8

Observations/Comments:

- According to the POC, the elevator, and its responsiveness, provides adequate service. The elevator is serviced by ThyssenKrupp Elevator on a routine basis. The elevator machinery and controls are the originally installed system. The elevator will require routine maintenance over the assessment period.
- The elevators are inspected on an annual basis by the municipality, and a certificate of inspection is displayed in the elevator cabs.
- According to the POC, the emergency communication equipment in the elevators is functional. Equipment testing is not within the scope of a Property Condition Assessment.
- The finishes in the elevator cabs appear to be in good condition. Based on the estimated Remaining Useful Life (RUL), some of the cab finishes will require replacement over the assessment period. The cost of this work is included in the Replacement Reserves Report.
- The elevator equipment appears to be in good condition. Based on the estimated Remaining Useful Life (RUL), the equipment will require replacement over the assessment period. The cost of this work is included in the Replacement Reserves Report.

7.6. FIRE PROTECTION SYSTEMS

Item	Description					
Type	Wet					
Fire Alarm System	None	☐	Battery Operated Smoke Detectors	x	Strobe Light Alarms	x
	Central Alarm Panel	x	Hard-wired Smoke Detectors	x	Illuminated EXIT Signs	x
	Battery backup Light Fixtures	x	Hard-wired Smoke Detectors/ with battery Backup	x	Annunciator Panels	x
Sprinkler System	None	☐	Standpipes	x	Flow Switches	x
	Pull Station	x	Fire Pumps	x	Siamese Connections	x
	Alarm horns	x	Backflow Preventer	x	Hose Cabinets	x
Central Alarm Panel System	Location of Alarm Panel			Age of Alarm panel		
	Community center entrance			2011		
Fire Extinguishers	Last Service Date			Estimated Quantity		
	Within the year			40		
Hydrant Location	Along public streets (20 to 80 feet from each tenant building)					
Siamese Location	Adjacent to the Community Center building					
Special Systems	Kitchen Suppression System	x		Computer Rm. Suppression System		☐

Observations/Comments:

- Information regarding fire department inspection information is included in Section 3.1.

- The fire extinguishers are serviced annually and appear to be in good condition. The fire extinguishers were serviced and inspected within the last year.
- The pull stations and alarm horns appear to be in good condition and will require routine maintenance over the assessment period.
- Smoke detector replacement is considered to be routine maintenance.
- Exit sign and emergency light replacement is considered to be routine maintenance.
- According to the POC, the central alarm panel is in good condition and is serviced regularly by a qualified fire equipment contractor. Based on inspection documents displayed by the panel, the central alarm panel has been inspected within the last year. Based on its estimated Remaining Useful Life (RUL), the equipment will require replacement during the assessment period. The cost of this work is included in the Replacement Reserves Report.

8. DWELLING UNITS

8.1. INTERIOR FINISHES

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

Typical Apartment Finishes			
Room	**Floor**	**Walls**	**Ceiling**
Living room	Vinyl Tile	Painted plaster	Painted plaster
Kitchen	Vinyl Tile	Painted plaster	Painted plaster
Bedroom	Vinyl Tile	Painted plaster	Painted plaster
Bathroom	Vinyl Tile	Painted plaster	Painted plaster
Stairwell	Vinyl Tread	Painted plaster	Painted plaster
Hallways	Vinyl Tile	Painted plaster	Painted plaster

Apartment Internal Doors				
Item	**Type**	**Good**	**Fair**	**Poor**
Internal Doors	Hollow Core and Solid Core Wooden	☐	x	X
Door Framing	Metal	☐	x	☐
Closet Doors-Type1	No closet doors	☐	☐	☐

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 in fair to poor condition. Painting is considered to be routine maintenance. Based on the estimated Remaining Useful Life (RUL), the vinyl flooring will require replacement over the assessment period. The cost of this work is included in the Replacement Reserves Report.
- The interior doors and door hardware are in fair to poor condition and will require replacement over the assessment period. The cost of this work is included in the Replacement Reserves Report.
- The closets are not equipped with doors.

8.2. DWELLING APPLIANCES

Each apartment unit kitchen typically includes the following appliances:

Apartment Kitchen Appliances						
Item	**Type**			**Good**	**Fair**	**Poor**
Refrigerator	Frost-free	Non-Energy Star	17 Cuft	☐	x	☐
Cooking Range	Electric			☐	x	☐
Range Hood	Ductless			☐	x	☐
Dishwasher	Not provided			☐	☐	☐
Food Disposer	Not provided			☐	☐	☐
Kitchen Cabinet	Stained Wood			☐	x	x
Kitchen Countertop	Plastic laminated wood			☐	x	x
Apartment Laundry	Tenant Provided					

Observations/Comments:

- According to the POC, apartment appliances are reportedly replaced on an "as needed" basis.
- The kitchen appliances appear to range in condition. Based on their estimated Remaining Useful Life (RUL), the kitchen appliances will require replacement over the assessment period. The cost of this work is included in the Replacement Reserves Report.
- Most of the kitchen cabinets are original and are in fair to poor condition. Based on its estimated Remaining Useful Life (RUL), the cabinets will require replacement during the assessment period. The cost of this work is included in the Replacement Reserves Report.
- The kitchen countertops vary in age and are in fair to poor condition. Based on its estimated Remaining Useful Life (RUL), the countertops will require replacement during the assessment period. The cost of this work is included in the Replacement Reserves Report.
- Many of the tenants install a washing machine in the kitchens. The tenants connect the washer's water line to the kitchen faucet thus removing the aerator. Numerous apartments that were inspected had their aerators removed for this purpose. A dedicated washer hookup is recommended so tenants will not remove the aerators from the kitchen faucets. The cost of this work is included in the Replacement Reserves Report.
- The kitchen exhaust fans are in fair to poor condition. They are underpowered and not adequate enough for proper venting. It is suggested that exhaust hoods be installed. The cost of this work is included in the Replacement Reserves Report.

Energy Conservation Measures:

- Replacing the current refrigerators with energy star units was accessed. It was found that the payback is longer than the estimated useful life of a refrigerator. EMG does not recommend this ECM.

8.3. HVAC

Apartment Heating System – 3 Story Walkup	
Primary Heating System Type	Individual Hotwater Boilers
Heating Fuel	Natural Gas
Input Capacity	52 btu
Manufactured Rated Efficiency	84%
Age	10-15
Heating Plant Condition	Good

Distribution System – 3 Story Walkup	
Fan Coil System	No
Location of Fan Coil System	N/A
Ductwork	No
Common Area Temperature Control:	Non-Programmable
Bathroom Exhaust Fan	No

Natural ventilation is provided by operable windows.

The row home tenant units are supplied by central hot water boiler systems mentioned in section 7.2.

Observations/Comments:

- According to the Facility Staff Representative, the HVAC systems are maintained by the in-house maintenance staff. Records of the installation, maintenance, upgrades, and replacement of the HVAC equipment at the property have been maintained since the property was first occupied.
- The HVAC equipment appears to vary in age. HVAC equipment is reportedly replaced on an "as needed" basis. Based on the estimated Remaining Useful Life (RUL), the equipment will require replacement over the assessment period. The cost of this work is included in the Replacement Reserves Report.
- The baseboard radiators appear to be in good to fair condition and will require routine maintenance over the assessment period.
- The bathrooms are not equipped with exhaust fans. There are a significant number of units that demonstrate evidence of mold growth in the bathrooms. It is recommended that exhaust fans be installed in the bathrooms of each unit. The cost of this work is included in the short term cost tables.

Energy Conservation Measures:

- Replacing the current central water boiler with higher efficiency models was assessed. It was found that the payback is longer than the standard water boiler estimated useful life. EMG does not recommend this ECM.

8.4. PLUMBING

Apartment Plumbing Fixtures				
Item	**Type**	**Good**	**Fair**	**Poor**
Bath Tub	Enameled Steel	☐	x	x
Tub/Shower Surround	Fiberglass	☐	x	☐

Apartment Plumbing Fixtures				
Item	Type	Good	Fair	Poor
Water Closet (GPF)	1.6 GPF	☐	x	☐
Bathroom Faucet (GPM)	2.2 GPM	☐	x	☐
Shower head (GPM)	2.5 GPM	☐	x	☐
Kitchen Faucet (GPM)	2.2 GPM	☐	x	☐
Bathroom Vanity Cabinet	Wooden	☐	x	x

Domestic Water Heater – 3 Story Walkups	
Domestic Water Heater	Gas Fired Storage Tank
Water Heater Volume	40 gal
Input Capacity	40,000 Btuh
Water Heater Location	Mechanical closet
Set point Temperature	122F

Domestic hot water for the other tenant buildings are supplied by the central system described in Section 7.2.

Observations/Comments:

- The bathroom fixtures are in fair to poor condition. Based on their estimated Remaining Useful Life (RUL), they will require replacement over the assessment period. The cost of this work is included in the Replacement Reserves Report.
- The tub/shower surrounds are in fair to poor condition and will require replacement over the assessment period. The cost of this work is included in the Replacement Reserves Report.
- The bathtubs are in fair condition and will require refinishing over the assessment period. The cost of this work is included in the Replacement Reserves Report.
- The bathrooms in the "bottom of the hill" units have been renovated to have showers. The "top of the hill" units do not have showers.
- Replacement of the vanity cabinets and sinks are anticipated during the next few years. The cost of this work is included in the Replacement Reserves Report.
- According to the Facility Staff Representative, apartment unit water heaters are reportedly replaced on an "as needed" basis. Only the 3 story walk up units have individual water heaters. The other units are on a central system.
- The water heaters appear to be in fair condition. Based on their estimated Remaining Useful Life (RUL), the water heaters will require replacement over the assessment period. The cost of this work is included in the Replacement Reserves Report.

Energy Conservation Measures:

- EMG recommends replacing the current low flow toilets with ultra low flow units. Many of the toilets throughout the property are nearing the end of their useful life.

- EMG recommends replacing the current 2.5 GPM shower heads with 1.75 GPM shower heads. Please note that many tenants were observed to have installed their own shower heads with varying degrees of GPM. The POC states that they only install 2.5 GPM showerheads and therefore EMG utilized 2.5 GPM in its calculations.
- EMG recommends replacing the 2.2 GPM aerators in the kitchens and bathrooms with 1.5 GPM units. The proposed ECM will not only save water but result in an annual energy saving in the form of reduction of water heating bills.
- EMG recommends replacing the current domestic water heaters with higher efficiency models.

8.5. ELECTRICAL

The electrical service to each apartment unit is 60 amps. A circuit breaker panel inside each unit supplies the HVAC system, appliances, receptacles and light fixtures.

Apartment Electrical Service	
Electric Service Rating to Each Apt.	60 Amps
Circuit Breaker Panel in Each Apt.	x
GFCI Plug in Kitchen	x
GFCI Plug in Bathrooms	x

The apartment units have fluorescent light fixtures. Each apartment unit has at least one cable television outlet and telephone jack. The table below provides the typical light fixtures observed in the apartments.

Apartment Lighting Fixtures		
Location	Typical Lamp Type	ECM
Living Room	None	
Kitchen	T8 - Linear Fluorescent	x
Bedrooms	Compact Fluorescent Lamps (Cfls)	x
Hallways	Compact Fluorescent Lamps (Cfls)	x
Bathrooms	Compact Fluorescent Lamps (Cfls)	x

Observations/Comments:

- The apartment unit light fixtures are in good to fair condition. The POC states that the current light fixtures were upgraded to pin style CFL fixtures less than 10 years ago. Light fixture replacement is considered to be routine maintenance.
- The current electrical system at the Project Site is in good to fair overall condition and is adequately configured with regard to "provided" versus "demanded" electrical capacity for each apartment unit.
- The electrical panels are in fair condition. Based on their estimated Remaining Useful Life (RUL), the panels will require replacement over the assessment period. The cost of this work is included in the Replacement Reserves Report.

Energy Conservation Measures:

- EMG recommends upgrading the existing linear fluorescent lamps with LED.

8.6. FURNITURE, FIXTURES AND EQUIPMENT (FF&E)

Not applicable. There are no furnished apartments.

9. OTHER STRUCTURES

Maintenance Garage - The garage is a CMU block structure and has a flat roof. The garage roof is finished with a built-up membrane. The garage is accessed by a metal service door and overhead metal doors which are equipped with automatic openers.

Central Boiler Building – There are 5 central boiler buildings located throughout the property. The structures house the central boiler equipment for the property. The buildings are CMU block structured clad in a brick veneer. The building is accessed by metal service doors. The roofs are sloped with a standing seam metal roof.

Observations/Comments:

- The maintenance garage is in fair to poor condition. The roof will require replacement during the maintenance period. The cost of this work will be included with the common area roof replacements in section 6.3.
- The boiler buildings are in good condition and will require routine maintenance during the assessment period.

10. ENERGY AUDIT - PURPOSE AND SCOPE

The purpose of this Energy Audit is to provide Woodhill Homes with a baseline of energy usage, the relative energy efficiency of the facility, and specific recommendations for Energy Conservation Measures. Information obtained from these analyses may be used to support a future application to an Energy Conservation Program, Federal and Utility grants towards energy conservation, as well as support performance contracting, justify a municipal bond-funded improvement program, or as a basis for replacement of equipment or systems

The energy audit consisted of an on site visual assessment to determine current conditions, itemize the energy consuming equipment (i.e. Boilers, Make-Up Air Units, DWH equipment); review lighting systems both exterior and interior; and review efficiency of all such equipment. The study also included interviews and consultation with operational and maintenance personnel. The following is a summary of the tasks and reporting that make up the Energy Audit portion of the report.

The following is a summary of the tasks and reporting that make up the Energy Audit portion of the report.

ENERGY AND WATER USING EQUIPMENT

- EMG has surveyed the tenant spaces, common areas, offices, maintenance facilities and mechanical rooms to document utility-related equipment, including heating systems, cooling systems, air handling systems and lighting systems.

BUILDING ENVELOPE

- EMG has reviewed the characteristics and conditions of the building envelope, checking insulation values and conditions. This review also includes an inspection of the condition of walls, windows, doors, roof areas, insulation and special use areas. Where we anticipated significant losses, we utilized infrared thermographs to analyze heat loss across the envelope.

RECOMMENDATIONS FOR ENERGY SAVINGS OPPORTUNITIES

- Based on the information gathered during the on site assessment, the utility rates, as well as recent consumption data and engineering analysis, EMG has identified opportunities to save energy and provide probable construction costs, projected energy/utility savings and provide a simple payback analysis.

ANALYSIS OF ENERGY CONSUMPTION

- Based on the information gathered during the on site assessment and a minimum of one year of utility billing history, EMG has conducted an analysis of the energy usage of all equipment, and identified which equipment is using the most energy and what equipment upgrades may be necessary. As a result, equipment upgrades or replacements are identified that may provide a reasonable return on the investment and improve maintenance reliability.

ENERGY AUDIT PROCESS

- Interviewing staff and review plans and past upgrades
- Performing an energy audit for each use type
- Performing a preliminary evaluation of the utility system
- Analyzing findings, utilizing ECM cost-benefit worksheets
- Making preliminary recommendations for system energy improvements and measures
- Estimating initial cost and changes in operating and maintenance costs based on implementation of energy efficiency measures
- Ranking recommended cost measures, based on the criticality of the project and the largest payback

11. ENERGY CONSERVATION MEASURES

EMG has evaluated 17 Energy Conservation Measures (ECMs) for this property and 11 are recommended.

List of Recommended Energy Conservation Measures For Woodhill Homes

ECM #	Description of ECM	ECM Evaluation	ECM Category	Net Project Initial Investment	Estimated Annual Energy Savings		Estimated Annual Water Savings	Estimated Cost Savings	Estimated Annual O&M Savings	Total Estimated Annual Cost Savings	Simple Payback	S.I.R.	ECM Category- Payback Based	Life Cycle Savings	Expected Useful Life (EUL)
					Natural Gas	Electricity									
					Therms	kWh	kgal	$	$	$	Years			$	Years
1	Install Low Flow Shower Heads	Evaluated	Plumbing- Core ECM	$18,596	12,669	0	1,564.31	$100,334	$0	$100,334	0.19	46.03	Payback ≤ 12 Yrs	$837,275	10.00
2	Install Low Flow Faucet Aerators	Evaluated	Plumbing- Core ECM	$31,652	9,098	0	1,375.01	$75,401	$0	$75,401	0.42	20.32	Payback ≤ 12 Yrs	$611,537	10.00
3	Upgrade Insulation	Evaluated	Envelope- Core ECM	$50,605	4,469	0	0.00	$28,047	$0	$28,047	1.80	14.26	Payback ≤ 12 Yrs	$671,036	50.00
4	Replace High Intensity Discharge Lamps With LED	Evaluated	Lighting- Core ECM	$286,314	0	148,482	0.00	$16,409	$22,386	$38,795	7.38	1.62	Payback ≤ 12 Yrs	$176,822	15.00
5	Replace Existing Linear Fluorescent Lamps	Evaluated	Lighting- Core ECM	$96,512	0	82,184	0.00	$9,082	$2,506	$11,588	8.33	1.43	Payback ≤ 12 Yrs	$41,828	15.00
6	Replace Existing Motors With High Efficiency Motors	Evaluated	Motors- Core ECM	$32,193	0	28,355	0.00	$3,134	$157	$3,290	9.78	1.22	Payback ≤ 12 Yrs	$7,085	15.00
7	Replace External Windows	Evaluated	Envelope- Core ECM	$2,526,533	38,902	0	0.00	$244,160	$1,221	$245,380	10.30	1.90	Payback ≤ 12 Yrs	$2,283,032	30.00
8	Replace Existing Water Heater With New Energy Efficient Units	Evaluated	Domestic Water Heater- Core ECM	$174,004	2,557	0	0.00	$16,047	$0	$16,047	10.84	1.27	Payback ≤ 12 Yrs	$46,704	18.00
9	Add Reflective Coating To Exterior Windows	Evaluated	Envelope- Core ECM	$349,121	4,837	0	0.00	$30,357	$911	$31,268	11.17	1.07	Payback ≤ 12 Yrs	$24,154	15.00
10	Install Low Flow Restroom Flush Tank Toilets	Evaluated	Plumbing- Core ECM	$332,557	0	0	2,039.86	$27,152	$0	$27,152	12.25	1.21	12 ≥ Payback ≤ 20 Yrs	$71,397	20.00
11	Replace Inefficient Heating Plant	Evaluated	HVAC- Core ECM	$109,884	1,154	0	0.00	$7,240	$362	$7,602	14.45	1.20	12 ≥ Payback ≤ 20 Yrs	$22,499	25.00
12	Replace CFL to LED	Evaluated	Lighting- Core ECM	$91,419	0	53,976	0.00	$5,965	$0	$5,965	15.33	0.30	12 ≥ Payback ≤ 20 Yrs	$64,101	5.00
13	Replace Existing Freezers With High Efficiency Freezers	Evaluated	Appliance- Core ECM	$542	0	229	0.00	$25	$0	$25	21.42	0.56	Payback >20 Yrs	-$240	15.00
14	Replace Existing Refrigerator(s) With Energy Star Certified Refrigerator(s)	Evaluated	Appliance- Core ECM	$311,789	0	120,491	0.00	$13,316	$0	$13,316	23.42	0.51	Payback >20 Yrs	-$152,827	15.00
15	Replace Inefficient Heating Plant	Evaluated	HVAC- Core ECM	$908,668	4,699	0	0.00	$29,494	$885	$30,378	29.91	0.58	Payback >20 Yrs	-$379,684	25.00
16	Install Thermostatic Radiator Valve (TRV) controls for Hot Water Radiators	Evaluated	Controls- Core ECM	$623,809	3,282	0	0.00	$20,601	$0	$20,601	30.28	0.39	Payback >20 Yrs	-$377,870	15.00
17	Replace Existing Dishwashers With High Efficiency Dishwashers	Evaluated	Appliance- Core ECM	$1,061	3	58	0.36	$33	$0	$33	32.22	0.26	Payback >20 Yrs	-$780	10.00

List of Recommended Energy Conservation Measures For Woodhill Homes

ECM #	Description of ECM	ECM Evaluation	ECM Category	Net Project Initial Investment	Estimated Annual Energy Savings		Estimated Annual Water Savings	Estimated Cost Savings	Estimated Annual O&M Savings	Total Estimated Annual Cost Savings	Simple Payback	S.I.R.	ECM Category-Payback Based	Life Cycle Savings	Expected Useful Life (EUL)
					Natural Gas	Electricity									
					Therms	kWh	kgal	$	$	$	Years			$	Years
18	Install Variable Frequency Drives (VFD)	N/A- Does not pertain to this property	Controls- Core ECM	$0	0	0	0.00	$0	$0	$0	-	0.00	-	$0	0.00
19	Control External Air Leakage In Residential Buildings	N/A- (Accessed with window upgrade)	Envelope- Core ECM	$0	0	0	0.00	$0	$0	$0	-	0.00	-	$0	0.00
20	Install On-Demand Ventilation on Air Handlers	ECM in Place	Controls- Core ECM	$0	0	0	0.00	$0	$0	$0	-	0.00	-	$0	0.00
21	Reduce HVAC Hours of Operation	N/A- No opportunity for DR	Controls- Core ECM	$0	0	0	0.00	$0	$0	$0	-	0.00	-	$0	0.00
22	Install Outside Air Temperature Reset Controls For Hot Water Boilers	ECM in Place	Controls- Core ECM	$0	0	0	0.00	$0	$0	$0	-	0.00	-	$0	0.00
23	Install Timers On Exhaust Fans	ECM in Place	Controls- Core ECM	$0	0	0	0.00	$0	$0	$0	-	0.00	-	$0	0.00
24	Install Energy Savers on Vending, Snack Machines	ECM in Place	Controls- Core ECM	$0	0	0	0.00	$0	$0	$0	-	0.00	-	$0	0.00
25	Replace Existing Air Conditioners with Energy Star Air Conditioners	N/A- (No AC)	HVAC- Core ECM	$0	0	0	0.00	$0	$0	$0	-	0.00	-	$0	0.00
26	Insulate Hot Water Pipes	ECM in Place	HVAC- Core ECM	$0	0	0	0.00	$0	$0	$0	-	0.00	-	$0	0.00
27	Insulate Refrigerant Lines	ECM in Place	HVAC- Core ECM	$0	0	0	0.00	$0	$0	$0	-	0.00	-	$0	0.00
28	Insulate Hot Surfaces And Tanks	ECM in Place	HVAC- Core ECM	$0	0	0	0.00	$0	$0	$0	-	0.00	-	$0	0.00
29	Insulate Air Ducts	N/A- No gas pilots	HVAC- Core ECM	$0	0	0	0.00	$0	$0	$0	-	0.00	-	$0	0.00
30	Replace Existing Heat Pumps With Energy Efficient Heat Pumps	ECM in Place	HVAC- Core ECM	$0	0	0	0.00	$0	$0	$0	-	0.00	-	$0	0.00
31	Replace Existing Baseboard Electric Heater And AirConditioners With Package Terminal Heat Pump System	N/A- (None at property)	HVAC- Core ECM	$0	0	0	0.00	$0	$0	$0	-	0.00	-	$0	0.00
32	Replace Inefficient Furnace System	N/A- (No furnace)	HVAC- Core ECM	$0	0	0	0.00	$0	$0	$0	-	0.00	-	$0	0.00
33	Lower Domestic Hot water Temperature Set-Points	N/A- (Central system)	Domestic Water Heater- Core ECM	$0	0	0	0.00	$0	$0	$0	-	0.00	-	$0	0.00
34	Replace Exit Signs With LED Exit Signs	ECM in Place	Lighting- Core ECM	$0	0	0	0.00	$0	$0	$0	-	0.00	-	$0	0.00
35	Replace Existing Washing Machines With Energy Star Certified Washing Machines	N/A- (None at property)	Appliance- Core ECM	$0	0	0	0.00	$0	$0	$0	-	0.00	-	$0	0.00
36	Upgrade Cooktops	N/A- (Electric)	Appliance- Core ECM	$0	0	0	0.00	$0	$0	$0	-	0.00	-	$0	0.00

List of Recommended Energy Conservation Measures For Woodhill Homes

ECM #	Description of ECM	ECM Evaluation	ECM Category	Net Project Initial Investment	Estimated Annual Energy Savings		Estimated Annual Water Savings	Estimated Cost Savings	Estimated Annual O&M Savings	Total Estimated Annual Cost Savings	Simple Payback	S.I.R.	ECM Category-Payback Based	Life Cycle Savings	Expected Useful Life (EUL)
					Natural Gas	Electricity									
					Therms	kWh	kgal	$	$	$	Years			$	Years
Totals For Evaluated ECM's With Payback ⩽ 12				$3,565,530	72,531	259,020	2,939	$522,972	$27,180	$550,152	6.48				
Totals For Evaluated ECM's With 12>Payback ⩽ 2				$533,860	1,154	53,976	2,040	$40,357	$362	$40,720	13.11				
Totals For Evaluated ECM's With Payback >20 Yrs				$1,845,869	7,985	120,778	0	$63,469	$885	$64,354	28.68				
Total For ALL Evaluated ECM'S				$5,945,259	81,670	433,774	4,980	$626,798	$28,427	$655,226	9.07				
Totals For Recommended ECM's (SIR ⩾ 1)				$4,007,971	73,685	259,020	4,979	$557,364	$27,542	$584,907	6.85				
	Interactive Savings Discount @ 10%				-7,368	-25,902	-498	-$55,736	-$2,754	-$58,491					
	Total Contingency Expenses @ 15%			$601,196											
Total for Improvements				$4,609,166	66,316	233,118	4,481	$501,628	$24,788	$526,416	8.76				

12. UTILITY ANALYSIS

Establishing the energy baseline begins with an analysis of the utility cost and consumption of the building. Utilizing the historical energy data and local weather information, we evaluate the existing utility consumption and assign it to the various end-uses throughout the buildings. The Historical Data Analysis breaks down utilities by consumption, cost and annual profile.

This data is analyzed, using standard engineering assumptions and practices. The analysis serves the following functions:

- Allows our engineers to benchmark the energy and water consumption of the facilities against consumption of efficient buildings of similar construction, use and occupancy.
- Generates the historical and current unit costs for energy and water
- Provides an indication of how well changes in energy consumption correlate to changes in weather.
- Reveals potential opportunities for energy consumption and/or cost reduction. For example, the analysis may indicate that there is excessive, simultaneous heating and cooling, which may mean that there is an opportunity to improve the control of the heating and cooling systems.

By performing this analysis and leveraging our experience, our engineers prioritize buildings and pinpoint systems for additional investigation during the site visit, thereby maximizing the benefit of their time spent on site and minimizing time and effort by the customer's personnel.

Utility Rates used for Cost Analysis

Electricity (Blended Rate)	Natural Gas	Water / Sewer
$0.11/kWh	$6.28/therm	$ 13.31/kGal

12.1. ELECTRICITY

The Illuminating Company provides the electricity requirements of the facility. The property is master metered.

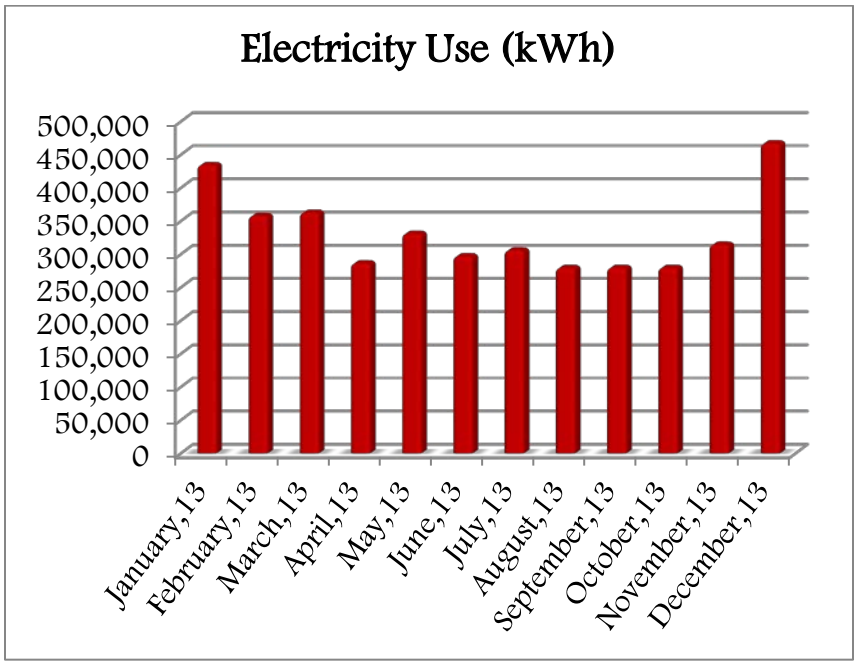
The electricity is paid for by the housing authority. The consumption pattern for the period under consideration varies seasonally. The seasonal variation in the consumption is attributed to the heating, while the base load primarily consists of lighting, appliances and cooking.

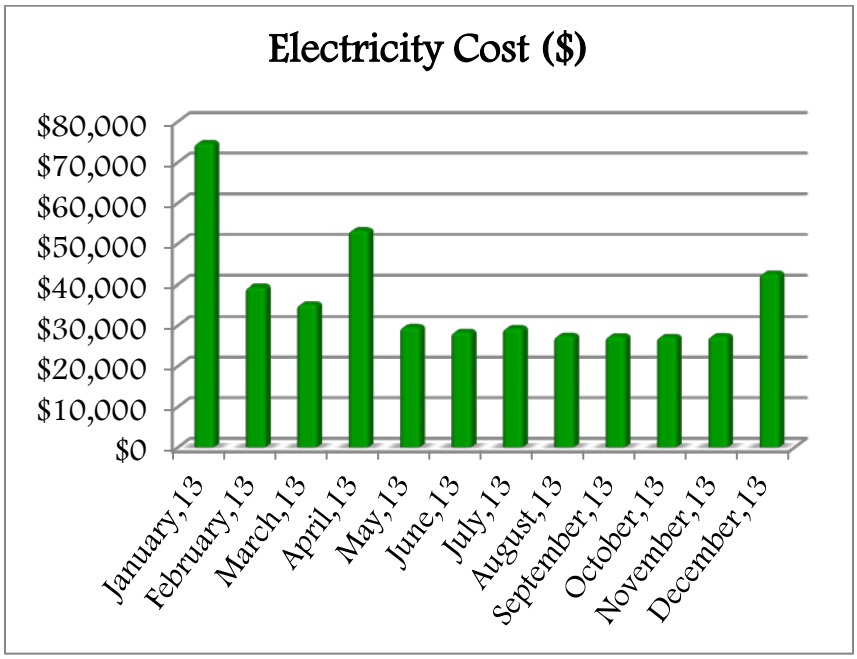
Based on the 2013 electric usage and costs, the average price paid during the year was $0.11 per kWh. The total annual electricity consumption for the 12-month period analyzed is 3,999,590 kWh for a total cost of $442,002.

Electricity Consumption and Cost Data

Billing Month	Consumption (kWh)	Unit Cost/kWh	Total Cost
January	434,728	$0.17	$74,698
February	358,092	$0.11	$39,470

Billing Month	Consumption (kWh)	Unit Cost/kWh	Total Cost
March	362,992	$0.10	$35,227
April	286,748	$0.19	$53,244
May	331,298	$0.09	$29,623
June	297,390	$0.10	$28,432
July	306,210	$0.10	$29,332
August	279,750	$0.10	$27,450
September	279,946	$0.10	$27,331
October	279,946	$0.10	$27,186
November	314,893	$0.09	$27,377
December	467,597	$0.09	$42,632
Total/Average	**3,999,590**	**$0.11**	**$442,002**


Electricity Use (kWh)
500,000
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
January,13
February,13
March,13
April,13
May,13
June,13
July,13
August,13
September,13
October,13
November,13
December,13


Electricity Cost ($)
$80,000
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
January,13
February,13
March,13
April,13
May,13
June,13
July,13
August,13
September,13
October,13
November,13
December,13

12.2. NATURAL GAS

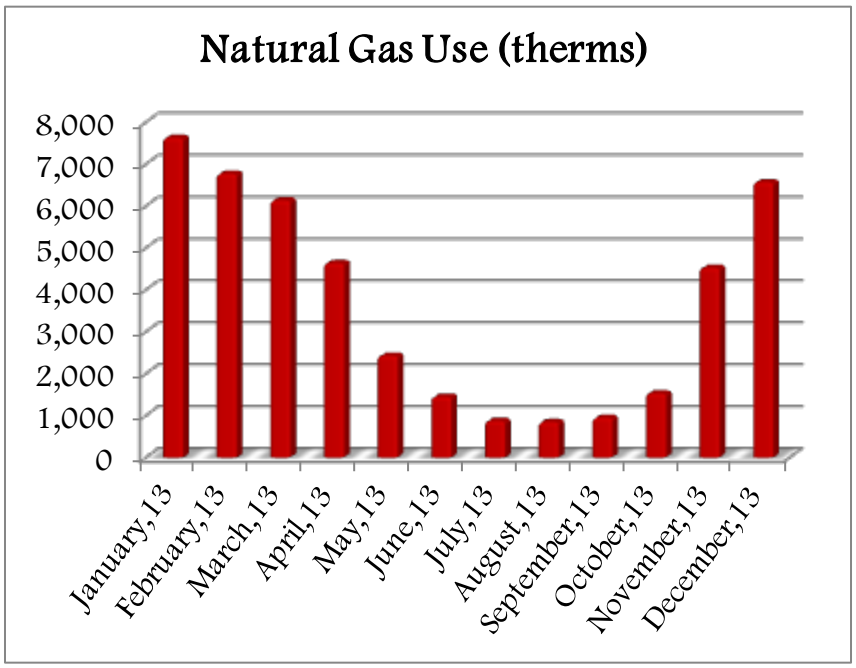
Dominion Gas satisfies the natural gas requirements of the facility are satisfied by. The gas to the property is master metered. The gas meters are located at on the exterior of the boiler houses.

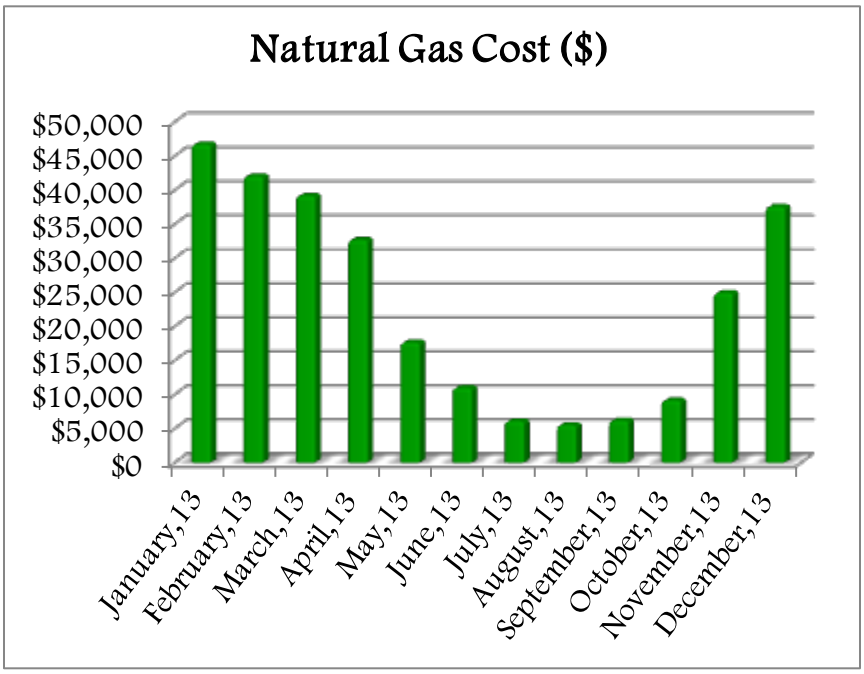
The primary use of natural gas is for space heating and domestic water heating. The consumption pattern for the period under consideration varies seasonally. Based on the information provided by the site manager, the heating season starts from October and continues till May end, this is seen through the seasonal variation in the fuel consumption pattern, as fuel is used for space heating.

Based on the 2013 natural gas usage and costs, the average price paid during the year was $6.28 per therm. The total annual natural gas consumption for the 12-month period analyzed is 44,449 Therms for a total cost of $278,972.

Natural Gas Consumption and Cost Data

Billing Month	Consumption (Therms)	Unit Cost/Therm	Total Cost
January	7,636	$6.12	$46,747
February	6,781	$6.20	$42,065
March	6,144	$6.38	$39,194
April	4,648	$7.04	$32,729
May	2,438	$7.24	$17,663
June	1,457	$7.56	$11,012
July	882	$6.94	$6,124
August	853	$6.51	$5,556
September	957	$6.48	$6,198
October	1,539	$5.95	$9,154
November	4,534	$5.50	$24,932
December	6,580	$5.71	$37,598
Total	44,449	$6.28	$278,972


Natural Gas Use (therms)
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
January,13
February,13
March,13
April,13
May,13
June,13
July,13
August,13
September,13
October,13
November,13
December,13


Natural Gas Cost ($)
$50,000
$45,000
$40,000
$35,000
$30,000
$25,000
$20,000
$15,000
$10,000
$5,000
$0
January,13
February,13
March,13
April,13
May,13
June,13
July,13
August,13
September,13
October,13
November,13
December,13

12.3. WATER AND SEWER.

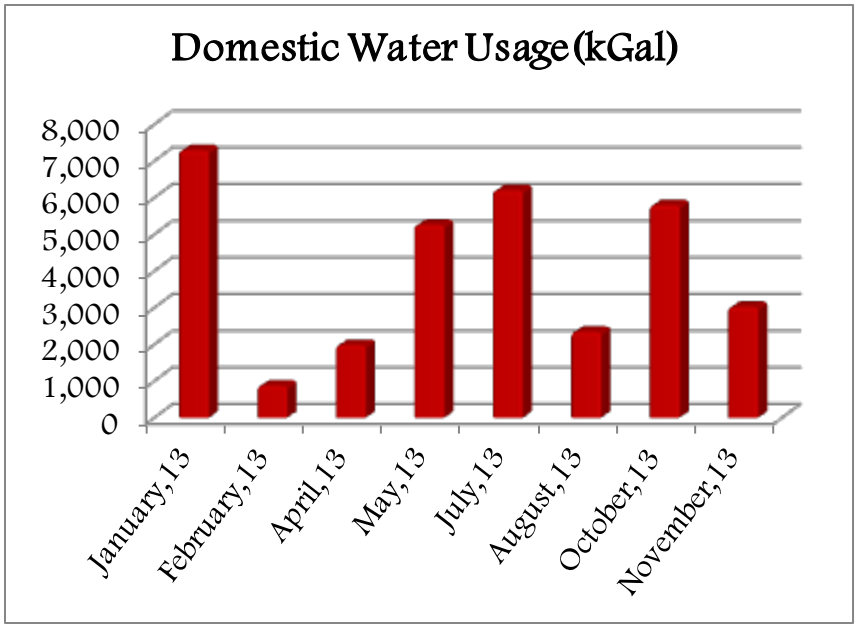
Cleveland Public Water satisfies the Water and Sewer requirements of the facility. The property shares a single water meter amongst them. The water and sewer charges are paid by the housing authority.

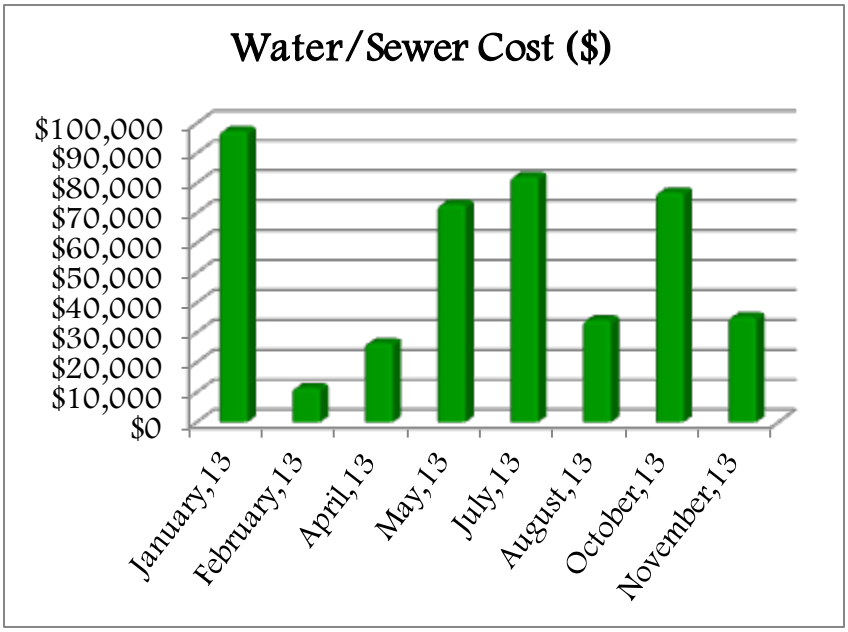
Note: The consumption and cost data for Water/sewer for the months of March, September and December is missing from the data provided to EMG. Based on the data provided to EMG, it seems that the billing to the property is quite irregular with sudden peaks in few months and valleys in the other.

Based on the 2013 water and sewer usage and costs, the average price paid during the year was $13.31 per-gallon. The total annual water and sewer consumption for the 12-month period analyzed is 32,826 KGal for a total cost of $436,939.

Water and Sewer Consumption and Cost Data

Billing Month	Consumption (kGal)	Unit Cost	Total Cost
January,13	7,300	$13.36	$97,493
February,13	882	$13.02	$11,480
April,13	1,989	$13.33	$26,520
May,13	5,266	$13.84	$72,880
July,13	6,208	$13.24	$82,187
August,13	2,348	$14.56	$34,191
October,13	5,804	$13.26	$76,963
November,13	3,029	$11.63	$35,225
Total	**32,826**	$13.31	**$436,939**


Domestic Water Usage (kGal)
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
January,13
February,13
April,13
May,13
July,13
August,13
October,13
November,13


Water/Sewer Cost ($)
$100,000
$90,000
$80,000
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
January,13
February,13
April,13
May,13
July,13
August,13
October,13
November,13

13. HUD BENCHMARKING

The HUD Benchmarking tools provide a comparison of the energy and water consumption at multi-family properties against HUD's portfolio. The benchmarking tools take into account the property location, size, and configuration to rank the subject property amongst similar building. The result is a percentile score which indicates the percentage of properties that the building is performing better than. A score of 50 indicates average performance, while a score of 75 would indicate that the property is performing better than 75% of peer buildings.

The results from the utility analysis and the HUD Energy Benchmarking Tool indicate that the subject property is slightly above average for energy consumption with 57 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.

Building Description

Building Name: Woodhill Homes (optional entry)

5-digit Zip Code: 44104 Not Sure?

Heating Degree Days: 6201

Cooling Degree Days: 621

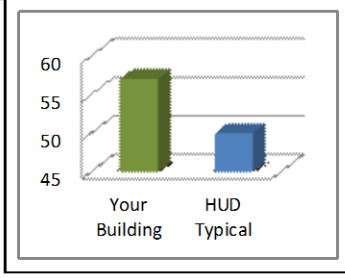
	Gross Floor Area (ft2)	Total Number of Units	Is This a Multifamily Building with Central Laundry? (Y/N)	Is this a Multi-Family Walkup Building? (Y/N)	Heated Floor Area (ft2)	Year Built
Building Description:	200,000	478	n	y	200,000	1939

Annual Consumption

	Electricity	Gas	#2 Fuel Oil	#4 Fuel Oil	District Steam	District Hot Water	Propane
Select Units:	kWh	Therms	Gal	Gal	kLbs	MMBtu	Gal
Energy	3,999,590	44,449					
Cost ($)	442,002	278,970					
Calculated unit cost:	$0.11 $/kWh	$6.28 $/therm	$/gallon	$/gallon	$/klbs	$/kBtu	$/gallon

Results

	Your Building	HUD Typical
Score Against Peers	57	50
Building Site Energy Use (kBtu/year)	18,091,501	19,727,864
Site Energy Use Intensity (kBtu/ft2-year)	90.5	98.6
Energy Cost Intensity ($/ft2-year)	3.60	3.93
Total Annual Energy Cost ($/year)	720,972	786,183



The results from the utility analysis and the HUD Water Benchmarking Tool indicate that the subject property is significantly below the average benchmark for water consumption with a 10 out of 100 as scored against peers.

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.

Building Description

Building Name: Woodhill Homes (optional entry)

5-digit Zip Code: 44104 Not Sure?

Mapping Location: *Cleveland, OH*

	Gross Floor Area of Building(s) (ft2)	Building(s) is Single-Family Detached or Semi-Detached? (Y/N)	Is Residents Water Use Paid Directly by the PHA? (Y/N)	Number of Units in Building(s)	Number of Units in Building(s) with In-Unit Laundry Hookups or Central Laundry Access?	How Many Buildings share this Water Meter?
Building Description:	200,000	N	Y	478	250	63

Annual Consumption

Building Annual Water Use:	32,826,000	(gallons/year)
Building Annual Water Use Cost:	436,939	($/year)
Average Annual Water Cost:	$1.3	($/100 gallons)

Results

	Your Building	HUD Typical
Score Against Peers	10	50
Annual Water Use (gal/year)	32,826,000	15,319,560
Annual Water Use Intensity (gal/ft2-year)	164.1	76.6
Annual Water Cost Intensity ($/ft2-year)	2.18	1.02
Total Annual Water Cost ($/year)	436,939	203,915

14. RECOMMENDED OPERATIONS AND MAINTENANCE PLAN

The quality of the maintenance and the operation of the facility's energy systems have a direct effect on its overall energy efficiency. Energy-efficiency needs to be a consideration when implementing facility modifications, equipment replacements, and general corrective actions. The following is a list of activities that should be performed as part of the routine maintenance program for the property. These actions will ensure that the energy conservation measures identified in this report will remain effective. The following general recommendations should be continued or implemented.

Building Envelope (Community Center and Tenant Buildings)

1. Ensure that the building envelope has proper caulking and weather stripping.
2. Patch holes in the building envelope with foam insulation and fire rated caulk around combustion vents
3. Inspect building vents semiannually for bird infestation
4. Inspect windows monthly for damaged panes and failed thermal seals
5. Repair and adjust automatic door closing mechanisms as needed.

Heating and Cooling (Community Center and Tenant Buildings)

1. Pilots lights on furnaces and boilers be turned off in summer
2. All preventive maintenance should be performed on all furnaces and boilers, which would include cleaning of burners and heat exchanger tubes.
3. Ensure that the combustion vents exhaust outside the conditioned space and the vent dampers are functional.
4. Ensure control valves/steam valves and traps are functional before start of each heating season.
5. Ensure the duct work in unconditioned space is un-compromised and well insulated Duct cleaning is recommended every 10 years. This should include sealing of ducts using products similar to 'aero-seal'
6. Ensure that the air dampers are operating correctly
7. Return vents should remain un-obstructed and be located centrally.
8. Temperature settings reduced in unoccupied areas and set points seasonally adjusted.
9. Evaporator coils and condenser coils should be regularly cleaned to improve heat transfer
10. Refrigerant pipes should be insulated with a minimum of ¾" thick Elastometric Rubber Pipe Insulation
11. Ensure refrigerant pressure is maintained in the condensers
12. Change air filters on return vents seasonally. Use only filters with 'Minimum Efficiency Rating Value'(MERV) of 8

Central Domestic Hot Water (Community Center and Tenant Buildings)

1. Never place gas-fired water heaters adjacent to return vents so as to prevent flame roll outs
2. Ensure the circulation system is on timer to reduce the losses through re-circulation
3. Ensure all hot water pipes are insulated with fiberglass insulation at all times

4. Replacement water heater should have Energy Factor (EF) > 0.9
5. Tank-type water heaters flushed monthly

Tenant Space- Domestic Hot Water (3 Story walk ups)

1. Domestic hot water heater temperature set to the minimum temperature required (122F)
2. Ensure that 6′ of cold and hot water pipes leading to and from the hot water heater be insulated at all times
3. Never place a gas-fired water heaters adjacent to return vents so as to prevent flame roll outs
4. Ensure that the water heater flue is vented outside the building directly and the vent dampers are functional to prevent air infiltration
5. Replacement water heaters should have Energy Factor (EF) > 0.7 (gas-fired) and EF > 0.9 (electric)
6. Tank-type water heaters flushed regularly

Lighting (Community Center and Tenant Buildings)

1. Use energy efficient replacement lamps (LEDs and CFLs)
2. Clean lighting fixture reflective surfaces and translucent covers.
3. Ensure that timers and/or photocells are operating correctly on exterior lighting
4. Use occupancy sensors for offices and other rooms with infrequent occupancy

Existing Equipment and Replacements (Community Center and Tenant Buildings)

1. Ensure that refrigerator and freezer doors close and seal correctly
2. Ensure kitchen and bathroom exhaust outside the building and the internal damper operates properly
3. Ensure that bathroom vents exhaust out
4. Office/ computer equipment either in the “sleep” or “off” mode when not used

15. APPENDICES

APPENDIX A: Photographic Record
APPENDIX B: Site Plan
APPENDIX C: Supporting Documentation
APPENDIX D: EMG Accessibility Checklist
APPENDIX E: Pre-Survey Questionnaire
APPENDIX F: Acronyms
APPENDIX G: Glossary of Terms - Energy Audits
APPENDIX H: Energy Conservation Measures

APPENDIX A:
PHOTOGRAPHIC RECORD

EMG
ENGINEERING PEACE OF MIND

EMG PHOTOGRAPHIC RECORD

Project No.: 109304.14R-025.308 **Project Name: Woodhill Homes**

Photo #1:	Site signage

Photo #2:	Community center – front elevation

Photo #3:	Community center – rear elevation

Photo #4:	3 story walk up –front elevation

Photo #5:	3 story walk up – rear elevation

Photo #6:	Pitched roof row homes – front and side elevation

EMG
ENGINEERING PEACE OF MIND

EMG PHOTOGRAPHIC RECORD

Project No.: 109304.14R-025.308 **Project Name: Woodhill Homes**

Photo #7:	Pitched roof row homes – rear elevation

Photo #8:	Flat roof row homes

Photo #9:	Maintenance garage

Photo #10:	Central boiler house

Photo #11:	Community center drive way

Photo #12:	Community center parking

EMG
ENGINEERING PEACE OF MIND

EMG PHOTOGRAPHIC RECORD

Project No.: 109304.14R-025.308 **Project Name: Woodhill Homes**

Photo #13:	Site drive aisle

Photo #14:	Tenant parking

Photo #15:	Tenant row-home roof

Photo #16:	Community center roof

Photo #17:	Site dumpster

Photo #18:	Tenant mail box

EMG
ENGINEERING PEACE OF MIND

EMG PHOTOGRAPHIC RECORD

Project No.: 109304.14R-025.308 **Project Name: Woodhill Homes**

Photo #19:	Courtyard and landscaping

Photo #20:	Perimeter fencing

Photo #21:	Chain link fence

Photo #22:	Erosion and ponding issue

Photo #23:	Site sidewalk

Photo #24:	Site lighting

EMG
ENGINEERING PEACE OF MIND

EMG PHOTOGRAPHIC RECORD

Project No.: 109304.14R-025.308 **Project Name: Woodhill Homes**

Photo #25:	Building mounted site lighting

Photo #26:	Playground

Photo #27:	Splash park

Photo #28:	Tenant unit window

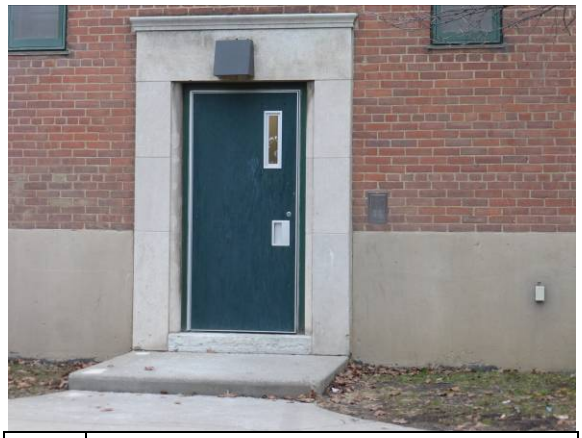


Photo #29:	3 story walk up – exterior door

Photo #30:	Community center – exterior doors and windows

EMG
ENGINEERING PEACE OF MIND

EMG PHOTOGRAPHIC RECORD

Project No.: 109304.14R-025.308 **Project Name: Woodhill Homes**

Photo #31:	Community center - gym

Photo #32:	Community center - kitchen

Photo #33:	Community center - corridor

Photo #34:	Community center - elevator

Photo #35:	Community center - classroom

Photo #36:	Community center – kitchen classroom

EMG
ENGINEERING PEACE OF MIND

EMG PHOTOGRAPHIC RECORD

Project No.: 109304.14R-025.308 **Project Name: Woodhill Homes**

Photo #37:	Community center - bathroom

Photo #38:	Community center – ADA bathroom

Photo #39:	Community center – conference room

Photo #40:	Community center – administration lobby

Photo #41:	Community center – interior doors

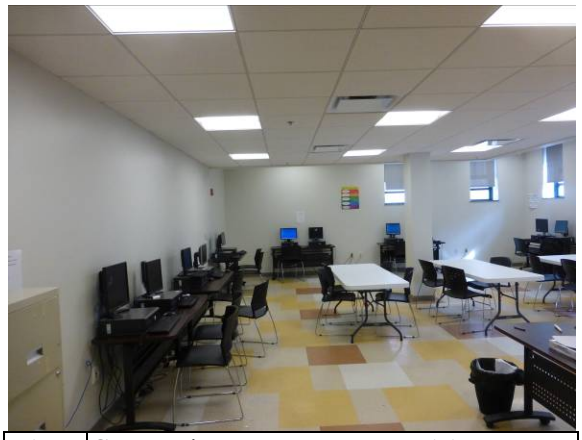


Photo #42:	Community center – computer lab

EMG
ENGINEERING PEACE OF MIND

EMG PHOTOGRAPHIC RECORD

Project No.: 109304.14R-025.308 **Project Name: Woodhill Homes**

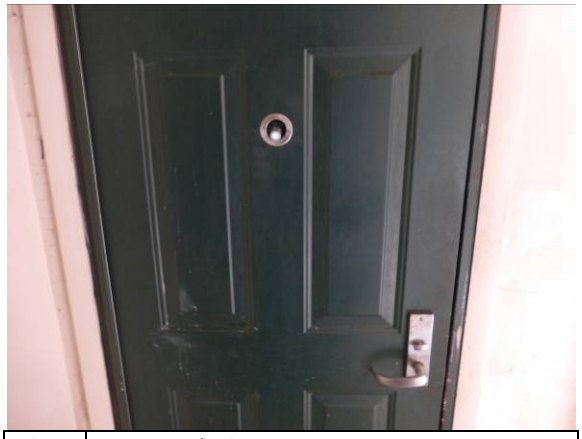


Photo #43:	Tenant unit door

Photo #44:	Tenant unit window

Photo #45:	Tenant unit window

Photo #46:	Row house kitchen

Photo #47:	3 story walk up kitchen

Photo #48:	Row house kitchen

EMG
ENGINEERING PEACE OF MIND

EMG PHOTOGRAPHIC RECORD

Project No.: 109304.14R-025.308 **Project Name: Woodhill Homes**

Photo #49:	Tenant supplied washer

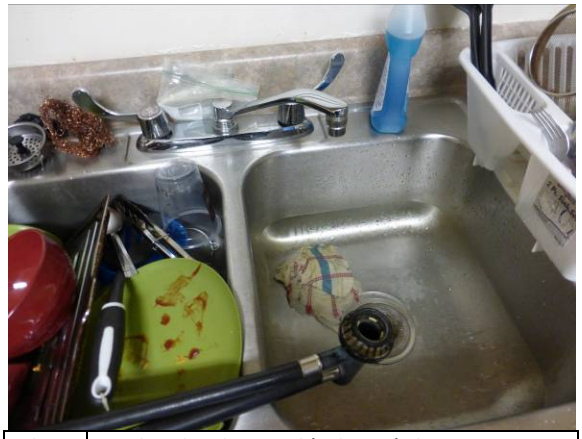


Photo #50:	Washer hookup to kitchen sink

Photo #51:	3 story walk up – living room

Photo #52:	Row house – living room

Photo #53:	Tenant bedroom

Photo #54:	Tenant bedroom

EMG
ENGINEERING PEACE OF MIND

EMG PHOTOGRAPHIC RECORD

Project No.: 109304.14R-025.308 **Project Name: Woodhill Homes**

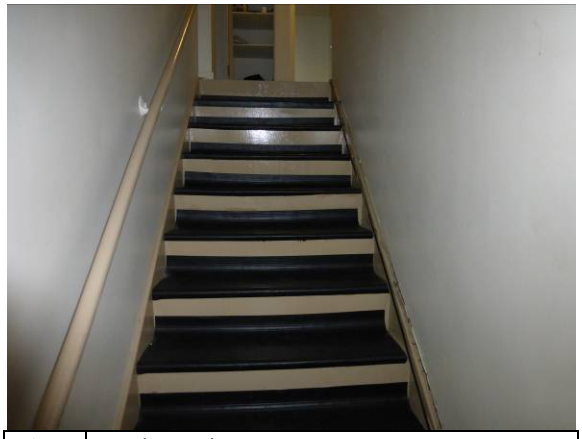


Photo #55:	Interior stairs

Photo #56:	Tenant unit interior door

Photo #57:	Bathroom

Photo #58:	Old pedestal sink

Photo #59:	Toilet

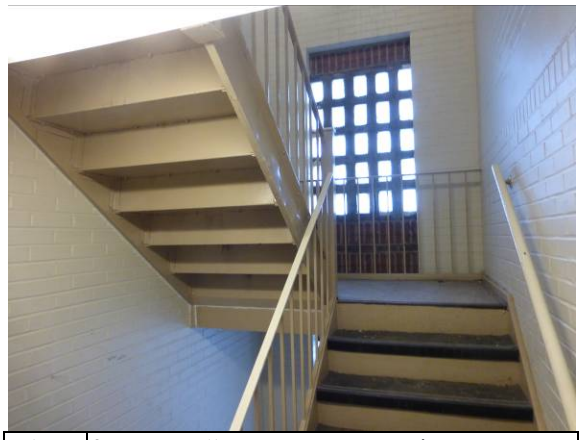


Photo #60:	3 story walk up – common stairs

EMG
ENGINEERING PEACE OF MIND

EMG PHOTOGRAPHIC RECORD

Project No.: 109304.14R-025.308 **Project Name: Woodhill Homes**

Photo #61:	Radiator control

Photo #62:	Radiator

Photo #63:	Electrical panel

Photo #64:	3 story walk up unit – mechanical equipment

Photo #65:	Central heating boiler

Photo #66:	Central domestic water boiler

EMG
ENGINEERING PEACE OF MIND

EMG PHOTOGRAPHIC RECORD

Project No.: 109304.14R-025.308 **Project Name: Woodhill Homes**

Photo #67:	Pump

Photo #68:	Storage tank

Photo #69:	Splash park equipment

Photo #70:	Community Center – boilers

Photo #71:	Community center – air handler

Photo #72:	Community center – hydraulic elevator equipment

EMG
ENGINEERING PEACE OF MIND

EMG PHOTOGRAPHIC RECORD

Project No.: 109304.14R-025.308 **Project Name: Woodhill Homes**

Photo #73:	Community center – split system units

Photo #74:	Community center – fire panels

Photo #75:	Community center – emergency generator

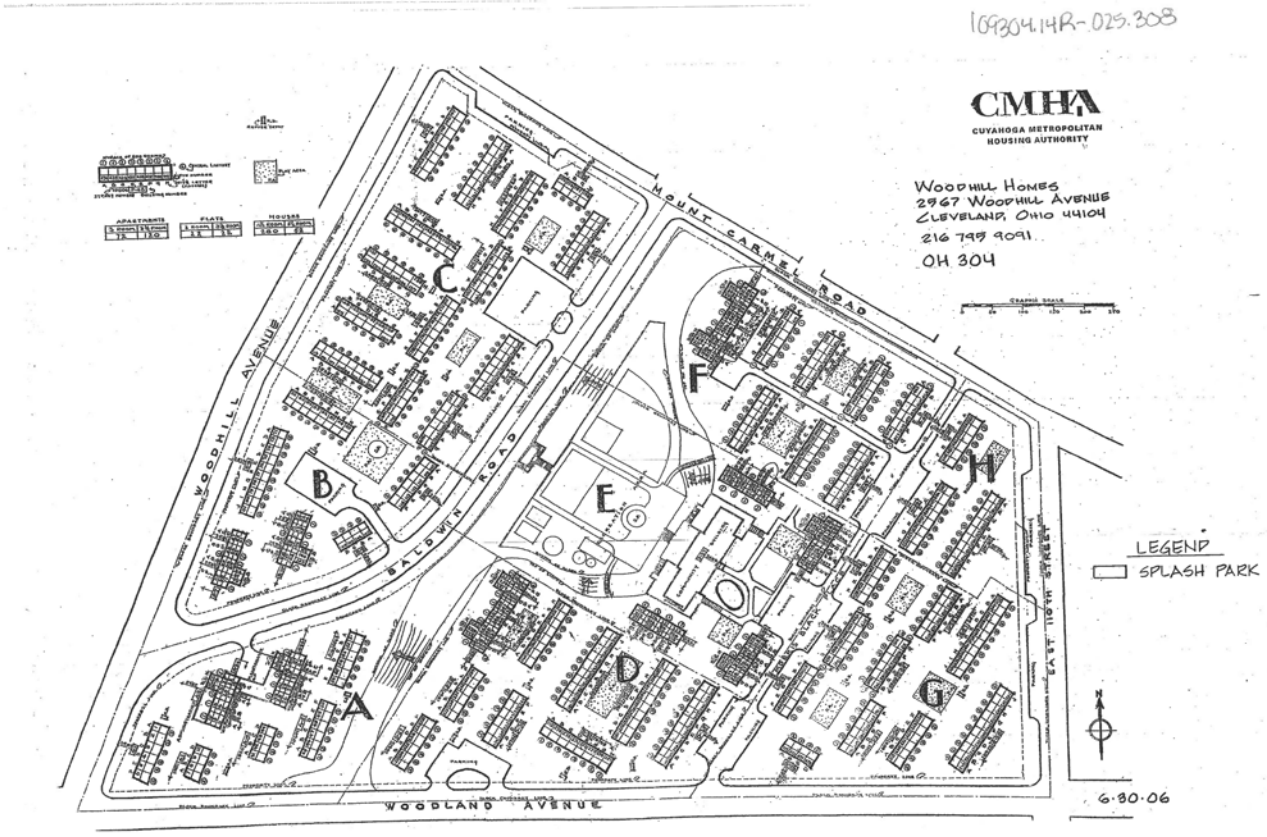
Photo #76:	Interior of the maintenance storage garage

Photo #77:	Row-home building crawl space

Photo #78:	3 Story walk up building basement

APPENDIX B:
SITE PLAN

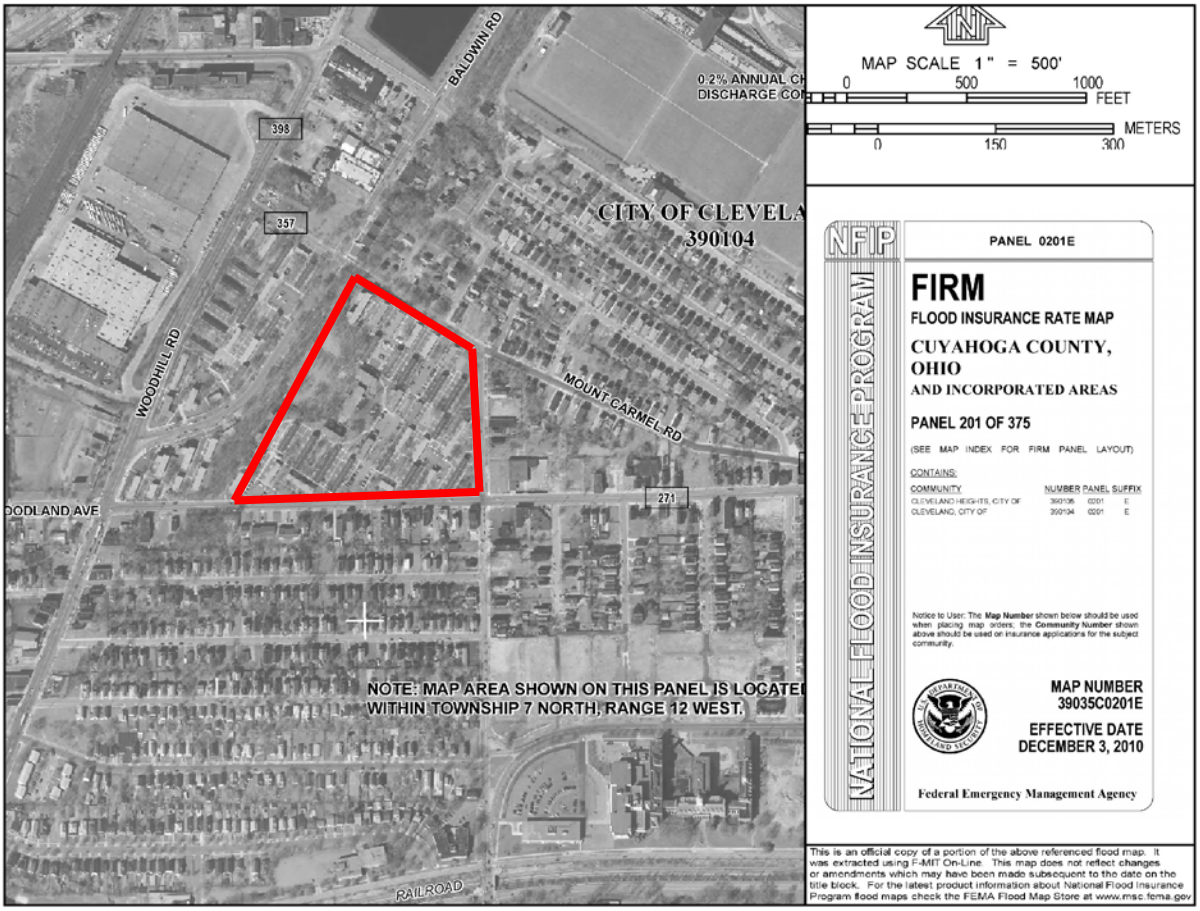
Site Plan



EMG		**Project Number:** 109304.14R-025.308
N		**Project Name:** Woodhill Homes
	Not drawn to scale. The north arrow indicator is an approximation of 0° North.	**On-Site Date:** March 16-19, 2015

APPENDIX C:
SUPPORTING DOCUMENTATION

Flood Map



EMG	**Source:** FEMA Map Number: 39035C0201E Dated: December 3, 2010	**Project Number:** **109304.14R-025.308**
N		**Project Name:** **Woodhill Homes**
	Not drawn to scale. The north arrow indicator is an approximation of 0° North.	**On-Site Date:** **March 16-19, 2015**

Aerial Plan

EMG		**Project Number:** 109304.14R-025.308
N		**Project Name:** Woodhill Homes
	Not drawn to scale. The north arrow indicator is an approximation of 0° North.	**On-Site Date:** March 16-19, 2015

APPENDIX D:
EMG ACCESSIBILITY CHECKLIST

Property Name: Woodhill Homes
Date: March 16-19, 2015
Project Number: 109304.14R-025.308

EMG Accessibility Checklist						
UFAS/ADA Accessibility						
	Building History	**Yes**	**No**	**N/A**	**Unk**	**Comments**
1.	Has the management previously completed an accessibility review?	✓				
2.	Have any ADA improvements been made to the property?	✓				
3.	Does a Barrier Removal Plan exist for the property?	✓				
4.	Has the Barrier Removal Plan been reviewed/approved by an arms-length third party such as an engineering firm, architectural firm, building department, other agencies, etc.?				✓	
5.	Have any accessibility related complaints been received in the past?		✓			
6.	Is the property Section 504 compliant?	✓				Community Center is but the rest of the property does not have any ADA units
7.	Is any litigation pending related to ADA issues?		✓			
	Parking	**Yes**	**No**	**N/A**	**Comments**	
1.	Are there an adequate number (per regulation) of wheelchair accessible parking spaces available at the rental office (96" wide/ 60" aisle)? (UFAS Sections 4.1.1 and 4.6.3) See attached table for appropriate number of spaces.	✓			Community Center Only	
2.	For any public space required, for every six or fraction of six accessible parking spaces provided, is at least one a wheelchair accessible van space (132" wide, or 96" wide with a 96" access aisle)? (Per ADAAG compliance: Section 502.2)	✓				
3.	Are accessible spaces marked with the International Symbol of Accessibility? Are there signs reading "Van Accessible" at van spaces?	✓				
4.	Are accessible parking spaces located on the shortest accessible route of travel from an accessible building entrance?	✓				
5.	Is the slope of the paving at the accessible parking spaces 1:50 (2%) or less in any direction? (UFAS Section 4.6.3)	✓				

	Parking	Yes	No	N/A	Comments
6.	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?	✓			
7.	Do curbs on the accessible route have depressed, ramped curb cuts at drives, paths, and drop-offs?	✓			
8.	Does signage exist directing you to wheelchair accessible parking and an accessible building entrance?	✓			
	Ramps	**Yes**	**No**	**N/A**	**Comments**
1.	Is there a ramp from the parking to an accessible building entrance (1:12 slope or less)? (UFAS Section 4.8.2)	✓			Community Center Only
2.	Do ramps longer than 72″ (or have a rise greater than 6″) have handrails on both sides of the ramp? (UFAS Section 4.8.5)	✓			
3.	Is the width between railings 36″ minimum? (UFAS Section 4.8.3)	✓			
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? (UFAS Section 4.8.2, Fig. 16)	✓			
	Entrances/Exits	**Yes**	**No**	**N/A**	**Comments**
1.	Are 60% of the entrances accessible? (Per ADAAG compliance: Section 206.4.1) (Note: for buildings built prior to March 15, 2012, if 50% of the entrances complied with the 1991 ADAAG standard, they are not required to meet the 60% minimum).	✓			Community Center only
2.	Are the accessible entrance doorways at least 32″ wide? (UFAS Section 4.13.5)	✓			
3.	If there are two main doors in series, is the minimum space between the doors 48″plus the width of any door swinging into the space? (UFAS Section 4.13.7)	✓			
4.	Is the door handle easy to open? (lever/push type knob, no twisting required, no higher than 48″ above floor) (UFAS Section 4.13.9)	✓			
5.	Are entry doors other than revolving doors available?	✓			
6.	Is the sidewalk slope at the main entrance door less than 1:50 (2%) UFAS Section 4.3.7)	✓			

	Rental office	Yes	No	N/A	Comments
1.	Is the entry door to the rental office 32″ wide (UFAS Section 4.13.5) with no step or threshold over ½″ tall (UFAS Section 4.13.8)?	✓			
2.	Is there a counter or table at 30″ high for wheelchair access to fill out a rental application? (UFAS Section 4.32.4)	✓			
3.	Is there space provided for a wheelchair in the seating are?	✓			
	Building Corridors	**Yes**	**No**	**N/A**	**Comments**
1.	Is the path of travel free of obstructions and wide enough for a wheelchair (at least 60″ wide)? (UFAS Section 4.3.4)	✓			Community Center
2.	Are floor surfaces firm, stable and slip resistant (carpets wheelchair friendly)?	✓			
3.	Do obstacles (phones, fountains, etc.) protrude no more than 4″ into walkways or corridor? (UFAS Section 4.4.1)	✓			
4.	If provided, is the public phone wheelchair accessible?	✓			
5.	Are wheelchair accessible facilities (restrooms, exits, etc.) identified with signage?	✓			
6.	Is there a path of travel that does not require the use of stairs?	✓			
	Elevators	**Yes**	**No**	**N/A**	**Comments**
1.	Are elevators controls low enough to be reached from a wheelchair (48″ front approach/54″ side approach)? (UFAS Section 4.10.12). Controls in public access areas must be between 15″ and 48″ high (per ADAAG compliancy: Section 308.2).	✓			Community Center
2.	Do elevator lobbies have visual and audible indicators of the cars arrival?	✓			
3.	Do the call buttons have visual signals to indicate when a call is registered and answered?	✓			
4.	Is the "UP" button above the "DOWN" button?	✓			
5.	Are there raised elevator markings in Braille and standard alphabet for the blind (on both jambs of each hoist way entrance and on elevator control buttons, mounted to the left of the buttons)?	✓			
6.	Do elevator doors have a reopening device that will stop and reopen a car door if an object or a person obstructs the door?	✓			
7.	Does the elevator interior provide sufficient wheelchair turning area (51″ x 68″ minimum)? (UFAS Section 4.10.9)	✓			
8.	Are there audible signals inside cars indicating floor changes?	✓			

	Elevators	Yes	No	N/A	Comments
9.	If a two-way emergency communication system is provided within the elevator cab, is it usable without voice communication?	✓			
	Common Area Restrooms	**Yes**	**No**	**N/A**	**Comments**
1.	Are common area public restrooms located on an accessible route?	✓			Community Center
2.	Are door handles push/pull or lever type?	✓			
3.	Are there audible and visual fire alarm devices in the toilet rooms?		✓		
4.	Are access doors wheelchair accessible (at least 32″ wide)? (UFAS Section 4.13.5)	✓			
5.	Are public restrooms large enough for wheelchair turnaround (60″ turning diameter)? (UFAS Sections 4.2.3 and 4.23.3)	✓			
6.	In unisex toilet rooms, are there safety alarms with pull cords?			✓	
7.	Are stall doors wheelchair accessible (at least 32″ wide)? (UFAS Sections 4.13.5 and 4.17.5)	✓			
8.	If stalls are to narrow can the toilet room be converted to a single occupant toilet room?			✓	
9.	Are grab bars provided in toilet stalls (33″-36″ above floor) (UFAS Section 4.17.6, Fig. 30c) with the rear bar at 36″ minimum (Fig. 30c) and the side bar at 42″ minimum (Fig. 30d), beginning no more than 12″ from the rear wall (Fig. 30d)?	✓			
10.	Do sinks provide clearance for a wheelchair to roll under (29″ clearance)? (UFAS Section 4.19.2)	✓			
11.	Are sink handles operable with one hand without grasping, pinching or twisting?	✓			
12.	Are exposed pipes under sink sufficiently insulated against contact?	✓			
13.	Are soap dispensers, towel, etc. reachable 48″ from floor for frontal approach (UFAS Section 4.2.5), 54″ for side approach (UFAS Section 4.2.6)? Said items in public access areas must be between 15″ and 48″ high (per ADAAG compliancy: Section 308.2).	✓			
14.	Is the base of the mirror no more than 40″ off floor? (UFAS Section 4.19.6)	✓			
	Common Area Kitchen	**Yes**	**No**	**N/A**	**Comments**
1.	In a "U"-shaped kitchen is there 60″ clear floor space width? (UFAS Section 4.34.6.1)			✓	Kitchen Classroom
2.	In a "U"-shaped kitchen with base cabinet removed from beneath sink, is there a minimum of 30″ width (UFAS Section 4.24.3)?			✓	

	Common Area Kitchen	Yes	No	N/A	Comments
3.	In a "L"-shaped kitchen, is there a 40" width minimum maintained? (UFAS Section 4.34.6.1)			✓	
4.	Are countertops a maximum of 24" deep (UFAS Section 4.2.6, Fig. 6c) and 34" high (UFAS Section 4.34.6.4)?			✓	
5.	Knee space beneath cabinetry is 30" wide and 27" high. (UFAS Section 4.32.3)			✓	
6.	Is insulation installed below sinks on piping?			✓	
7.	Are adaptable units equipped with removable or retractable cabinetry fronts beneath sink or stove?			✓	
	Common Area Laundry rooms	**Yes**	**No**	**N/A**	**Comments**
1.	Are the laundry rooms located on an accessible route?			✓	
2.	Are the door handles push/pull or lever?			✓	
3.	Are the access doors wheelchair accessible (at least 32" clear width)? (UFAS Section 4.13.5)			✓	
4.	Are laundry rooms large enough for wheelchair turnaround (60" turning diameter)? (UFAS Section 4.2.3)			✓	
5.	Is there a front load washing machine?			✓	
6.	If clothes folding tables are provided, is one section between 28" to 34" high with a clear area below the table (UFAS Section 4.32.4)?			✓	
	Unit Living Space	**Yes**	**No**	**N/A**	**Comments**
1.	Is there access throughout unit?			✓	There are no ADA units at the property
2.	Are electrical outlets 15" minimum above floor? (UFAS Section 4.27.3)			✓	
3.	Are environmental controls and switches 48" maximum above floor or lower? (UFAS Section 4.27.3)			✓	
	Unit Bathroom	**Yes**	**No**	**N/A**	**Comments**
1.	Is entry door at least 32" wide frame-to-frame? (UFAS Section 4.13.5)			✓	
2.	Are switches & outlets in accessible locations?			✓	
3.	Are bathroom walls around the toilet and tub/shower reinforced?			✓	
4.	Is there a 30" x 48" clear floor space outside of door swing area? (UFAS Section 4.2.4.1)			✓	
5.	In a toilet room, is there adequate space in front of the toilet? See attached diagrams for appropriate measurements (Fig. 28).			✓	

	Unit Bathroom	Yes	No	N/A	Comments
6.	In a toilet stall, is there adequate space in front of the toilet? See attached diagrams for appropriate measurements (Fig. 30a and 30b).			✓	
7.	Is there a 30″ x 48″ clear floor space in front of lavatories (UFAS Section 4.19.3)			✓	
8.	Is there adequate space in front of the tub/shower? See attached diagrams for appropriate measurements (Fig. 33, 35a, and 35b).			✓	
9.	Is vanity a maximum of 24″ deep (UFAS Section 4.2.6, Fig. 6c) and 34″ high (UFAS Section 4.19.2)?			✓	
10.	Knee space beneath sink is 30″ wide and 27″ high. (UFAS Section 4.34.6.5)			✓	
11.	Is shower stall 36″x 42″ minimum with small lip? (UFAS Section 4.34.5.5)			✓	
12.	Is insulation installed below sinks on piping?			✓	
	Unit Kitchen	**Yes**	**No**	**N/A**	**Comments**
1.	In a "U"-shaped kitchen is there 60″ clear floor space width? (UFAS Section 4.34.6.1)			✓	
2.	In a "U"-shaped kitchen with base cabinet removed from beneath sink, is there a minimum of 30″ width (UFAS Section 4.24.3)?			✓	
3.	In a "L"-shaped kitchen, is there a 40″ width minimum maintained? (UFAS Section 4.34.6.1)			✓	
4.	Are countertops a maximum of 24″ deep (UFAS Section 4.2.6, Fig. 6c) and 34″ high (UFAS Section 4.34.6.4)?			✓	
5.	Knee space beneath cabinetry is 30″ wide and 27″ high. (UFAS Section 4.34.6.4)			✓	
6.	Is insulation installed below sinks on piping?			✓	POC states insulation can be installed if the space under the sink is removed.
	Play Areas	**Yes**	**No**	**NA**	
1	Is there an accessible route to the play area, with a minimum width of 36″? (ADAAG Section 1008.2)	✓			
2	Has the play area been reviewed for accessibility? All playgrounds are subject to ADAAG standards.	✓			
Fair Housing Accessibility *As outlined in Section 3 of the FHA Guidelines, this section applies to Multifamily dwellings with first occupancy after March 13, 1991; all ground floor units in buildings that contain 4 or more units; and all units in buildings where there is an elevator.*					
	Requirements	**Yes**	**No**	**N/A**	**Comments**
1.	Is the entry door at least 36" wide?	✓			
2.	Is the entry door hardware lever handled?	✓			
3.	Do interior doors have a clearance of 32"?	✓			
4.	Are thresholds at exterior primary entrance doors to FHA units beveled and no greater than 3/4"?			✓	No ADA units at the property
5.	Are all routes through FHA units at least 36″ wide?			✓	

Fair Housing Accessibility *As outlined in Section 3 of the FHA Guidelines, this section applies to Multifamily dwellings with first occupancy after March 13, 1991; all ground floor units in buildings that contain 4 or more units; and all units in buildings where there is an elevator.*					
	Requirements	**Yes**	**No**	**N/A**	**Comments**
6.	Are light switches, electrical outlets, thermostats, and other environmental controls in accessible locations?			✓	
7.	Is there a 30" X 48" clear floor space at each fixture in kitchens?	✓			
8.	Is there a 32" wide minimum entrance to the kitchens?	✓			
9.	Is there 40" between facing counters in kitchens (in "U" kitchen, min 60" if any fixture at bottom of "U" OR 40" min if sink has removable front)?			✓	
10.	Do bathrooms contain reinforcements in the walls to allow later installation of grab bars around toilet, tub, shower stall and shower seat where such facilities are provided?			✓	
11.	Is there a 32" wide minimum entrance to the bathrooms?			✓	
12.	Is there adequate maneuvering space in bathrooms?			✓	

APPENDIX E:
PRE-SURVEY QUESTIONNAIRE

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: CMHA	Address: 8120 Kinsman Rd
Owner, if other than Authority:	Address:
Name of Subject Site: Woodhill Homes	Residential Buildings: 61 Common Buildings: 1 Other Buildings: 1
Address 2488 Morris Black Place	City, State, Zip Cleveland, oh 44104
Building Manager	Phone (216) 231-6432
Maintenance Manager N/A	Phone —
Energy Management Coordinator N/A	Phone —

Building Description (circle all that apply)

Masonry – Wood framed – Steel framed – Curtain wall

Detached – Townhouse – Low-rise – Mid-rise – High-rise

Basement – Crawl Space – Attic – Flat Roof – Slope Roof

Number of:

0 Efficiencies 134 One BR ___ Two BR 254 Three BR 85 Four BR 0 Five BR 4 Six BR 1 SRO

Date of original completion 1933

Dates of significant renovations 2008

Describe: plumbing upgrade

Other uses on this site

- ✓ Rental Office
- ✓ Community Service Offices
- ___ Common Laundry
- ✓ Common Meeting-Activity
- ✓ Common Kitchen
- Residential or Commercial
- ✓ Daycare
- ✓ Training Education
- ✓ Gym Fitness Recreation
- ✓ Maintenance Storage
- ___ Other, Specify:

Anticipated Modifications or Changes In Use in the next 15 yrs:

N/A

Have there been previous Energy Audits or Retrofit Programs? ✓ Yes __ No

Date _____

Agency _____

Scope _____

Are related Energy Audit or Retrofit documents available?

Any additional Energy Investment Programs? _____

Does the Institution Have an ongoing energy management program? ✓ Yes ___No

Utilities			
	Utility Supplier to the Site	Master Metered	Tenant Metered
Electric	The Illuminating Company		
Natural/LP Gas	Dominion		
Fuel Oil	N/A		
Other_____			
Domestic Water	CP Water		
Sewer	CP Water		

- 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	All	
Cooling	N/A	
Domestic Hot Water	All	
Water Supply	All	
Sewer	All	

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)?		✓			
2. Do any of the gas fired boilers, furnaces, or water heaters have vent or flue dampers?	✓				
3. Does the boiler have outdoor reset controls?		✓			
4. Does the County pay for the tenant gas or oil consumption?		✓			
5. Are low-flow faucet aerators and shower heads installed on all or most faucets and showers?	✓				
6. Are the water closets low-flow (1.6 gpf)?	✓				
7. Are the motors used for the elevators					

Unk = Unknown, NA = Not Applicable	Yes	No	Unk	NA	Comments
high-efficiency motors?	✓				
8. Are the motors used for the ventilation systems (i.e. - air handlers, fan coils, etc.) high-efficiency motors?	✓				
9. Are the motors used for the hydronic heating system (i.e. – pumps) high-efficiency motors?	✓				
10. Are the motors used for the hydronic cooling system (i.e. – pumps, chillers, cooling tower fan) high-efficiency motors?	✓				
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?	✓	✓			
12. Is a booster pump required to maintain water pressure at the property?	✓				
13. Are laundry room washing machines fixed to cold rinse only?		✓			
14. Are there any wall or window leaks?	✓				
15. Are there any poorly insulated areas?					
16. Do the utilities (electric, gas, sewer, water) provide adequate service?	✓				
17. Are HVAC systems at the property inspected and maintained, at a minimum, annually?	✓				
18. Is the HVAC equipment more than ten years old?	✓				
19. Are the water heaters/boilers more than ten years old?	✓				
20. Are the any leaks or pressure problems with natural gas service?		✓			
21. Is the electrical service adequate?	✓				
22. Are there any emergency electrical generators?	✓				For management office
23. Are there any large UPS battery systems?			✓		
24. Are there any vacant buildings or significant building areas?		✓			
25. Is there anything else that EMG should know about when assessing this property? If so, what?		✓			

PROPERTY CONDITION ASSESSMENT: DOCUMENT REQUEST

On the day of the site visit, provide EMG's Field Observer access to all of the available documents listed below. Provide copies if possible. Your timely compliance with this request is greatly appreciated.

- A site plan, preferably 8 1/2" X 11", which depicts the arrangement of buildings, roads, parking stalls, and other site features.
- Diagram floor plan of each floor level at 8 1/2" X 11" with room numbers.
- Any available construction documents (blueprints) for the original construction of the building or for any tenant improvement work or other recent construction work.
- For commercial properties, provide a tenant list which identifies the names of each tenant, vacant tenant units, the floor area of each tenant space, and the gross and net leasable area of the building(s).
- For apartment properties, provide a summary of the apartment unit types and apartment unit type quantities, including the floor area of each apartment unit as measured in square feet.
- For hotel or nursing home properties, provide a summary of the room types and room type quantities.
- Copies of Certificates of Occupancy, building permits, fire or health department inspection reports, elevator inspection certificates, roof or HVAC warranties, or any other similar, relevant documents.
- The names of the local utility companies which serve the property, including the water, sewer, electric, gas, and phone companies.
- The company name, phone number, and contact person of all outside vendors who serve the property, such as mechanical contractors, roof contractors, fire sprinkler or fire extinguisher testing contractors, and elevator contractors.
- A summary of recent (over the last 5 years) capital improvement work which describes the scope of the work and the estimated cost of the improvements. Executed contracts or proposals for improvements. Historical costs for repairs, improvements, and replacements.
- Records of system & material ages (roof, MEP, paving, finishes, and furnishings).
- Any brochures or marketing information.
- Appraisal, either current or previously prepared.
- Current occupancy percentage and typical turnover rate records (for commercial and apartment properties).
- Previous reports pertaining to the physical condition of property.
- ADA survey and status of improvements implemented.
- Current / pending litigation related to property condition.

Allen, Janet

From: Belcher, Kim
Sent: Monday, March 02, 2015 9:19 AM
To: Allen, Janet
Subject: FW: Message from KMBT_C552
Attachments: SKMBT_C55215030209150.pdf

Survey is attached:

From: woodhillhomes@cmha.net [mailto:woodhillhomes@cmha.net]
Sent: Monday, March 02, 2015 8:15 AM
To: Belcher, Kim
Subject: Message from KMBT_C552

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: Ada Worley

Association with property: Site manager

Length of association with property: 8 months

Date Completed: 2/27/15

Phone Number: (916) 231-6432

Property Name: Woodhill Homes

EMG Project Number:

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

	INSPECTIONS	DATE LAST INSPECTED	LIST ANY OUTSTANDING REPAIRS REQUIRED
1	Elevators	2014	None
2	HVAC, Mechanical, Electric, Plumbing	1-15	
3	Life-Safety/Fire		unKnown
4	Roofs		unKnown
	QUESTION		**RESPONSE**
5	List any major capital improvement within the last three years.		NO
6	List any major capital expenditures planned for the next year.		none
7	What is the age of the roof(s)?		?
8	What building systems (HVAC, roof, interior/exterior finishes, paving, etc.) are the responsibilities of the tenant to maintain and replace?		None

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?		✓			
10	Are there any "down" or unusable units?		✓			
11	Are there any problems with erosion, stormwater drainage or areas of paving that do not drain?	✓				Through out
12	Is the property served by a private water well?		✓			
13	Is the property served by a private septic system or other waste treatment systems?		✓			
14	Are there any problems with foundations or structures?					
15	Is there any water infiltration in basements or crawl spaces?	✓				
16	Are there any wall, or window leaks?		✓			
17	Are there any roof leaks?		✓			
18	Is the roofing covered by a warranty or bond?		✓			
19	Are there any poorly insulated areas?	✓				
20	Is Fire Retardant Treated (FRT) plywood used?		✓			
21	Is exterior insulation and finish system (EIFS) or a synthetic stucco finish used?		✓			
22	Are there any problems with the utilities, such as inadequate capacities?		✓			
23	Are there any problems with the landscape irrigation systems?				✓	
24	Has a termite/wood boring insect inspection been performed within the last year?		✓			
25	Do any of the HVAC systems use R-11, 12, or 22 refrigerants?	✓				R12 Community Center

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

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?	✓				
44	Are there any other significant issues/hazards with the property?			✓		
45	Are there any unresolved construction defects at the property?	✓				steps

Ada Wong

Signature of person Interviewed or completing form

2/27/15

Date

On the day of the site visit, provide EMG's Field Observer access to all of the available documents listed below. Provide copies if possible.

INFORMATION REQUIRED

1. All available construction documents (blueprints) for the original construction of the building or for any tenant improvement work or other recent construction work.

2. A site plan, preferably 8 1/2" X 11", which depicts the arrangement of buildings, roads, parking stalls, and other site features.

3. For commercial properties, provide a tenant list which identifies the names of each tenant, vacant tenant units, the floor area of each tenant space, and the gross and net leasable area of the building(s).

4. For apartment properties, provide a summary of the apartment unit types and apartment unit type quantities, including the floor area of each apartment unit as measured in square feet.

5. For hotel or nursing home properties, provide a summary of the room types and room type quantities.

6. Copies of Certificates of Occupancy, building permits, fire or health department inspection reports, elevator inspection certificates, roof or HVAC warranties, or any other similar, relevant documents.

7. The names of the local utility companies which serve the property, including the water, sewer, electric, gas, and phone companies.

8. The company name, phone number, and contact person of all outside vendors who serve the property, such as mechanical contractors, roof contractors, fire sprinkler or fire extinguisher testing contractors, and elevator contractors.

9. A summary of recent (over the last 5 years) capital improvement work which describes the scope of the work and the estimated cost of the improvements. Executed contracts or proposals for improvements. Historical costs for repairs, improvements, and replacements.

10. Records of system and material ages (roof, MEP, paving, finishes, furnishings).

11. Any brochures or marketing information.

12. Appraisal, either current or previously prepared.

13. Current occupancy percentage and typical turnover rate records (for commercial and apartment properties).

14. Previous reports pertaining to the physical condition of property.

15. ADA survey and status of improvements implemented.

16. Current / pending litigation related to property condition.

Your timely compliance with this request is greatly appreciated.

APPENDIX F:
ACRONYMS

ASTM E2018-08 ACRONYMS

ADA - The Americans with Disabilities Act
ASTM - American Society for Testing and Materials
BOMA - Building Owners & Managers Association
BUR - Built-up Roofing
DWV – Drainage, Waste, Ventilation
EIFS - Exterior Insulation and Finish System
EMF – Electro Magnetic Fields
EMS - Energy Management System
EUL - Expected Useful Life
FEMA - Federal Emergency Management Agency
FFHA - Federal Fair Housing Act
FIRMS - Flood Insurance Rate Maps
FRT- Fire Retardant Treated
FOIA - U.S. Freedom of Information Act (5 USC 552 et seq.) and similar state statutes.
FOIL - Freedom of Information Letter
FM - Factory Mutual
HVAC - Heating, Ventilating and Air-conditioning
IAQ - Indoor Air Quality
MEP – Mechanical, Electrical & Plumbing
NFPA - National Fire Protection Association
PNA – Capital Needs Assessment
PCR - Property Condition Report
PML - Probable Maximum Loss
RTU - Rooftop Unit
RUL - Remaining Useful Life
STC – Sound Transmission Class
UBC – Uniform Building Code

APPENDIX G:
GLOSSARY OF TERMS - ENERGY AUDITS

GLOSSARY OF TERMS AND ACRONYMS - ENERGY AUDITS

ECM – Energy Conservation Measures are projects recommended to reduce energy consumption. These can be No/Low cost items implemented as part of routine maintenance or Capital Cost items to be implemented as a capital improvement project.

Initial Investment – The estimated cost of implementing an ECM project. Estimates typically are based on R.S. Means Construction cost data and Industry Standards.

Annual Energy Savings – The reduction in energy consumption attributable to the implementation of a particular ECM. These savings values do not include the interactive effects of other ECMs.

Cost Savings – The expected reduction in utility or energy costs achieved through the corresponding reduction in energy consumption by implementation of an ECM.

Simple Payback Period – The number of years required for the cumulative value of energy or water cost savings less future non-fuel or non-water costs to equal the investment costs of the building energy or water system, without consideration of discount rates.

EUL – Expected Useful Life is the estimated lifespan of a typical piece of equipment based on industry accepted standards.

RUL – Remaining Useful Life is the EUL minus the effective age of the equipment and reflects the estimated number of operating years remaining for the item.

SIR – The savings-to-investment ratio is the ratio of the present value savings to the present value costs of an energy or water conservation measure. The numerator of the ratio is the present value of net savings in energy or water and non-fuel or non-water operation and maintenance costs attributable to the proposed energy or water conservation measure. The denominator of the ratio is the present value of the net increase in investment and replacement costs less salvage value attributable to the proposed energy or water conservation measure. It is recommended that energy-efficiency recommendations be based on a calculated SIR, with larger SIRs receiving a higher priority. A project typically is recommended only if the SIR is greater than or equal to 1.0, unless other factors outweigh the financial benefit.

Life Cycle Cost – The sum of the present values of (a) **I**nvestment costs, less salvage values at the end of the study period; (b) Non-fuel operation and maintenance costs: (c) Replacement costs less salvage costs of replaced building systems; and (d) Energy and/or water costs.

Life Cycle Savings – The sum of the estimated annual cost savings over the EUL of the recommended ECM, expressed in present value dollars.

Building Site Energy Use Intensity – The sum of the total site energy use in thousand of Btu per unit of gross building area. Site energy accounts for all energy consumed at the building location only not the energy consumed during generation and transmission of the energy to the site.

Building Source Energy Use Intensity – The sum of the total source energy use in thousand of Btu per unit of gross building area. Source energy is the energy consumed during generation and transmission in supplying the energy to your site.

Building Cost Intensity – This metric is the sum of all energy use costs in dollars per unit of gross building area.

Greenhouse Gas Emissions – Although there are numerous gases that are classified as contributors to the total for Greenhouse Emissions, the scope of this energy audit focuses on carbon dioxide (CO_2). Carbon dioxide enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement).

APPENDIX H:
ENERGY CONSERVATION MEASURES

UIC	**Install Low Flow Shower Heads**
EAP1	**Details: 2.5 GPM to 1.75 GPM (Up the hill units do not have showers)**

Total Number of Shower Heads To Be Replaced		380	
No. of Shower Days/Year		250	
No. of Residents		1,030	
Estimated Time Per Shower		8.10	Mins
GPM of Existing Shower Head		2.5	GPM
GPM of Proposed Shower Head *	*(Select)*	1.75	GPM

**(Federal Law Requires all new shower heads to have a max flow rate of 2.5 GPM)*

Water & Energy Savings Calculations

Property Location in United States		**Northern Localities**	
Select Type of Water Heater Fuel	*(Select)*	Natural Gas	
Average Hot Water Discharge Temperature		110.00	°F
Annual Water Savings		1,564	kGal
(Assuming 1 shower/day/person for 365 days a year)			
Energy Factor of Domesitc Hot Water Heater:		0.72	EF
Equivalent Heating Fuel Energy savings:		1,266,876	kBtu

Cost Savings Calculations

Equivalent Heating Fuel Savings Natural Gas		12,669	Therms
Water Tariff ($/1000 Gal)	$13.31	$/kGal	
Annual Cost Savings In Form of Water		$20,822	$$
Annual Energy Savings From Water Heater		$79,512	$$
Estimated Total Annual Cost Savings		$100,334	$$

Estimated Installation Costs

Estimated Total Installation Cost	$18,596	$$
Simple Payback Period	0.19	Years
Type of Recommendation	Capital Cost ECM Recommendation	

ECM EXPLANATION:

By reducing the flow of water coming off the shower heads, savings can be generated in the form of reduced water and sewer costs. Additional savings can be realized via reduction in the demand for hot water. Currently Federal law requires all new shower heads to have a maximum flow rate of 2.5 GPM.

EMG recommends replacing the existing shower heads with new low flow shower heads as mentioned above. The proposed ECM shall also result in an annual energy saving in form of reduction in water heating bills.

Summary:

Initial Investment:	$18,596	Simple Payback:	0.19
Annual Cost Savings:	$100,334		

UIC	Install Low Flow Faucet Aerators
EAP2	Details: 2.2 GPM to 1.5 GPM for tenant unit faucets

Property Type:	Residential	Estimated No. of Operational Weeks	52
No. of Occupants	1,401	Number of Occupied Days/Week (Max 7)	7

KITCHEN FAUCETS			BATHROOM FAUCETS		
Do You Want To Replace Kitchen Faucets Aerators	Yes	*(Select)*	Do You Want To Replace Bathroom Faucets Aerators	Yes	*(Select)*
Total Number of Faucet Aerators To Be Replaced	478		Total Number of Faucet Aerators To Be Replaced	483	
Total Number of Faucets To Be Replaced:	0		Total Number of Faucets To Be Replaced:	0	
GPM of Existing Faucet Aerators	2.2	GPM	GPM of Existing Faucet Aerators	2.2	GPM
GPM of Proposed Faucet Aerator	1.5	GPM	GPM of Proposed Faucet Aerator	1.5	GPM
Estimated Number of Uses Per Day	4		Estimated Number of Uses Per Day	6	
Estimated Time Per Faucet Use *8.1 Min/Person/day @AWWA*	0.49	Mins	Estimated Time Per Faucet Use *8.1 Min/Person/day @AWWA*	0.74	Mins
Annual Water Savings From Kitchen Faucets	423.08	kGal	Annual Water Savings From Bathroom Faucets	951.93	kGal

WATER & ENERGY SAVING CALCULATION			COST SAVING CALCULATION		
Select Type of Water Heater Fuel:	Natural Gas	(Select)	Property Location in United States	Northern Localities	
Energy Factor of Domestic Hot Water Heater:	0.75	EF	Heating Fuel Tariff	$6.28	$/Therm
Hot Water Discharge Temperature at Faucet	110.00	°F	Water Tariff ($/1000 Gal)	$13.31	$/kGal
Equivalent Heating Fuel Savings: *Savings Discounted by 15% to Account For Cold Water Use*	9,098	Therms	Annual Cost Savings In Form of Water	$18,302	$
Annual Water Savings	1375.01	kGal	Annual Energy Savings From Water Heater	$57,099	$

COST BENEFIT ANALYSIS				
Estimated Total Annual Cost Savings	$75,401	$$	Estimated Total Installation Cost	$31,652 $$
Simple Payback Period	0.42	Years	*Type of Recommendation*	Capital Cost ECM Recommendation

ECM EXPLANATION:

By reducing the flow of water coming from the restroom faucets, aerators can generate energy savings at low cost and with easy installation. The savings generated would be in the form of reduced water and sewer costs and at the same time aerators would save energy by reducing the demand for hot water. The average faucet has a flow rate of about 2 to 4 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.

EMG recommends replacing the proposed faucet aerators with new low flow aerators as mentioned above. The proposed ECM shall also result in an annual energy saving in form of reduction in water heating bills.

Summary:

Initial Investment: $31,652 Estimated Annual Cost Savings: $75,401 Simple Payback Period (Yrs): 0.42

UIC	**Upgrade Insulation**
EAE3B	**Details: All tenant buildings with pitched roofs**

ENTER EXISTING CONDITION

Property Zone	Surface Under Consideration	Min. R-Value		
Zone-5	**Ceiling/Attic**	R-38	Existing Net Effective R-Value: (Sq.Ft deg F/btu)	21
Source: 2009 IECC For Residential Bldgs		*"-" Not Specified*		
Enter Total Surface Area Under Consideration:		90,000 Sq.Ft	Proposed Net Effective R-Value: (Sq.Ft deg F/btu)	44

ENTER CLIMATIC & SYSTEM DATA

Annual Cooling Degree Days (CDD):	1,001	Estimated Annual Cooling Plant Efficiency (EER):	0.00 EER
Annual Heating Degree Days (HDD):	6,015	Estimated Annual Heating Plant Efficiency: %	72.37 %

WINTER			**SUMMER**		
Select Type of Heating Fuel	**Natural Gas** (Select)		Is the Property Cooled ?	**No** (Select)	
Annual Conduction Losses From Existing Insulation	618,686	kBtu	Annual Conduction Losses From Existing Insulation	102,960	Kbtu
Annual Conduction Losses From Proposed Insulation	295,282	kBtu	Annual Conduction Losses From Proposed Insulation	49,140	kBtu
Savings In Conduction Losses After Adding Insulation	323,404	kBtu	Savings In Conduction Losses After Adding Insulation	0	kBtu
Estimated Total Annual Input Heating Energy Savings	4,469	Therms	Estimated Total Annual Input Cooling Energy Savings	0	kWh
Cost of Heating Fuel/Unit:	$6.28	$/Therm	Cost of Electricity/Unit	$0.11	$/kWh
Annual Heating Cost Savings	28046.9278	$$	Annual Cooling Cost Savings	$0	$$

COST ANALYSIS

Estimated O&M Savings	$0.00	$$	Estimated Cost To Add Insulation/Sqft	$0.53	
Total Estimated Annual Cost Savings	$28,047	$$	Estimated Total Installation Cost	$50,605	$$
Simple Pay Back Period	1.80	Years	*Type of Recommendation*	Capital Cost ECM Recommendation	

UIC	**Replace High Intensity Discharge Lamps With LED**
EAL9-S	**Details: Metal Halide to LED**

	Exterior Site Lighting	*Pole Mounted*						
Existing Lamp & Fixture Type	**Wall Packs-150W**	**Flood Lights:-150W**						
Fixture Mounting Height	21 - 25 ft	21 - 25 ft						
Proposed Replacement Type:	LED	LED	LED	LED	LED	LED	LED	LED
Number of Lamps to Be Replaced :	300	80						
Current Annual Avg Hrs of Operation:	3,650 hrs	3,650 hrs	hrs	hrs	hrs	hrs	hrs	hrs
Proposed Annual Avg. Hours of Operation	3,650 hrs	3,650 hrs	hrs	hrs	hrs	hrs	hrs	hrs
Proposed Replacement:	40Watt	54Watt	-	-	-	-	-	-
Proposed Lighting Control: *(Select)*	Photosensor	Photosensor	Light Switch	Light Switch	Light Switch	Light Switch	Light Switch	Light Switch
No. of Lighting Controls:	150 Qty	40 Qty	0 Qty	0 Qty	0 Qty	0 Qty	0 Qty	0 Qty
Estimated Annual Energy Savings	120,450 kWh	28,032 kWh	0 kWh	0 kWh	0 kWh	0 kWh	0 kWh	0 kWh
Total labor Cost *(Includes Bucket Truck Fees if Applicable)*	$72,630 $$	$19,368 $$	#N/A $$	#N/A $$	#N/A $$	#N/A $$	#N/A $$	#N/A $$
Estimated Material Cost:	$144,960 $$	$49,356 $$	#VALUE! $$	#VALUE! $$	#VALUE! $$	#VALUE! $$	#VALUE! $$	#VALUE! $$
Cost For Retrofit	$217,590 $$	$68,724 $$	$0 $$	$0 $$	$0 $$	$0 $$	$0 $$	$0 $$

Total Initial Investment For Retrofit	$286,314 $	Total kWh Saving	148,482	Electric Rate:	**$0.11** $	Energy Cost Savings:	$16,409 $	
Total O&M Savings:	$22,386 $	Total Cost Savings:	$38,795		Simple Pay back Period	7.38 Yrs		
	Type of Recommendation		Capital Cost ECM Recommendation					

ECM Description:

Exterior and site lighting at the site is currently provided by High Intensity Discharge (HID) lighting. Significant savings can be achieved in terms of energy usage as well as in life-cycle performance terms with more energy efficient lighting technologies like Light Emitting Diodes (LED) and induction lighting. Induction and LED lighting with dimmable controls and no re-strike delay capabilities can be easily tied into a building management controls and/or photo-sensor controls to reduce light output and energy consumption. Apply that over ten years plus reduced replacement costs compared to HID lamps and it makes sense to go with LED/induction lighting.

The LED lights are rated 100,000hrs after which the illumination levels drop below 70%. LED's are gaining more popularity and acceptance over the time and are considered ideal replacement for parking and street lightings along with site illumination lights. The new LED lights consume less than a third of the power as consumed by the HID and last up to five times longer, in addition to this the LED's can be easily dimmed as per the requirement.

SUMMARY;

Initial Investment: $286,314 Annual Cost Savings: $38,795 Simple Payback Period: 7.38 Yrs

UIC	Replace Existing Linear Fluorescent Lamps
EAL2-S	Details: Fluorescent to LED

Existing Lighting System

	Tenant Kitchen	Community Building OfficeLevel	Boiler Rooms	Old Admin Building	Walk up building basements	Community Building Common Areas	Stairwell- BiLevel Lighting
Current Type of Lamp: *(Select)*	F42T8	F42T8	F42T8	F42T8	F42T8	F42T8	F42T8
Current Annual Avg Hrs of Operation:	1,278 hrs	2,080 hrs	200 hrs	2,080 hrs	200 hrs	2,080 hrs	8,760 hrs
Existing Number of Fixtures:	328	30	12	60	40	80	144

Proposed Lighting System

Proposed Lamp Replacement: *(Select)*	F42LED	F42LED	F42LED	F42LED	F42LED	F42LED	F42LED
Proposed Annual Avg. Hours of Operation	1,278 hrs	2,080 hrs	200 hrs	2,080 hrs	200 hrs	2,080 hrs	2,190 hrs
Proposed Number of Fixtures:	328	30	12	60	40	80	144
Proposed Lighting Control: *(Select)*	Light Switch	Wall Mounted Occupancy Sensor	Wall Mounted Occupancy Sensor	Wall Mounted Occupancy Sensor	Ceiling Mounted Occupancy Sensor	Ceiling Mounted Occupancy Sensor	Wall Mounted Occupancy Sensor
No. of Lighting Controls:	0 Qty	10 Qty	6 Qty	10 Qty	20 Qty	20 Qty	60 Qty

Energy Saving Calculation

Estimated Annual Energy Savings	10060.42 kWh	1497.60 kWh	57.60 kWh	2995.20 kWh	192.00 kWh	3993.60 kWh	63387.36 kWh
Are The Ballast's Being Replaced: *(Select)*	No	Yes	Yes	Yes	Yes	Yes	No
Estimated Material Cost:	$15,731 $$	$3,039 $$	$1,326 $$	$5,528 $$	$6,018 $$	$9,337 $$	$31,680 $$
Estimated Labor Cost:	$2,613 $$	$1,997 $$	$958 $$	$3,197 $$	$3,193 $$	$4,793 $$	$5,735 $$

Estimated Total Material Cost:	$72,658 $$	Estimated Total Labor Cost:	$23,854	Total kWh Saving		82,184 kWh
Electric Rate:	$0.11 $$	**Total Initial Investment For Retrofit**	$96,512	Estimated Annual O&M Cost Savings		$2,506
				Estimated Annual Cost Savings		$11,588
Simple Pay back Period	8.33 Yrs	*Type of Recommendation*	**Capital Cost ECM Recommendation**			

ECM DESCRIPTION:

Fluorescent lighting is recommended for areas where color sensitivity is an important criterion (e.g., offices or small parts assembly rooms). Fluorescent tubes are currently available that produce a higher light output (more lumens per watt) than standard fluorescent tubes. There are efficient 40-watt lamps that produce 8% to 10% more light than standard lamps. The 34-watt fluorescent tubes use 15% less power than standard lamps, while producing about 8% less light. Since the human eye responds to light exponen-tially, rather than linearly, the difference is often unnoticeable. "T8" fluorescent lamps use only 32 watts, but existing fixtures must be replaced. Therefore, EMG recommends retrofitting all the existing fixtures with new 17.5W LED Tube lamps. The LED tubes provide a 180 degree light dispersal, and can be retrofitted in the existing ligt fixture. The LED tubes are rated at 50,000 hrs as compared to 20,000 to 30,000 hrs ratings for conventional fluorescent lamps.

It is important to replace all lamps when re-lamping a fluorescent fixture, never mix energy-efficient and standard lamps with the same ballast. Ensure that the fluorescent ballast is compatible with the energy-efficient lamps. It must be noted that when switching from T-12 magnetic ballast to T8 lamps, the ballasts should be replaced with instant start electrical ballast. Also it should be noted that when installing an occupancy sensor/motion sensor, rapid start electronic ballast should be used.

SUMMARY:

Initial Investment:	$72,658	Simple Payback:	8.33	Years
Annual Cost Savings:	$11,588			

UIC	Replace Existing Motors With High Efficiency Motors
EAM1	Details: All central boiler system motors for the tenant buildings

Enter The Number of Existing Motors	24	
Enter Horse Power of Existing Motor:	7.5	hp
Enter Existing Annual Hours of Operation:	2,562	Hrs
Enter Existing Name Plate Efficiency:	80.0%	
Type of Current Supplied	Three Phase Current	
Enter The Number of Proposed Motors	24	
Enter Horse Power of Proposed Motor:	7.5	hp
Enter Proposed Annual Hours of Operation:	2,562	Hrs
No. of Poles of the Proposed Motor:	**4 Pole (1800 RPM)**	
Select Type of Motor:	**Totally Enclosed Fan Cooled**	
Enter NEMA Premium Efficiency of Proposed Motor :	92.4%	
Peak kW savings with Premium Motor:	11.07	kW
Annual kWh Savings From All Premium Motors:	28355	kWh
Electricity Cost/kWh:	**$0.11**	per kWh
Estimated Annual Cost Savings From Energy:	$3,134	$$
Estimated Annual O &M Savings:	$157	$$
Estimated annual cost savings:	$3,290	$$
Estimated cost to replace *one* motor w/Premium motor: *(Material And Installation Cost)*	$1,264	$$
Total Replacement Cost	$32,193	$$
Simple Payback:	9.78	Yrs
Type of Recommendation	Capital Cost ECM Recommendation	

ECM DESCRIPTION:

High-efficiency motors will perform the same function as standard motors, but will improve efficiency by reducing losses in the conversion of electrical to mechanical energy. For example, magnetic losses are reduced by using thinner, higher quality steel lamination in the stator and rotor core. The air gap between rotor and stator is minimized by manufacturing to higher tolerances. More copper is used in the stator windings to reduce resistive losses. On motors with fans, smaller and more efficient fans are used.

The best applications are generally those in which the motor operates at least eight hours or more per day (NCEL 1983a). In some cases, the savings in electrical energy consumption justifies immediate replacement. However, high-efficiency motors are not cost-effective when their premium cost cannot be recovered during the normal life of the motor because of limited hours of operation.

Summary:

Initial Investment:	$32,193	Simple Payback:	9.78 Yrs
Energy Cost Savings:	$3,290		

UIC	Replace External Windows
EAE2	Details: All tenant building windows

ENTER EXISTING CONDITIONS

Existing and Proposed Window Properties

Total Sq.Ft window area:	34,640	sq.ft
Approximate number of windows:	4330	
Total existing window area:	34,640	Sq.Ft
Select The Existing Window Type	Wooden Frame & Double Glazing	*(Select)*
Existing U-value of window: (1/R)	0.49	Btu/ ft²·°F·h
ASHRAE Climatic Zone	Zone-5	
New U-value with Double pane Low E window: (1/R)	0.31	Btu/ ft²·°F·h
AHRAE 90.1 Recommended Value		

Existing & Proposed Air Leakage Through Windows

Insert Existing Estimated Air Change Rate/Hr (ACH 1):	1.30	
(Existing Air Changes Per Hour, 3 is very leaky and 0.35 ideal)		
Insert Proposed Estimated Air Change Rate/Hr (ACH 2):	0.70	
Estimated Space Volume Under Consideration	1,800,000.00	Cu. Ft
Is the Property Cooled ?	No	*(Select)*

WINTER

Select Type of Heating Fuel	Natural Gas	*(Select)*
Net heating plant & distribution system efficiency:	72.37	%
Annual Heating Hours:	6,015	HDD
Estimated Total Annual Input Heating Energy Savings By Replacing Windows	124.38	Therms
Estimated Total Annual Input Heating Energy Savings Achieved By Controlling Air Leakage Through Windows	38,778	Therms
Estimated Total Input Heating Fuel Savings From Replacing Windows	38,902	Therms

SUMMER

Select Type of Cooling Fuel:	Electric	*(Default)*
Cooling Plant Efficiency **(EER)**:		EER
Annual Cooling Hours:	1,001	CDD
Annual Total Input Cooling Fuel Savings During Summer Season By Replacing Windows	#DIV/0!	kWh
Estimated Total Annual Input Cooling Energy Savings Achieved By Controlling Air Leakage Through Windows	0	kWh
Estimated Total Input Cooling Fuel Savings From Replacing Windows	0	kWh

ENERGY & COST ANALYSIS

Insert Cost of Heating Fuel:	$6.28	$/Therm	Annual Heating Cost Savings:	$244,159.66	$$
Insert Cost of Cooling Fuel:	$0.11	$/kWh	Annual Cooling Cost Savings:	$0.00	$$
Total Annual Cost Savings	$245,380		Total Annual Cost Savings From Heating & Cooling:	$244,160	$$
Cost of window upgrade:	$2,526,533		Estimated Annual O&M Savings	$1,221	$
Simple payback:	10.30	**Yrs**	*Type of Recommendation*	Capital Cost ECM Recommendation	

ECM DESCRIPTION:

Windows play a major role in the energy use and comfort of an interior space. In the winter, heat in a room is lost when cold outside air infiltrates around the edges of windows. Heat also can be lost by conduction directly through the pane, even if the window fits tightly. Windows with insulated panes, such as those filled with Argon address this issue, while proper caulking and sealant address the infiltration issue. The cold drafts and the chilly windowpane make the room uncomfortable. Windows also can help to heat a room by letting the sun's rays enter. While this solar radiation is beneficial in the winter, it can be a major source of discomfort in hot, summer climates. Energy Star rated windows with Low-E glazing are designed to keep the solar heat gain minimized during the summer months. Choosing a replacement window that fits properly has the desired U-value, and proper glazing characteristics is critical to energy conservation through window upgrades.

Summary:

Initial Investment:	$2,526,533	Simple Payback	10.30 Yrs
Annual Energy Cost Savings:	$245,380		

UIC	Replace Existing Water Heater With New Energy Efficient Units				
EAD3	**Details: Replace water heater in the 3 story walk up units**				
Step 1	**Existing Water Heater Details**	*3 Story walk up unit*			
	Number of Water Heaters Being Replaced:	150			0
	Select Existing Hot Water Heater Fuel	Natural Gas	Natural Gas	Natural Gas	Natural Gas
	Insert Energy Factor of Existing Water Heater	0.51 EF	EF	EF	EF
	Input Existing Water Heater Input Rating	40.00 kBtus	kBtus	kBtus	kBtus
	Select One Method For Calculation	Annual Heating Hours	Annual Heating Hours	Annual Heating Hours	Annual Heating Hours
	Insert Average Annual Hours of Operation	157 hrs	Therms	Therms	Therms
	Annual Water Heater Energy Consumption/Heater	63 Therms	0 Therms	0 Therms	0 Therms
	Total Estimated Annual Energy Consumption For all Heaters	9,420 hrs	0 Therms	0 Therms	0 Therms
	Total Estimated Annual Operating Energy Costs For all Heaters	$59,122 $	$0 $	$0 $	$0 $
Step 2	**Proposed New Water Heater**				
	Proposed Hot Water Heater Fuel	Natural Gas	Natural Gas	Natural Gas	Natural Gas
	Capacity of the Proposed New Water Heater	40-Gal,40-kBtu			
	Energy Factor of Proposed Water Heater	0.70 EF	0.00 EF	0.00 EF	0.00 EF
	Proposed Water Heater Input Rating	40.00 kBtuh	0.00 kBtuh	0.00 kBtuh	0.00 kBtuh
	Annual kBtuh Consumption For All The Proposed Water Heaters	686,314 kBtuh	#DIV/0! kBtuh	#DIV/0! kBtuh	#DIV/0! kBtuh
	Estimated Annual Water Heater Fuel Consumption (All Heaters)	6,863 Therms	0 Therms	0 Therms	0 Therms
	Estimated Total Annual Energy Costs	$43,075 $	$0	$0	$0
Step 3	**Energy & Cost Saving Calculation**				
	Estimated Cost of New Water Heater/Unit	$1,160 $	$0 $	$0 $	$0 $
	Total Estimated Installation Cost	$174,001 $	$1 $	$1 $	$1 $
	Total Estimated Annual Cost Savings	$16,047 $	$0 $	$0 $	$0 $
	Total Annual Cost Savings:	$16,047	Total Initial Investment::	$174,004	
	Simple Pay Back Period	10.84			
	Type of Recommendation	Capital Cost ECM Recommendation			

ECM SUMMARY:

Electric resistance is the most expensive method for heating domestic hot water. A natural gas or propane fired water system provide more units of heat with direct burning of fuel while high wattage draw is required for electric water heaters to create resistance heat. This electric usage can be seen with the increase power demand for the site and the additional kWh consumption. The installation process of the gas/propane fired water heater requires additional measures with tying a gas line or fuel tank to the system along with installing an exhaust gas vent. This process is not a costly retrofit if a current gas line or tank is at the site. The hot water exhaust duct can be tied to the existing gas fired furnaces or boilers for an easy retrofit.

SUMMARY:

Initial Investment: $174,001 Simple Payback: 10.84 yrs
Annual Cost Savings: $16,047

UIC	Add Reflective Coating To Exterior Windows
EAE1	Details: All tenant building windows

ENTER EXISTING CONDITIONS

Total Sq.Ft window area:	34,640	sq.ft	Select The Existing Window Type:	Wooden Frame & Double Glazing	(Select)
Approximate number of windows:	4330		Existing U-value of window: (1/R)	0.49	Btu/ ft²·°F·h
ASHRAE Climatic Zone	Zone-5		New U-value with Double pane Low E window: (1/R)	0.42	Btu/ ft²·°F·h
Select Type of Heating Fuel	Natural Gas	(Select)	Is the Property Cooled ?	No	(Select)

WINTER			SUMMER		
Net heating plant & distribution system efficiency:	72.37	%	Cooling Plant Efficiency (EER):	0.00	EER
Annual Heating Degree Days (HDD):	6,015		Annual Cooling Degree Days (CDD):	1,001	
Heat loss through Existing Window/ Yr :	2,450,309	kBtu/Yr	Energy Loss Through Existing Single Pane Window/Yr	407,774	kBtu/Yr
Estimated Heat Loss With New Windows:	2,100,265	kBtu/Yr	Estimated Energy Loss With New Windows:	349,520	kBtu/Yr
Annual Heat Loss Reduction:	350,044	kBtu/Yr	Annual Energy Loss Reduction:	58,253	kBtu/Yr
Estimated Total Annual Input Heating Energy Savings	4,837	Therms	Annual Cooling Fuel Savings During Summer Season	0	Kwh

ENERGY & COST ANALYSIS

Insert Cost of Heating Fuel:	$6.28	$/Therm	Annual Heating Cost Savings:	$30,357.28	$
Insert Cost of Cooling Fuel:	$0.11	$/kWh	Annual Cooling Cost Savings:	$0.00	$
Estimated Annual O&M Savings	$911	$	Total Annual Cost Savings From Heating & Cooling:	$30,357	$
Total Annual cost savings:	**$31,268**	**$**			
			Cost For Up-grading Windows	$329,080	
Cost of window upgrade:	$349,121		**Total project cost:**	$329,080	
Simple payback:	11.17	**years**	*Type of Recommendation*	Capital Cost ECM Recommendation	

ECM DESCRIPTION:

When the existing windows are not justified for complete replacement retrofit due to financial, functional, historical building restrictions or aesthetic reasons, higher performance low-emissivity (low E) and reflective coating films can improve the performance of the windows for a lower cost and reduce the desired heating or cooling load. Low-emissivity (Low-E) coatings on glazing or glass control the heat transfer through a double paned or higher glazing window. A Low-E coating is a microscopically thin, virtually invisible, metallic oxide layer deposited directly on one or more panes of glass. Different types of Low-E coatings have been designed to allow for high solar gain, moderate solar gain, or low solar gain. A high solar gain coating is applied to reduce heat conduction and intended for cold climates. To keep the heat inside, the Low-E coating should be applied to the inside pane of glass. A low solar gain coating is used for hot climates and designed to reduce solar heat gain by blocking admission of the infrared portion of the sunlight spectrum. To keep the sun's heat out, the Low-E coating should be applied to the outside pane of glass. Tinted and reflective films can also be used on single paned and multi-paned windows to reduce solar heat gain to reduce the cooling load for hotter climates.

Summary:

Initial Investment:	$349,121	Simple Payback Period:	11.17 Yrs
Annual Energy Cost Savings:	$31,268		

UIC	**Install Low Flow Restroom Flush Tank Toilets**
EAP3	**Details: All tenant unit bathrooms**

EXISTING CONDITION

Total Occupants:	1401	
Number of Water Closets To Be Replaced	483	
Number of Occupied Days Per Week (Max 7)	7	
Number of Occupied Weeks/Year (Max 52)	52	
Estimated Restroom Usage/Individual/Day *5.05 flushes/person/day@American Water Works Association (AWWA)*	5	(Select)

PROPOSED RETROFIT/REPLACEMENT

Water Closets With External Flush Tanks

Existing Gallons Per Flush Ratings For Water Closet Flushes	1.60	GPF
GPF of Proposed New Low Flow Water Closet Fixture*	0.8	GPF

**(Federal Law Requires All Flushes Not To Exceed 1.6 GPF)*

Water & Cost Saving Calculations

Water Savings By The Use of Low Flow Water Closet Flush Valves/Day	5604.00	gal
Total Annual Water Savings in gallons	2039.86	kgal
Cost Savings Calculations		
Enter Water Tariff Rate ($/1000Gal)	$13.31	$$
Estimated Cost Savings From Water	$27,152	$$
Estimated Cost of Retrofit		
Estimated Total Cost For Retrofit** ***$549/WC replacement*	$332,557	$$
Simple Pay Back Period	12.25	Yrs

Type of Recommendation — Capital Cost ECM Recommendation

ECM EXPLANATION:

The highest water utilization at any home/office occurs in the restrooms. It is estimated that on an average a normal human being uses the restroom at least four times a day. Keeping with the global water conservation objectives, federal law prohibits use of any new water closet flushes over 1.6 GPF.

Existing toilets can be retrofitted with pressure-assisted flush technology to reduce the flush rate to 1.0 GPF or less. Though water efficient these toilets make considerable amount of noise as this involves release of pressurized air during the course of flushing. Thus making them unpopular among residential properties.

Thus EMG recommends replacing the existing high flow toilets with new low flow 1.28GPF rated flush tank toilets, which are comparatively more water efficient at the same time considerably quiter as compared to the pressure assisted technology retrofitted toilets.

Summary:

Initial Investment: $332,557

Simple Payback: 12.25 Years

Annual Cost Savings: $27,152

UIC	Replace Inefficient Heating Plant
EAH1A-2	**Details:** Replace all 6 central domestic water boilers for the tenant buildings

Existing System

Select Type of Heating Fuel	Natural Gas	Existing Boiler Type:	Cast Iron
No. of Heating Units To Be Replaced:		6	Qty
Rated Heating Capacity of Each Existing Boilers:		251-500 MBH	
Estimated Actual Heating Fuel Used For Heating:		4,765	Therms
Existing Average Annual Heating Plant Efficiency:		72%	%
Cost For Demolition of Existing Heating System:		$7,373	

Proposed Heating System

Proposed Heating Fuel	Natural Gas	Proposed Boiler Type:	Condensing Boiler	
	MBH	Qty	Total No. of New Boilers	
Proposed Boiler Type-1	320	6	6	Qty
Proposed Boiler Type-2	0	0		
Proposed Boiler Type-3	0	0		
Proposed Heating Plant Efficiency:			95%	%
Estimated Fuel Consumption With Improved Efficiency:			3,611	Therms

Financial Analysis

Existing Annual Heating Cost:	$29,906	Proposed Annual Heating Cost:	$22,666	$
Annual Energy Cost Savings	$7,240	Estimated Annual O&M Savings:	$362	$
Total Annual Cost Savings:	$7,602	$		
Cost of Type-1 New Boilers (Material + Installation):			$96,684	$
Cost of Type-2 New Boilers (Material + Installation):			$0	$
Cost of Type-3 New Boilers (Material + Installation):			$0	$
Total For Material +Installation+Demolition:			**$104,057**	$
Estimated Engineering and Architecture Fees:			$5,827	$
Install New Gas Line & Gas Meter?	No			
Estimated Cost For Installing New Gas Line & Gas Meter :			$0	$
(The Above Cost is the cost for gas pipeline from gas meter to heating plant only ie. within the property)				
Estimated Cost For Extending Gas Pipeline To The Property:			$0	$
Estimated Total Cost For Replacing All Heating Plants:			$109,884	$
Simple Payback:			14.45	years
Type of Recommendation	Capital Cost ECM Recommendation			

ECM DESCRIPTION

Standard boilers on the market generally attain operating efficiencies around 80% (Output MBH / Input MBH). The operating efficiencies for condensing boilers are above 90% and reduce the energy requirements for heating significantly. Condensing boilers utilize the latent heat of condensing exhaust gasses to extract additional heat from the input fuel, thus achieving a significantly higher operating efficiency. Additionally, many condensing boilers have the ability to modulate the input rate to meet a reduced heating demand, which boiler cycling on days of moderate temperature. . A properly-sized modulating condensing boiler will reduce the input energy required for heating and will provide ability for the boiler to turn-down the firing rate during periods of reduced heating load, further conserving heating energy. Sizing analysis and design for replacement by a local professional engineer is recommended prior to replacement of the heating equipment. This step will ensure that the new boilers are properly sized and configured to meet the building hot water demands and operate in the most efficient manner. In addition to reducing the energy consumption, the increased efficiency may also allow for a decrease in the required input capacity.

SUMMARY:

Initial Investment: $109,884 Simple Payback: 14.45 Yrs

Energy Cost Savings: $22,666

UIC	Replace CFL to LED
EAL1B-S	Details: CFL to LED in tenant units

	Living Room	Kitchen 3 story walk up	Bathroom	Bedroom			
Current Type of Lamps in the Fixtures:	CFL18	CFL18	CFL18	CFL18	-	-	-
Number of Lamps to Be Replaced :	956	300	1,434	1,836	0	0	0
Current Annual Usage:	1,278 hrs	1,278 hrs	730 hrs	913 hrs	0 hrs	0 hrs	0 hrs
Proposed Measure	Replace Lamps With LED Equivalent	Replace Lamps With LED Equivalent	Replace Fixtues With Flush Mount LED Fixture	Replace Lamps With LED Equivalent	-	-	-
Replacement Qty- Lamps / Fixtures:	475	150	478	918	0	0	0
Proposed Annual Avg. Hours of Operation	1,278 hrs	1,275 hrs	730 hrs	913 hrs	0 hrs	0 hrs	0 hrs
Proposed Replacement:	LED11	LED11	LED17	LED11	-	-	-
Estimated Annual Energy Savings	15,314 kWh	4,797 kWh	12,911 kWh	20,953 kWh	0 kWh	0 kWh	0 kWh
Total labor Cost For Retrofit	$2,007	$634	$20,196	$3,879	$0	$0	$0
Estimated Cost Per Lamp/Fixture	$13.75	$13.75	$80.00	$13.75	$0.00	$0.00	$0.00
Cost For Retrofit	$8,538	$2,696	$58,436	$16,501	$0	$0	$0

Total Initial Investment For Retrofit	$91,419	Total kWh Saving	53,976 kWh	Total O&M Savings/Yr	$6,373
Electric Rate	**$0.11**	Estimated Annual Cost Savings	$12,338	Simple Pay back Period	7.41 Yrs

Type of Recommendation — Capital Cost ECM Recommendation

ECM DESCRIPTION:

The existing incandescent lamps can be replaced with screw-in compact fluorescent lamps. The result of the replacement is a direct energy savings up to 60%. In case of the incandescent lamps approximately 80% of the energy consumed by it is lost in the form of heat radiated by them when lit where as only 20% is actually converted into light. In addition to this the commercially available incandescent lamp have an annual life expectancy of 5000 hrs, whereas a CFL can last for nearly 10,000-12,000 hrs, which is more than twice the life expectancy of the incandescent lamps. Not all, screw-in fluorescent lamps are generally compatible with dimmers.

EMG recommends replacing all the existing lamps with new LED/CFL's or replace the entire fixture with new LED fixture.

SUMMARY;

Initial Investment: $91,419 Simple Payback Period: 7.41 yrs

Annual Cost Savings: $12,338

UIC	Replace Existing Freezers With High Efficiency Freezers
EAA2	Details: In the common area kitchen

Number of Freezers To Be Replaced	1 Qty	
Details of Existing Freezers:	2001-2008 Chest Freezer 18.5-18.9 CuFt 590 kWh/Yr	
Estimated Annual Energy Consumption of The Existing Freezer:	590	kWh/Yr
Proposed New Freezers	2010 -2012 Chest Freezer 14-18 CuFt 361 kWh/Yr	
Estimated Annual Energy Consumption of The Proposed Freezer:	361	kWh/Yr
Annual Kwh Savings Per Unit (Kwh/year)	229	kWh
Total Annual Kwh Savings (Kwh/year)	229	kWh
Current Electrical Tariff ($/Kwh)	$0.11	$/kWh
Annual Cost Savings From All Freezers ($$)	$25	$$

Total Installation Cost Including, Eco Friendly Disposal Of Existing Freezers ($$)

No. of Units	Disposal Tax	Unit Cost	Total Cost	
1	$50.00	$461	$542	$$

Simple Return on Investment: 21.42 Yrs

Note- *Average Life of a Freezer is 15 Years*

Type of Recommendation: Capital Cost ECM Recommendation

UIC	**Replace Existing Refrigerator(s) With Energy Star Certified Refrigerator(s)**
EAA1	**Details: Replace all tenant and community building refrigerators**

Number of Refrigerators To Be Replaced	481 Qty	
Details of Existing Refrigerator:	2001-2008 Top Freezer 18.5-18.9 CuFt-632.5 kWh	
Estimated Annual Energy Consumption By The Existing Refrigerator:	633	kWh/Year
Proposed New Refrigerator:	2010 -2012 Top Freezer 16.0-19.5 CuFt-382 kWh/Yr	
Estimated Proposed Annual Energy Consumption of The New Refrigerator:	382	kWh/Year
Annual Kwh Savings Per Unit (Kwh/year)	251	kWh
Total Annual Kwh Savings (Kwh/year)	120,491	kWh
Current Electrical Tariff ($/Kwh)	$0.11	$/kWh
Annual Cost Savings From All Refrigerators ($$)	$13,316	$$

Total Installation Cost Including, Eco Friendly Disposal Of Existing Refrigerator ($$)

481	$50	$561	$311,789 $$
No. of Units	Disposal Tax	Unit Cost	Total Cost

Simple Return on Investment: 23.42 Yrs

Note- *Average Life of a Refrigerator is 15 Years*

Type of Recommendation: Capital Cost ECM Recommendation

ECM DESCRIPTION:

One of the highest 'silent' energy consuming devices in any home/office is the refrigerator, which runs all year long. Having a low energy consuming refrigerator thus results in a considerable reduction in the annual energy costs. On an average a useful life of any refrigerator is approximately 19 years and hence EMG recommends replacing the current refrigerator at the end of its useful life with a new energy star certified low energy consuming refrigerator.

EMG strongly recommends replacing the existing older non energy star refrigerators with new energy efficient Energy Star Certified refrigerators of the appropriate type.

The expected useful life of new refrigerators is approximately 15 years.

Summary:

Initial Investment:	$311,789	Simple Payback:	23.42	Yrs
Annual Cost Savings:	$13,316			

UIC	Replace Inefficient Heating Plant
EAH1A	**Details:** Replace all 12 central boilers for the tenant buildings

Existing System

Select Type of Heating Fuel	Natural Gas	Existing Boiler Type:	Cast Iron
No. of Heating Units To Be Replaced:		12	Qty
Rated Heating Capacity of Each Existing Boilers:		2001 - 2500 MBH	
Estimated Actual Heating Fuel Used For Heating:		19,410	Therms
Existing Average Annual Heating Plant Efficiency:		72%	%
Cost For Demolition of Existing Heating System:		$45,466	

Proposed Heating System

Proposed Heating Fuel	Natural Gas	Proposed Boiler Type:	Condensing Boiler

	MBH	Qty	Total No. of New Boilers
Proposed Boiler Type-1	1,000	24	24 Qty
Proposed Boiler Type-2	0	0	
Proposed Boiler Type-3	0	0	

Proposed Heating Plant Efficiency:	95%	%
Estimated Fuel Consumption With Improved Efficiency:	14,711	Therms

Financial Analysis

Existing Annual Heating Cost:	$121,822	Proposed Annual Heating Cost:	$92,328 $
Annual Energy Cost Savings	$29,494	Estimated Annual O&M Savings:	$885 $
Total Annual Cost Savings:	$30,378 $		

Cost of Type-1 New Boilers (Material + Installation):	$802,500	$
Cost of Type-2 New Boilers (Material + Installation):	$0	$
Cost of Type-3 New Boilers (Material + Installation):	$0	$
Total For Material +Installation+Demolition:	**$847,966**	$
Estimated Engineering and Architecture Fees:	$40,702	$

Install New Gas Line & Gas Meter?	No	
Estimated Cost For Installing New Gas Line & Gas Meter :	$0	$

(The Above Cost is the cost for gas pipeline from gas meter to heating plant only ie. within the property)

Estimated Cost For Extending Gas Pipeline To The Property:	$20,000	$
Estimated Total Cost For Replacing All Heating Plants:	$908,668	$
Simple Payback:	29.91	years

Type of Recommendation — Capital Cost ECM Recommendation

ECM DESCRIPTION

Standard boilers on the market generally attain operating efficiencies around 80% (Output MBH / Input MBH). The operating efficiencies for condensing boilers are above 90% and reduce the energy requirements for heating significantly. Condensing boilers utilize the latent heat of condensing exhaust gasses to extract additional heat from the input fuel, thus achieving a significantly higher operating efficiency. Additionally, many condensing boilers have the ability to modulate the input rate to meet a reduced heating demand, which boiler cycling on days of moderate temperature. . A properly-sized modulating condensing boiler will reduce the input energy required for heating and will provide ability for the boiler to turn-down the firing rate during periods of reduced heating load, further conserving heating energy. Sizing analysis and design for replacement by a local professional engineer is recommended prior to replacement of the heating equipment. This step will ensure that the new boilers are properly sized and configured to meet the building hot water demands and operate in the most efficient manner. In addition to reducing the energy consumption, the increased efficiency may also allow for a decrease in the required input capacity.

SUMMARY:

Initial Investment: $908,668 Simple Payback: 29.91 Yrs

Energy Cost Savings: $92,328

UIC	Install Thermostatic Radiator Valve (TRV) controls for Hot Water Radiators
EAC2	Details: All tenant unit radiators

Select Type of Heating Fuel	Natural Gas (Select)	
Estimated/Actual Usage of Heating Fuel:	32,004	Therms
Existing Heat Distribution Efficiency:	70%	
New Distribution efficiency with TRVs	78%	
Estimated new heating fuel consumption with new TRV:	28,722	Therms
Estimated annual heating fuel savings:	3,282	Therms
Annual average cost/unit of heating fuel:	$6.28	$/Therm
Estimated annual cost savings:	$20,601	$$
Number of TRVs to be installed:	2352	
Estimated cost to install all TRVs:	$623,809	$$
Simple payback:	30.28	years
Type of Recommendation	Capital Cost ECM Recommendation	

ECM DESCRIPTION:

A Thermostatic Radiator Valve (TRV) is a self regulating control device for hot water heating and steam (also known as air vent valves) systems consisting of hot water baseboard heaters/ radiators. A TRV consists of two parts: a valve that opens or closes to control the hot water flow and a sensor that controls the opening of the valve. The sensor contains an actuator with a sensing substance, which adjusts the valve opening based on the temperature in the room and via a physical connection between the actuator-spindle and the valve-spindle/cone. TRVs control the temperature in the room based on an individually set temperature. TRVs also come in different motorized and electronic actuator design and can also work together with outdoor temperature controls, supply flow temperature controls, pressure controls and time set-back devices.

TRVs help to control the flow of hot water/steam in the heating system that is used throughout the spaces. By controlling the fluid flow in response to the actual heating demand, energy costs can be reduced by limiting the amount of steam or hot water being un-necessarily being produced. TRVs help to improve temperature control in individual spaces by relating the desired space temperature to the flow required in the radiator unit. This efficient control method reduces overheating of the space and modulates the demand for steam. The result is better distribution of hot water/steam throughout the building, which reduces energy consumption related to space heating.

SUMMARY

Initial Investment	$623,809	Simple Payback:	30.28
Annual Energy Cost Savings:	$20,601		

UIC	Replace Existing Dishwashers With High Efficiency Dishwashers
EAA3	Details: Community building

Number of Dishwashers To Be Replaced: 2 Qty

Enter Estimated Loads/ Week / Washer: 1 Qty

Existing

Select Type of Existing Model: Typical 2000 Model (Select)

Estimated Annual kWh Consumption / Unit: 62 (Kwh)

Estimated Annual Hot Water Consumption/ Unit: 442 (Gal)

Proposed Energy Star Qualified Dishwasher

Estimated Annual kWh Consumption of Proposed Machine: 33 (Kwh)

Estimated Annual Hot Water Consumption of Proposed Machine: 260 (Gal)

Energy, Water & Cost Saving

Water Savings

Annual Hot Water Savings Per Unit: 182 Gal

Total Annual Hot Water Savings: 0.36 Kgal

Current Water Tariff: $13.31 $/Kgal

Total Annual Water Cost Savings: $4.85 $$

Energy Savings

Annual Kwh Savings Per Unit: 29 kWh

Total Annual Kwh Savings: 58 kWh

Current Electrical Tariff: **$0.11** $/kWh

Total Annual Electric Cost Savings: $6.41 $$

Hot Water Based Energy Savings

Select Type of Hot Water Heating Fuel: Natural Gas

Energy Factor of DWH: 0.54 EF

Cost of Heating Fuel ($$/Unit): $6.28 $/Therm

Hot Water Supply Temperature *(140F in Most Cases)*: 125.00 F

Energy Savings From Hot Water: 345 kBtu

Energy Savings From Hot Water: 3 Therms

Total Cost Savings From Hot Water: $22 $$

COST ANALYSIS

Total Annual Cost Savings: $33 $$

Total Installation Cost Including, Eco Friendly Disposal Of Existing Dishwashers ($$)

No. of Units	Disposal Tax	Unit Cost	Total Cost
2	$50.00	$450	$1,061 $$

Simple Return on Investment: 32.22 Yrs

Note- *Average Life of a Dishwasher is 10-15 Years*

Type of Recommendation: Capital Cost ECM Recommendation

ECM DESCRIPTION:

A dishwasher built before 1994 wastes more than 10 gallons of water per cycle. A new, energy star qualified dishwasher will save, on average, 1,300 gallons of water over its lifetime. New dishwasher models consume 4.25 gallons per cycle for compact sized dishwashers for capacities of lower than 8 place settings and six serving piece and 5.8 gallons per cycle for standard sized dishwashers of higher capacity. Newer models also contain wash cycle options that provide the option of using less water with a shorter cycle for slightly soiled place settings and serving pieces. Water consumption can also be greatly reduced if dishes are scraped off and not rinsed before loading into dishwasher, dishwashers and detergents are designed to do the complete cleaning. Energy star qualified dishwashers are 10% more efficient than non-qualified models and are more efficient than models that simply meet the federal minimum standard for energy efficiency

Summary:

Initial Investment: $1,061

Simple Payback: 32.22

Annual Cost Savings: $33