



VILLAGE OF DOBBS FERRY BOARD OF TRUSTEES AGENDA

MEETING DATE: JUNE 14, 2022
AGENDA ITEM SECTION: PRESENTATIONS
AGENDA ITEM NO. : 1
DEPARTMENT: VILLAGE ADMINISTRATOR
AGENDA ITEM: HONEYWELL PRESENTATION; AND <u>RESOLUTION:</u> AUTHORIZING THE VILLAGE ADMINISTRATOR TO ENTER INTO AN ENERGY PERFORMANCE CONTRACT WITH HONEYWELL
ITEM BACKUP DOCUMENTATION: <ul style="list-style-type: none">1. DRAFT RESOLUTION2. HONEYWELL PRESENTATION3. HONEYWELL AGREEMENT

**RESOLUTION OF THE BOARD OF TRUSTEES
AUTHORIZING THE VILLAGE ADMINISTRATOR TO ENTER INTO AN ENERGY
PERFORMANCE CONTRACT WITH HONEYWELL AND TO ENTER INTO AN
EQUIPMENT LEASE/PURCHASE AGREEMENT WITH BANK OF AMERICA**

WHEREAS, on December 30, 2021, the Board of Trustees of the Village of Dobbs Ferry adopted Resolution 174-2021 whereby it authorized Honeywell to conduct a comprehensive energy audit of various Village-owned buildings; and

WHEREAS, over the last several months, Honeywell completed a comprehensive energy audit to assess the Village cost analysis for energy savings; and

WHEREAS, Honeywell has identified several practical Energy Conservation Measures that meet the Village's constraints and economic criteria totaling \$2,403,500 in project costs, to include: (1) LED lighting and lighting controls upgrade throughout Village-owned buildings, (2) street lighting upgrades, (3) boiler plant upgrades (4) air handling Unit replacement (5) rooftop unit replacements (6) condensing unit replacements, (7) pump and motor replacements, (8) building management system upgrades, (9) building envelope improvements, (10) pipe insulation, (11) desktop computer power management, (12) roof replacement,; and

WHEREAS, the Village intends to finance the project costs for the Energy Performance Contract (EPC) of \$2,403,500 with Bank of America, at 3.222% interest over a 20 year term under the Lease/Purchase Documents; and

WHEREAS, this EPC provides that Honeywell will guarantee savings of fully implemented energy conservation measures or compensate the Village the shortfall, as results will be analyzed on an annual basis; and

WHEREAS, this Board of Trustees finds it to be in the best interest of the Village of Dobbs Ferry to enter into the EPC Contract with Honeywell to perform these energy upgrades

and the Lease/Purchase Documents with Bank of America in order to finance the acquisition of the Equipment for these energy upgrades.

NOW THEREFORE BE IT

RESOLVED, that the Village Administrator is authorized to enter an EPC Contract with Honeywell at a total project cost of \$2,403,500 and to enter into the Lease/Purchase Documents with Bank of America in order to finance the acquisition of the Equipment for the energy upgrades under the EPC Contract for \$2,403,500 at a 3.222% interest rate for a 20 year term; and be it further

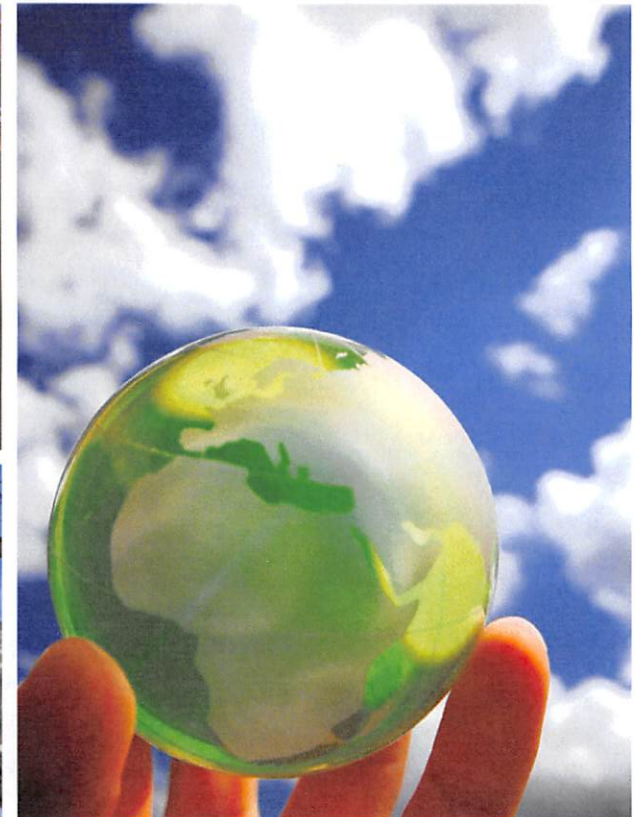
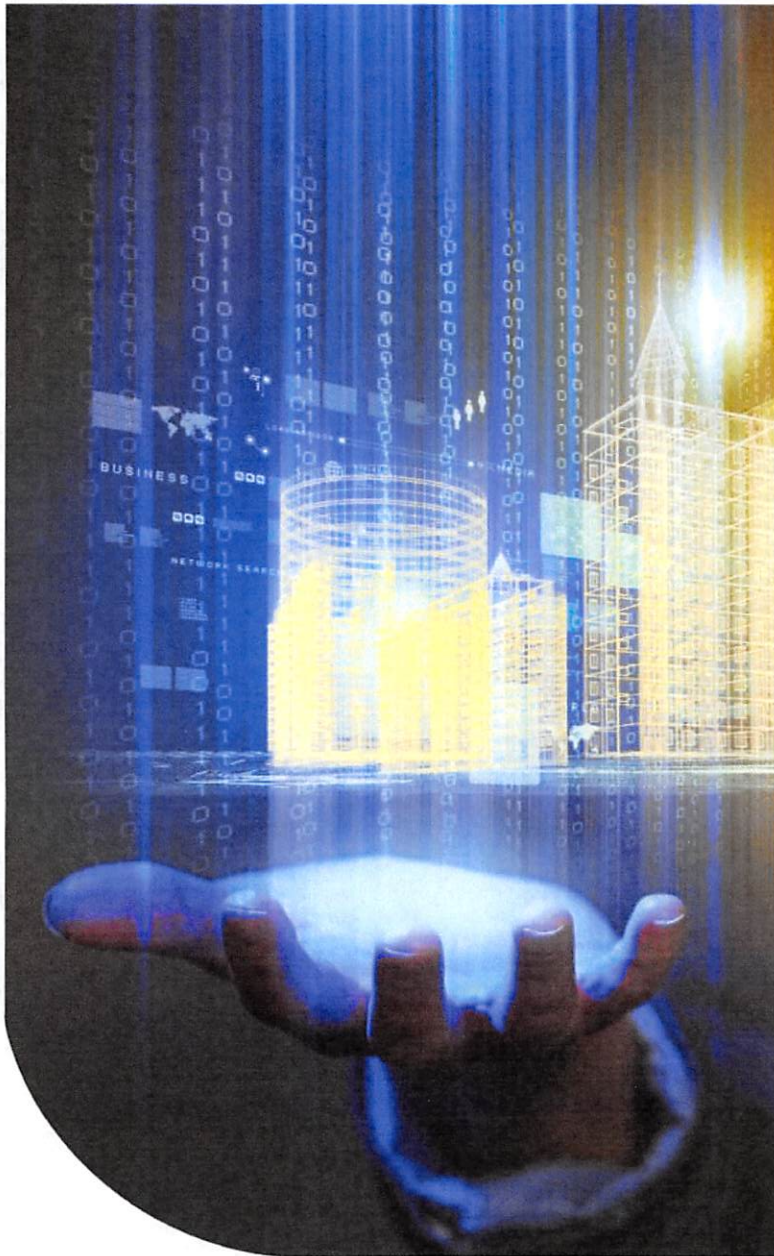
RESOLVED, that the EPC Contract and the Lease/Purchase Documents shall be subject to the review and approval of the Village Administrator and Village Attorney; and be it further

RESOLVED, that the Village Administrator is hereby authorized and directed to execute the EPC Contract; and be it further

RESOLVED, that the Village Administrator is hereby authorized and directed to execute the Equipment Lease/Purchase Agreement and any related Exhibits; and be it further

RESOLVED, that the Village Administrator shall be authorized to take any and all steps necessary to effectuate the intent of this Resolution; and be it further

RESOLVED, that this Resolution shall take effect immediately.



Terence Guiry
June 14, 2022

ENERGY & FACILITY RENEWAL SOLUTIONS VILLAGE OF DOBBS FERRY

Honeywell

Agenda

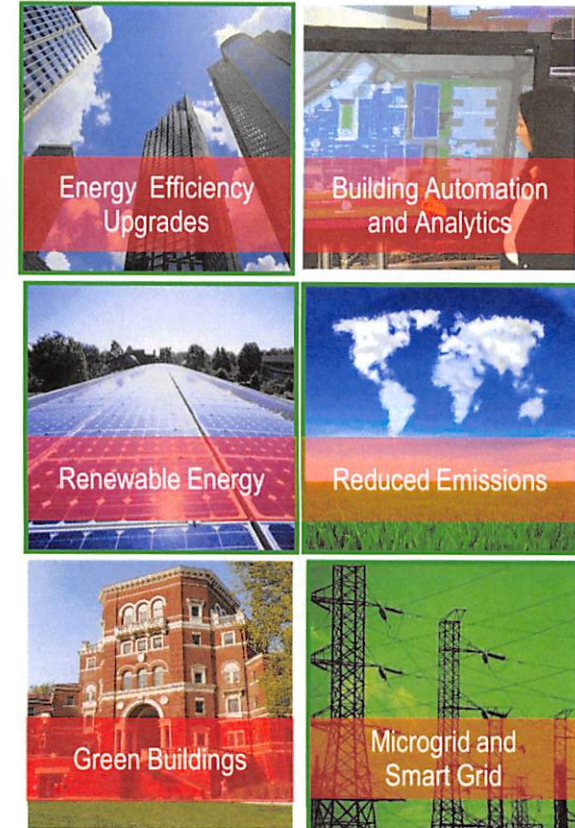
- Introduction
- Growing Municipal Challenges / Concerns
- What is Energy Performance Contracting (EPC)?
- Utility Analysis
- Program Overview
- Environmental Impact
- Timeline
- Q&A

Introduction

- Terence Guiry
 - Senior Business Consultant, Honeywell Energy Services Group
 - Leading NYS Public Sector Team
 - 30+ years in the energy conservation & building automation industry
 - BS Electrical Engineering, Rensselaer Polytechnic Institute

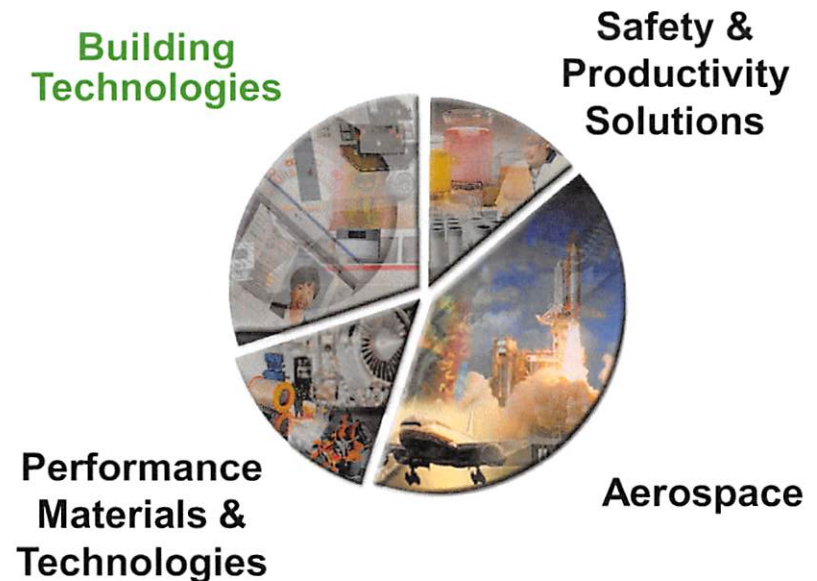
Honeywell Business History & Qualifications

- A U.S. Business since 1886
- Dedicated to Energy Efficiency - 50% of products and services are energy-efficiency related
- \$32.6 Billion in 2020 Sales
- 133,000 worldwide employees – 1,105 in New York State
- Delivered over 1100 EPC projects with a total value of more than \$3.5 Billion
- Deeply committed to local job creation & the community
- World's Most Admired Companies (Fortune)
- World's Most Ethical Companies (Ethisphere Institute)



A Worldwide Leader in Energy Management

- 42 years as an Energy Services Company (ESCO)
- 7,000+ Energy Conservation Projects
- \$6 Billion per year in Energy & Operational Savings
- Industry Recognition – Green Excellence of the Year Award (Frost & Sullivan)
- Four Strategic Business Groups

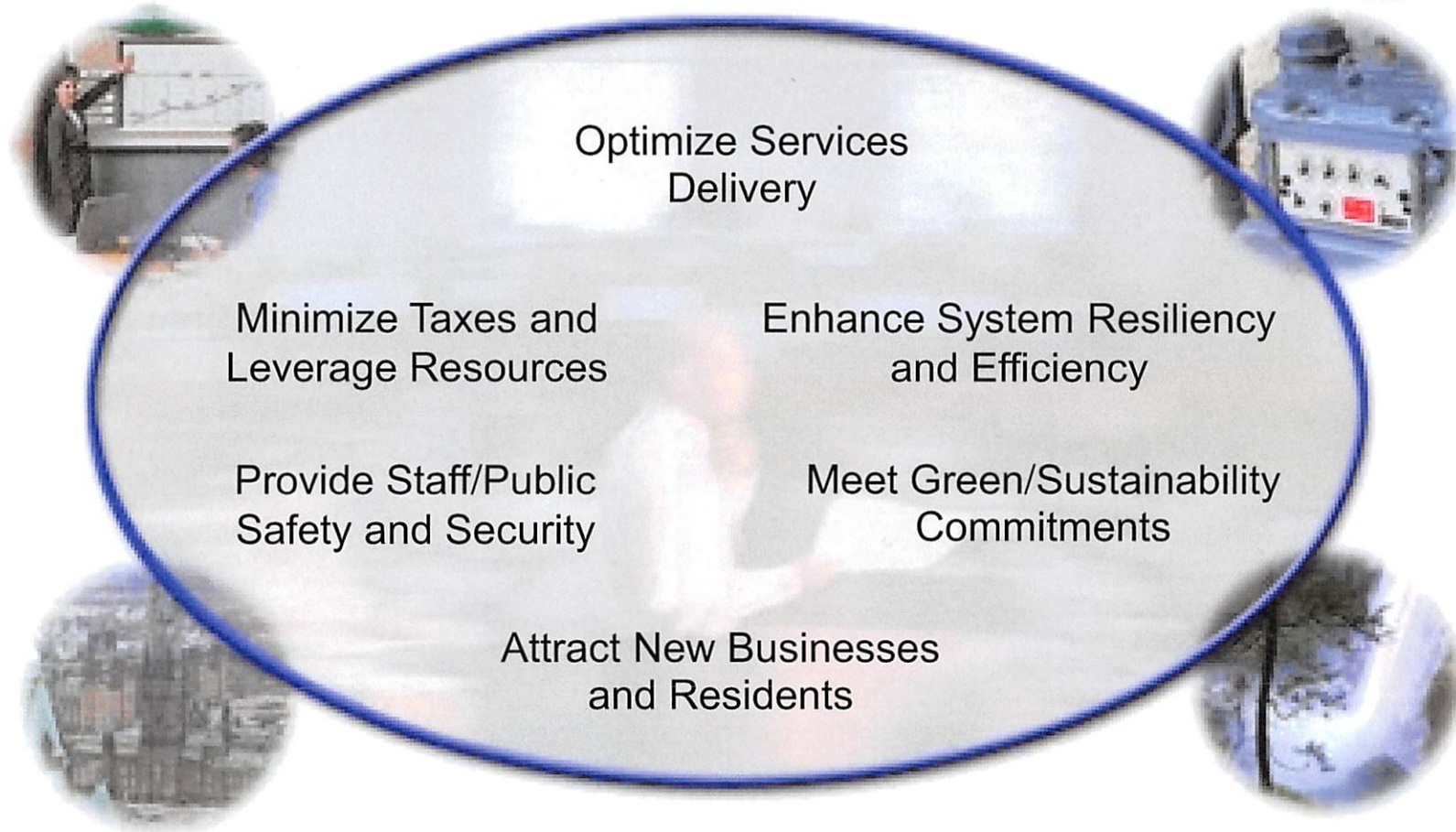


Since 2010, Honeywell has Deployed 2100+ Energy Efficiency Projects at its Own Facilities and Reduced its Greenhouse Gas Emissions by over 65%

Current Situation

Tight Budgets

Rapidly Advancing
Technologies



Aging Infrastructure
& Workforce

Environmental Issues

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Municipalities Under Increasing Pressure

What Is Performance Contracting?

- Proven method to achieve targeted infrastructure upgrades while minimizing project risk
- Design Build, Performance Based Construction Method
- Comprehensive Turnkey Service
 - Energy Infrastructure Auditing
 - Engineering and Design
 - Financing
 - Construction and Commissioning
 - Training
 - Maintenance
 - Measurement and Verification of Results / Performance Criteria
 - Guaranteed Results
- Energy Service Company (ESCO) is responsible for project risks

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All Project Components Delivered with a Single Contract

Contracting Method Comparison

FACTOR	BID/SPEC	PERFORMANCE CONTRACTING
Financial	Capital/Bond	Current Budget
Contract Team	Only During Installation & Warranty	1-20 Years
Upfront Fees	Yes	No
Technology & Contractor Selection	Low bid	Long-term Value and Performance
Guarantee	No	Financial & Performance

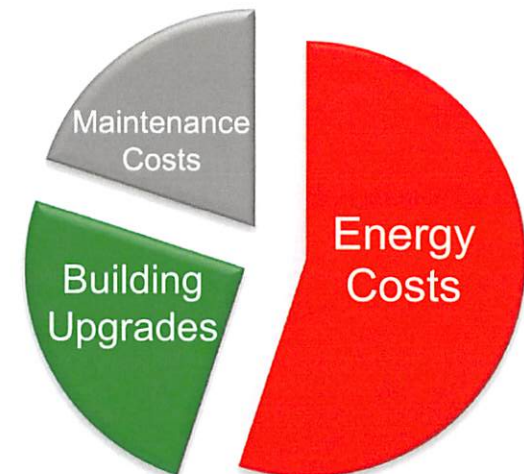
Performance Contracting Value

- **Achieve Priority Infrastructure Upgrades**
 - Address deferred maintenance and allow capital budget to be focused on other priorities
 - Select technologies and contractors based on long-term value not only lowest first-cost
- **Budget-Neutral, Fiscally-Responsible Funding Mechanism**
 - Upgrades paid for with energy & operational savings
 - Tax increases avoided by using alternative funding
 - No up-front funding required
- **Peace-of-Mind**
 - Guaranteed savings and performance throughout the life of the contract
 - Single point of responsibility for results
 - Enable proactive vs. reactive maintenance
- **Community/Environmental Leadership**
 - Showcases commitment to environmental stewardship and energy-efficiency
 - Improved building comfort
 - Enhanced staff productivity & health

Before Improvements

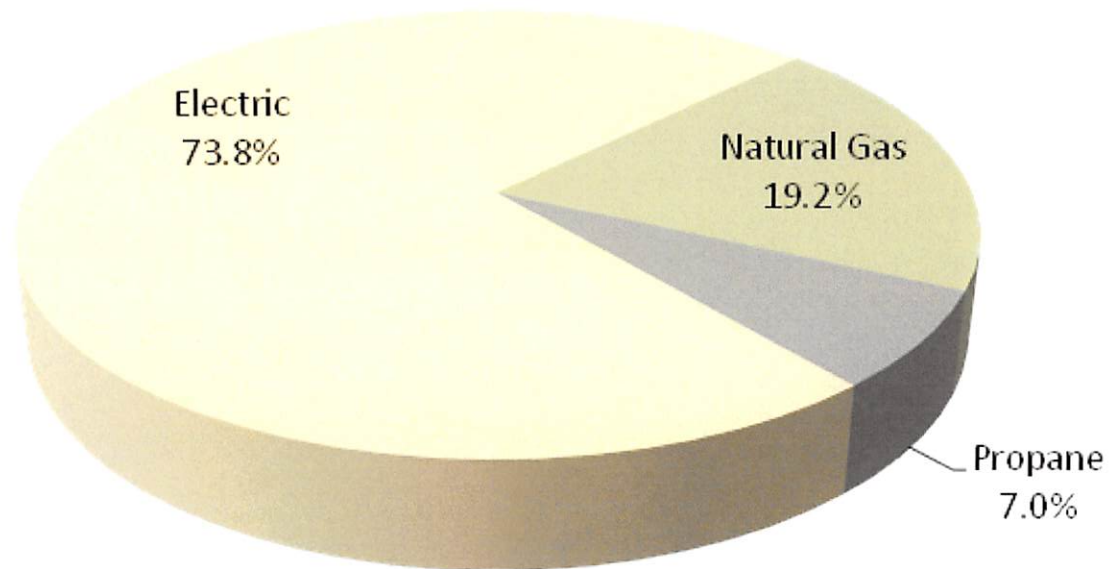


After Improvements



Utility Analysis

Village Buildings & Street Lights - Utility Cost by Type



Utility	Annual Baseline Cost
Electric	\$214,373
Natural Gas	\$55,738
Propane	\$20,286
Total	\$290,397

Program Overview

Total Price \$2,403,500 (\$100,000 NYSERDA grant, \$62,905 in Con Ed rebates, and \$220,235 in NYPA credit)

Savings \$105,714 / year

Financing RFP process completed June 8th. Banc of America low bidder @ 3.2%. Payments start after the installation period to line up with the guarantee period.

ECMs Twelve (12) proposed measures – LED lighting and lighting controls upgrade, street lighting upgrades, boiler plant upgrades, air handling unit replacement, rooftop unit replacement, condensing unit replacement, pump & motor replacement, building management system upgrades, building envelope improvements, pipe insulation, desktop computer power management, and roof replacement

Program Overview

#	ECM	Public Library	Village Hall	Memorial Park Building	DPW	Ambulance Corps. Building	Ogden Engine Company	Pool House & Offices at Gould	Embassy Club	Street Lighting
1	LED Lighting & Controls Upgrade	X	X	X	X	X	X	X	X	
2	Street Lighting Upgrades									X
3	Boiler Plant Upgrades		X							
4	Air Handling Unit Replacement		X							
5	Rooftop Unit Replacement		X							
6	Condensing Unit Replacement		X							
7	Pump & Motor Replacement		X							
8	Building Management System Upgrades	X	X	X	X	X	X	X	X	
9	Building Envelope Improvements	X	X	X		X	X		X	
10	Pipe Insulation	X	X			X			X	
11	Desktop Computer Power Management	X	X	X	X	X	X			
12	Roof Replacement		X							

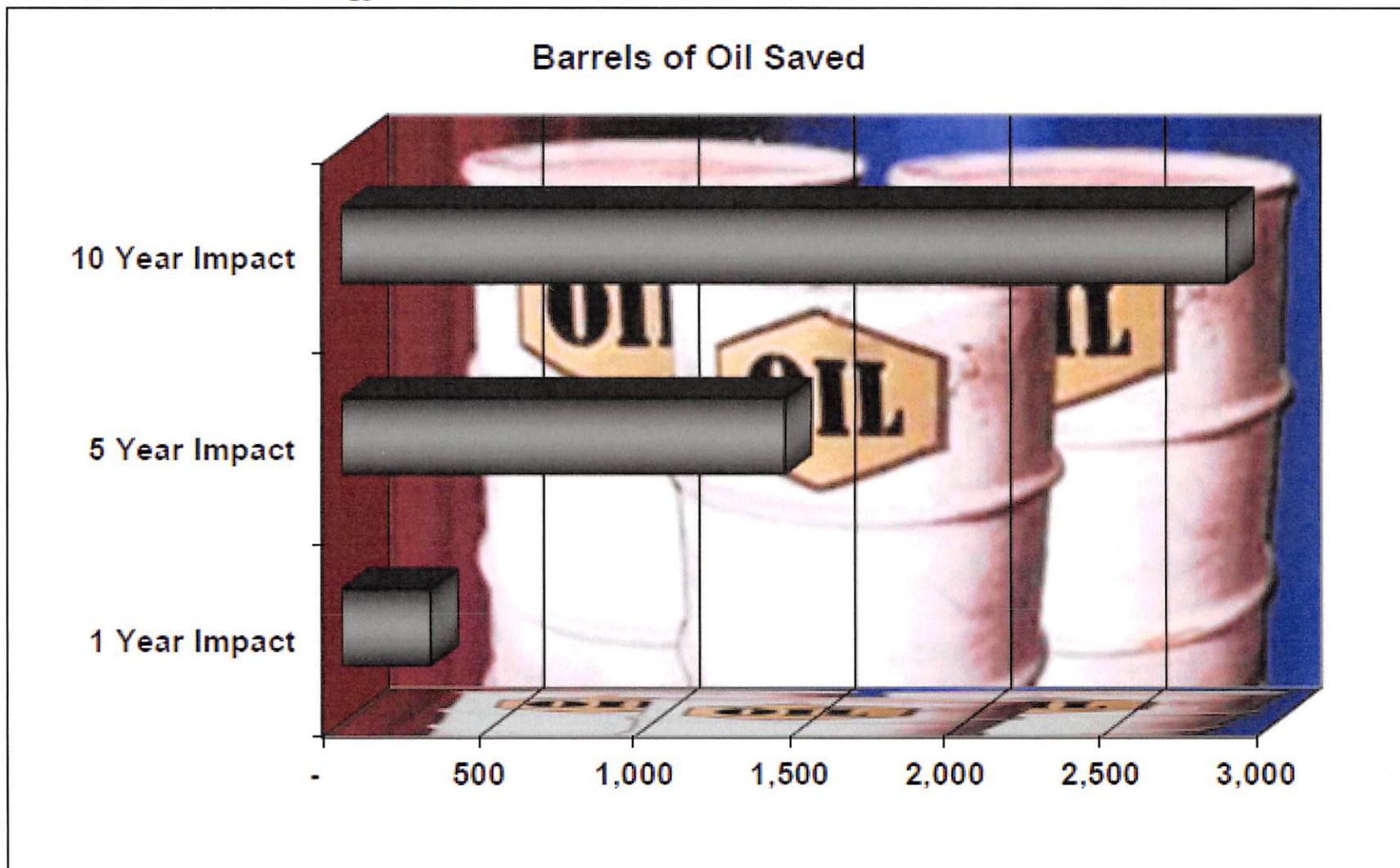
Environmental Impact

ECM #	Description	Electric Savings [kWh]	Natural Gas Savings [Therms]	Fuel Oil Savings [Gallons]	Propane Savings [Gallons]	CO _{2e} Emissions Reduction [Metric Tons]
1	LED Lighting and Lighting Controls Upgrade	89,683	(191)	-	(101)	21.0
2	Street Lighting Upgrades	147,464	-	-	-	37.1
3	Boiler Plant Upgrades	-	1,139	-	-	6.0
4	Air Handling Unit Replacement	-	662	-	-	3.5
5	Roof Top Unit Replacement	717	-	-	-	0.2
6	Condensing Unit Replacement	1,578	-	-	-	0.4
7	Pump & Motor Replacement	149	-	-	-	0.0
8	Building Management System Upgrades	15,149	5,145	-	818	35.9
9	Building Envelope Improvements	2,635	1,148	-	-	6.8
10	Pipe Insulation	-	1,802	-	-	9.6
11	Desktop Computer Power Management	8,850	-	-	-	2.2
12	Roof Replacement	55	164	-	-	0.9
TOTAL		266,280	9,870	-	717	123.7

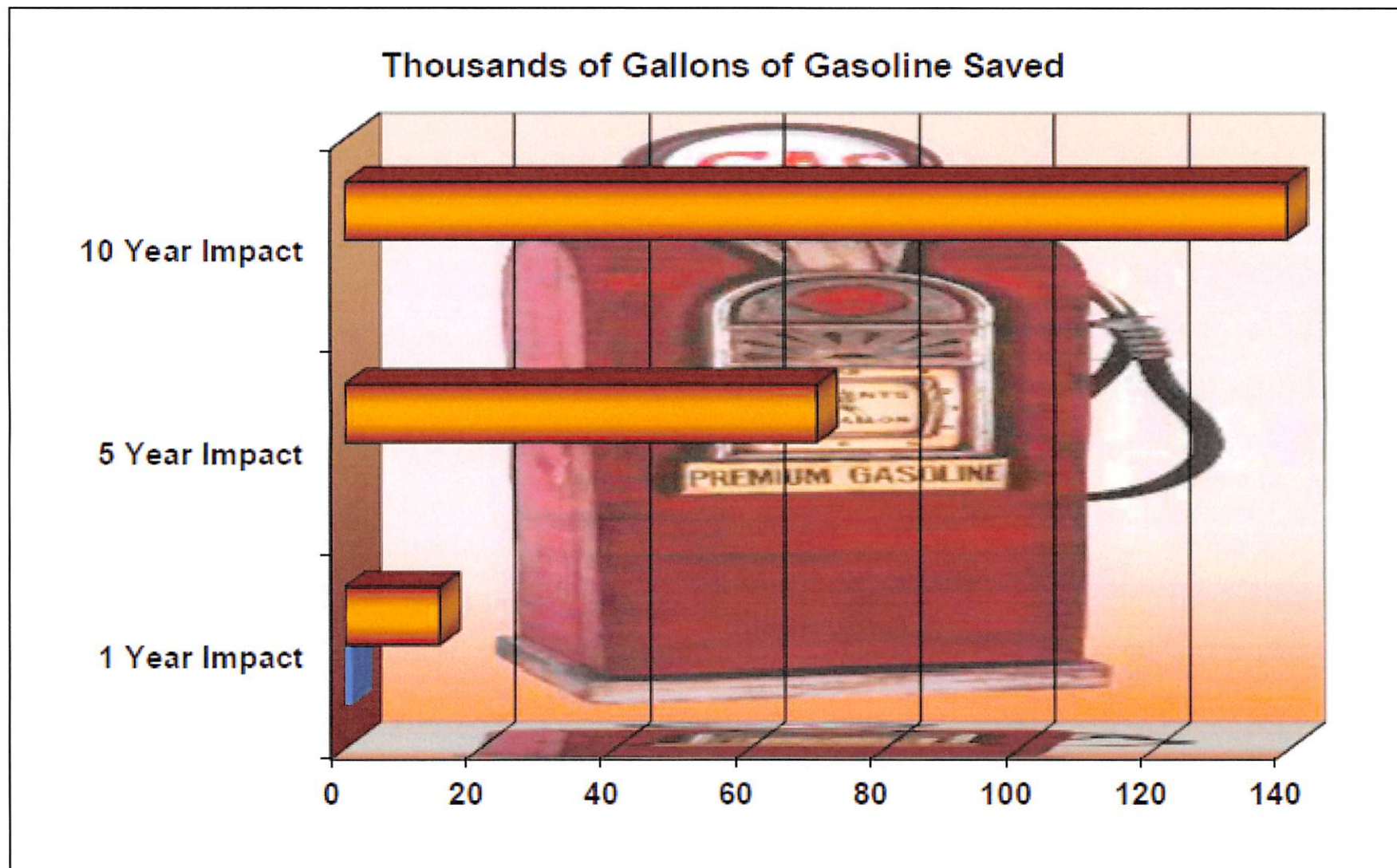
Greenhouse Gas Emissions Reduction		
Metric Tons of CO _{2e} Saved per Year	123.7	Metric tons

Environmental Impact

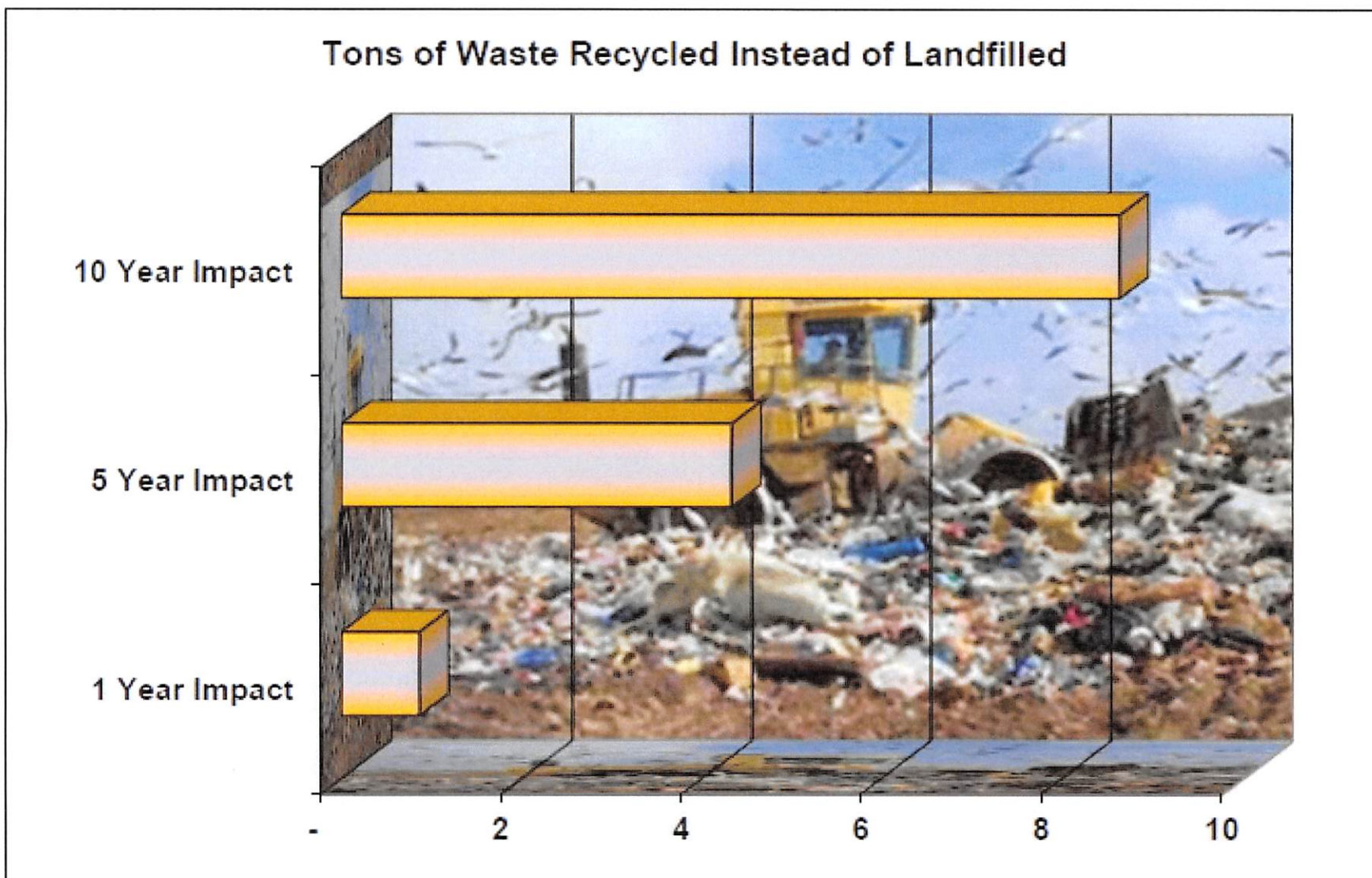
Total Metric Tons of CO_{2e} Savings is Equivalent to...



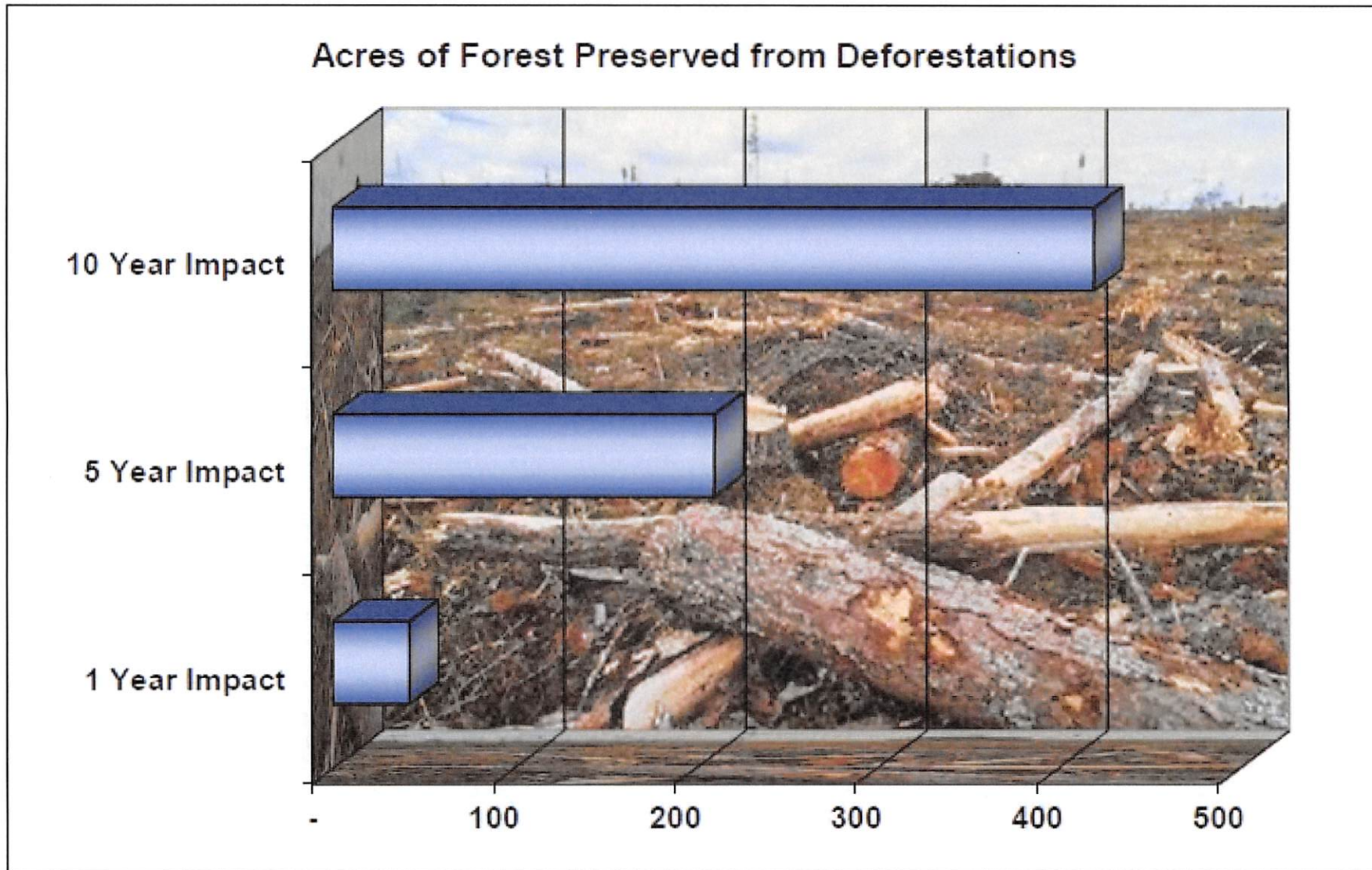
Environmental Impact



Environmental Impact



Environmental Impact



Timeline

- Preliminary Audit to Assess Opportunity – **July '21**
- RFP to Select Energy Service Company (ESCO) – **Issued 11/22/2021 with responses due 12/13/2021**
- Board resolution to select Honeywell and authorization to proceed with the Comprehensive Energy Audit (CEA) – **12/30/2021**
- Complete Comprehensive Energy Audit (CEA) and Submit a Contract – **05/31/2022**
- Board approval to proceed with the contract – **06/14/2022**
- Execute Contract and Close on Financing – **06/29/2022**
- Implement the Work – **July '22 through March '23**
- Commence the Guarantee and the required Measurement & Verification (M&V) – **April '23**

Questions / Discussion

Terence Guiry

Senior Business Consultant

Honeywell Energy Services Group

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Email: terence.guiry@honeywell.com

Honeywell is building a smarter, safer,
and more sustainable world

THAT'S THE POWER OF **CONNECTED**
THAT'S THE POWER OF **HONEYWELL**

Connected Aircraft • Connected Automobile • Connected Home • Connected Building
Connected Plant • Connected Supply Chain • Connected Worker

Honeywell
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HONEYWELL AGREEMENT

CUSTOMER NAME:	VILLAGE OF DOBBS FERRY
HONEYWELL PROPOSAL NUMBER:	VODF052422
DATE OF SUBMISSION:	05-26-22
VALIDITY PERIOD:	07-29-22

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ATTACHMENT J	PROJECT ACCEPTANCE
EXHIBITS	D-1 THROUGH D-8

ARTICLE 1

GENERAL PROVISIONS

1.1 This Agreement, including all attachments, exhibits, and schedules referenced herein (hereinafter the "Agreement") is made by and between Honeywell International Inc. ("Honeywell"), a Delaware Corporation, acting through its Honeywell Building Technologies business unit, with a principal place of business at 300 South Tryon Street, Charlotte, North Carolina 28202, and Village of Dobbs Ferry, 112 Main Street, Dobbs Ferry, NY 10522 ("Customer," and together with Honeywell, the "Parties"). The Agreement is effective as of the date of the later signature of the respective Parties (the "Effective Date").

1.2 As used in this Agreement, the term "Work" means the construction and services required by the Contract Documents (as defined below), whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by Honeywell to fulfill Honeywell's obligations, as described in Attachment A and otherwise set forth in the Contract Documents. The "Contract Documents" consist of this Agreement, its attachments, exhibits, schedules, and addenda. The Work may constitute the whole or a part of the Project. The "Project" is the total construction of which the Work performed by HONEYWELL under this Agreement may be the whole or a part. The Work specifically excludes certain design and construction relating to the Project, which are the subject of separate agreements between Customer and parties other than Honeywell.

1.3 "Support Services" means those services and obligations to be undertaken by HONEYWELL in support of CUSTOMER as set forth in Attachment D – Guarantee and Support Services Agreement.

ARTICLE 2

HONEYWELL'S RESPONSIBILITIES

2.1 HONEYWELL Work

2.1.1 Honeywell shall be responsible for construction of the Work.

2.1.2 Honeywell will assist CUSTOMER in securing construction permits necessary for the Work.

2.2 Responsibilities with Respect to the Work

2.2.1 Honeywell will provide construction supervision, inspection, labor, materials, tools, construction equipment and subcontracted items necessary for the execution and completion of the Work.

2.2.2 Honeywell shall keep the premises in an orderly fashion and free from unnecessary accumulation of waste materials or rubbish caused by its operations. If HONEYWELL damages property not needed for the Work, Honeywell shall repair the property to its pre-existing condition unless Customer directs otherwise. At the completion of the Work, Honeywell shall remove waste material supplied by HONEYWELL under this Agreement as well as all its tools, construction equipment, machinery and surplus material. Waste shall be disposed of as follows:

- (a) Construction Waste and/or Non-hazardous Waste: Construction waste (cardboard, metal, wood crates, plastic, wiring, etc.), and/or non-hazardous waste (non-PCB ballast's, lamps, batteries, etc.), shall be removed offsite by Honeywell or its subcontractors for disposal and/or recycling. The Customer's name and address shall be listed on the shipping documents as the owner/generator of the waste. The transportation of waste materials will meet local regulatory requirements.
- (b) Hazardous Waste: If and to the extent Honeywell is responsible for removal of hazardous waste pursuant to the express provisions of the Attachment A Scope of Work, Honeywell or its subcontractors shall contract with a licensed transporter for the removal of the applicable hazardous waste (PCB's, mercury, asbestos, etc.). The Customer's name and address shall be listed on the shipping documents as the owner/generator of the waste. The transportation of waste materials will meet local regulatory requirements.

2.2.3 Honeywell shall give all notices and comply with all laws and ordinances legally enacted as of the date of execution of the Agreement governing the execution of the Work. Provided, however, that Honeywell shall not be responsible nor liable for the violation of any code, law or ordinance caused by Customer or existing in Customer's property prior to the commencement of the Work.

2.2.4 Honeywell shall comply with all applicable federal, state and municipal laws and regulations that regulate the health and safety of its workers while providing the Work, and shall take such measures as required by those laws

and regulations to prevent injury and accidents to other persons on, about or adjacent to any Site (as defined in Section 3.8.4). It is understood and agreed, however, that Honeywell shall have no responsibility for elimination or abatement of health or safety hazards created or otherwise resulting from activities at any Site carried on by persons not in a contractual relationship with Honeywell, including Customer, Customer's contractors or subcontractors, Customer's tenants or Customer's visitors. Customer agrees to cause its contractors, subcontractors and tenants to comply fully with all applicable federal, state and municipal laws and regulations governing health and safety and to comply with all reasonable requests and directions of Honeywell for the elimination or abatement of any such health or safety hazards at any Site.

2.3 Patent Indemnity

2.3.1 Honeywell shall, at its expense, defend or, at its option, settle any suit that may be instituted against Customer for alleged infringement of any United States patents related to the hardware manufactured and provided by Honeywell under this Agreement, provided that: (a) such alleged infringement consists only in the use of such hardware by itself and not as part of, or in combination with, any other devices, parts or software not provided by Honeywell hereunder; (b) Customer gives Honeywell immediate notice in writing of any such suit and permits Honeywell, through counsel of its choice, to answer the charge of infringement and defend such suit; and (c) Customer gives Honeywell all needed information, assistance and authority, at Honeywell's expense, to enable Honeywell to defend such suit.

2.3.2 If such a suit has occurred, or in Honeywell's opinion is likely to occur, Honeywell may, at its election and expense: (a) obtain for Customer the right to continue using such hardware; (b) replace, correct or modify it so that it is not infringing; or (c) remove such hardware and grant Customer a credit therefor, as depreciated.

2.3.3 In the case of a final award of damages in any such suit, Honeywell will pay such award. Honeywell shall not, however, be responsible for any settlement made without its written consent.

2.3.4 THIS ARTICLE STATES HONEYWELL'S TOTAL LIABILITY AND CUSTOMER'S SOLE REMEDY FOR ANY ACTUAL OR ALLEGED INFRINGEMENT OF ANY PATENT OR OTHER INTELLECTUAL PROPERTY RIGHTS BY THE HARDWARE MANUFACTURED AND PROVIDED BY HONEYWELL HEREUNDER. IN NO EVENT SHALL HONEYWELL BE LIABLE FOR ANY INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY SUCH ACTUAL OR ALLEGED INFRINGEMENT, EXCEPT AS SET FORTH IN THIS SECTION 2.3.

2.4 Warranties and Completion

2.4.1 Honeywell warrants Customer good and clear title to all equipment and materials furnished to Customer pursuant to this Agreement free and clear of liens and encumbrances. Honeywell hereby warrants that all such equipment and materials shall be of good quality and shall be free from defects in materials and workmanship, including installation and setup, for a period of one (1) year from the earlier of the date of first beneficial use, or substantial completion of the equipment or portion of the Work in question, provided that no repairs, substitutions, modifications, or additions have been made, except by Honeywell or with Honeywell's written permission, and provided that after delivery such equipment or materials have not been subjected by non-Honeywell personnel to accident, neglect, misuse, or use in violation of any instructions supplied by Honeywell. Honeywell's sole liability hereunder shall be to repair promptly or replace defective equipment or materials, at Honeywell's option and at Honeywell's expense. The limited warranty contained in this Section 2.4.1 shall constitute the exclusive remedy of Customer and the exclusive liability of Honeywell for any breach of any warranty related to the equipment and materials furnished by Honeywell pursuant to this Agreement.

2.4.2 In addition to the warranty set forth in Section 2.4.1 above, Honeywell shall, at Customer's request, assign to Customer any and all manufacturer's or installer's warranties for equipment or materials not manufactured by Honeywell and provided as part of the Work, to the extent that such third-party warranties are assignable and extend beyond the one (1) year limited warranty set forth in Section 2.4.1.

2.4.3 THE WARRANTIES SET FORTH HEREIN ARE EXCLUSIVE, AND HONEYWELL EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES, WHETHER WRITTEN OR ORAL, IMPLIED OR STATUTORY, INCLUDING BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO THE EQUIPMENT AND MATERIALS PROVIDED HEREUNDER. HONEYWELL SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING FROM, OR RELATING TO, THIS LIMITED WARRANTY OR ITS BREACH.

ARTICLE 3
CUSTOMER'S RESPONSIBILITIES

- 3.1** Customer shall provide Honeywell full information regarding the requirements for the Work.
- 3.2** Customer shall designate a representative who shall be fully acquainted with the Work, and who has authority to approve changes in the scope of the Work and render decisions promptly.
- 3.3** Customer shall furnish to Honeywell all information regarding legal limitations, utility locations and other information reasonably pertinent to this Agreement, the Work and the Project.
- 3.4** Customer shall secure and pay for all necessary approvals, easements, assessments and charges required for the construction, use or occupancy of permanent structures or for permanent changes in existing facilities, including charges for legal and auditing services.
- 3.5** If Customer becomes aware of any fault or defect in the Work, it shall give prompt written notice thereof to Honeywell.
- 3.6** The services and information required by the above paragraphs shall be furnished with reasonable promptness at Customer's expense and Honeywell shall be entitled to rely upon the accuracy and the completeness thereof.
- 3.7** Prior to the commencement of the Work and at such future times as HONEYWELL shall reasonably deem appropriate, Customer shall furnish evidence in a form satisfactory to Honeywell that sufficient funds are available and committed to pay for the Work. Unless such evidence is furnished, Honeywell is not required to commence or continue any Work. Further, if CUSTOMER does not provide such evidence, HONEYWELL may stop work upon fifteen (15) days notice to Customer. The failure of Honeywell to insist upon the providing of this evidence at any one time shall not be a waiver of Customer's obligation to make payments pursuant to this Agreement, nor shall it be a waiver of Honeywell's right to request or insist that such evidence be provided at a later date.
- 3.8 HAZARDOUS SUBSTANCES, MOLD AND UNSAFE WORKING CONDITIONS**
- 3.8.1** "Hazardous Substance" includes, but is not limited to, all of the following, whether naturally occurring or manufactured, in quantities, conditions or concentrations that have, are alleged to have, or are believed to have an adverse effect on human health, habitability of a site, or the environment: (a) any dangerous, hazardous or toxic pollutant, contaminant, chemical, material or substance defined as hazardous or toxic or as a pollutant or contaminant under local, state or federal law; (b) any petroleum product, nuclear fuel or material, carcinogen, asbestos, urea formaldehyde, foamed-in-place insulation, polychlorinated biphenyl (PCBs); or (c) any other chemical or biological material or organism, that has, is alleged to have, or is believed to have an adverse effect on human health, habitability of a site, or the environment. This includes any related conditions or any such conditions caused by third parties.
- 3.8.2** "Mold" means any type or form of fungus or biological material or agent, including mold, mildew, moisture, yeast and mushrooms, and any mycotoxins, spores, scents, or by-products produced or released by any of the foregoing.
- 3.8.3** "Supplied Equipment" means the equipment covered by the Work to be performed by Honeywell under this Agreement, and is limited to the new equipment included in Attachment A ("Scope of Work").
- 3.8.4** Customer has not observed or received notice from any source (formal or informal) of (a) Hazardous Substances or Mold, either airborne or on or within the walls, floors, ceilings, heating, ventilation and air conditioning systems, plumbing systems, structure, and other components of the sites of the Work or the Support Services (each a "Site," and collectively, the "Sites"), or within furniture, fixtures, equipment, containers or pipelines in a Site; or (b) conditions that, to Customer's knowledge, might cause or promote accumulation, concentration, growth or dispersion of Hazardous Substances or Mold on or within such locations.
- 3.8.5** Honeywell is not responsible for determining whether the Supplied Equipment, the Covered Equipment (as defined in Attachment D), or the temperature, humidity and ventilation settings used by Customer are appropriate for Customer and the Sites with respect to avoiding or minimizing the potential for accumulation, concentration, growth or dispersion of any Hazardous Substance or Mold.

3.8.6 If any such materials, situations or conditions, whether disclosed or not, are in fact discovered by Honeywell or others and provide an unsafe condition for the performance of the Work or Support Services, the discovery of the condition shall constitute a cause beyond Honeywell's reasonable control and Honeywell shall have the right to cease the Work or Support Services until the area has been made safe by Customer or Customer's representative, at Customer's expense. Honeywell shall have the right to terminate this Agreement if Customer has not fully remediated the unsafe condition within sixty (60) days of discovery.

3.8.7 Customer represents that Customer has not retained Honeywell to discover, inspect, investigate, identify, prevent or remediate Hazardous Substances or Mold or conditions caused by Hazardous Substances or Mold.

3.8.8 TO THE FULLEST EXTENT ALLOWED BY LAW, CUSTOMER SHALL INDEMNIFY AND HOLD HONEYWELL HARMLESS FROM AND AGAINST ANY AND ALL CLAIMS AND COSTS OF WHATEVER NATURE, INCLUDING BUT NOT LIMITED TO, CONSULTANTS' AND ATTORNEYS' FEES, DAMAGES FOR BODILY INJURY AND PROPERTY DAMAGE, FINES, PENALTIES, CLEANUP COSTS AND COSTS ASSOCIATED WITH DELAY OR WORK STOPPAGE, THAT IN ANY WAY RESULTS FROM OR ARISES UNDER THE BREACH OF THE REPRESENTATIONS AND WARRANTIES IN THIS SECTION, THE EXISTENCE OF MOLD OR A HAZARDOUS SUBSTANCE AT A SITE, OR THE OCCURRENCE OR EXISTENCE OF THE SITUATIONS OR CONDITIONS DESCRIBED IN THIS SECTION, WHETHER OR NOT CUSTOMER PROVIDES HONEYWELL ADVANCE NOTICE OF THE EXISTENCE OR OCCURRENCE AND REGARDLESS OF WHEN THE HAZARDOUS SUBSTANCE OR OCCURRENCE IS DISCOVERED OR OCCURS. THIS INDEMNIFICATION SHALL SURVIVE TERMINATION OR EXPIRATION OF THIS AGREEMENT FOR WHATEVER REASON.

3.9 In addition to the price set forth in Article 6 of this Agreement, Customer shall pay any present and future taxes or any other governmental charges now or hereafter imposed by existing or future laws with respect to the sale, transfer, use, ownership or possession of the Work or any Support Services provided hereunder, excluding taxes on Honeywell's net income.

3.10 All software made available to Customer in connection with this Agreement shall be subject to the software manufacturer's standard license terms and conditions.

3.11 Tax-Related Cooperation. Customer agrees to execute any documents and to provide additional reasonable cooperation to Honeywell related to Honeywell tax filings under Internal Revenue Code Section 179D. Honeywell will be designated the sole Section 179D (or any amendment thereof or replacement legislation) beneficiary.

3.12 Representations and Warranties. Customer hereby represents and warrants to Honeywell that:

3.12.1 Customer has all requisite power and authority necessary to authorize the execution and delivery of this Agreement and the performance of its obligations hereunder and is not prohibited from entering into this Agreement or discharging and performing all covenants and obligations on its part to be performed under and pursuant to this Agreement. The execution, delivery and performance of this Agreement by Customer and the selection of, and the award of this Agreement to, Honeywell have been duly authorized by all necessary action on the part of Customer and do not and will not require the consent of any trustee or holder of any indebtedness or other obligation of Customer, any other party to any other agreement with Customer or any other person or entity.

3.12.2 The selection of and award of this Agreement to Honeywell, execution and delivery of this Agreement, performance of all services, actions and responsibilities contemplated herein, and fulfillment of and compliance by Customer with the provisions of this Agreement do not and will not conflict with or constitute a breach of or a default under Customer's charter, as adopted by the laws of the state in which Customer is located, or any other applicable law, rule, ordinance, code or regulation, including but not limited to government procurement, competitive bidding, public notice, open meetings, or prior appropriation requirements. This Agreement meets the requirements of and complies with the Customer's charter and all other applicable laws, rules, ordinances, codes, and regulations. Customer has properly and validly selected Honeywell and awarded this Agreement to Honeywell pursuant to and in reliance on such charter, laws, rules, ordinances, codes, and regulations.

3.12.3 This Agreement has been duly executed and delivered by Customer. This Agreement is a legal, valid and binding obligation of Customer enforceable against Customer in accordance with its terms, except as such enforceability is limited by laws of general applicability limiting the enforcement of creditors' rights.

ARTICLE 4

SUBCONTRACTS

- 4.1 At its exclusive option, HONEYWELL may subcontract some or all of the Work or Support Services.
- 4.2 A Subcontractor is a person or entity who has a direct contract with Honeywell to perform any effort in connection with the Work. The term Subcontractor does NOT include any separate contractors employed by Customer or such separate contractors' subcontractors.
- 4.3 For the purposes of this Agreement, no contractual relationship shall exist between Customer and any Subcontractor. Honeywell shall be responsible for the management of its Subcontractors in their performance of their Work.

ARTICLE 5

INSTALLATION AND ACCEPTANCE

5.1 The Work to be performed under this Agreement shall be commenced and substantially completed as set forth in the Installation Schedule attached hereto as Attachment C, which describes the Parties' intentions respecting the times by which the components or aspects of the Work therein set forth shall be installed and/or ready for acceptance or beneficial use by CUSTOMER. The Installation Schedule may be adjusted to reflect the final Effective Date, or as otherwise set forth in this Agreement.

5.2 If Honeywell is delayed at any time in the progress of performing its obligations under this Agreement by any act of Customer or any contractor employed by Customer; or by changes ordered or requested by Customer in the Work performed pursuant to this Agreement; or by labor disputes, fire, unusual delay in transportation, adverse weather conditions or other events or occurrences which could not be reasonably anticipated; or unavoidable casualties; or any other problem beyond Honeywell's reasonable control (an "Excusable Delay"), then the time for performance of the obligations affected by such Excusable Delay shall be extended by the period of any delay actually incurred as a result thereof. If any delay, or cumulative delays, within Customer's control, extends beyond ten (10) days, Customer shall reimburse Honeywell for all additional costs resulting therefrom.

Notwithstanding anything to the contrary, in light of the COVID-19 pandemic, the effects of which cannot be foreseen, the parties agree that Honeywell shall be entitled to an equitable extension of time to deliver or perform its work and appropriate additional compensation to the extent Honeywell's delivery or performance, or the delivery or performance of its suppliers and/or subcontractors, is in any way delayed, hindered or otherwise affected by the COVID-19 pandemic.

5.3 Honeywell shall provide Certificates of Substantial Completion and Final Project Acceptance in a form acceptable to Customer and Honeywell for the Work provided and as set forth in Attachment J. Upon receipt of each Certificate of Substantial Completion, Customer shall promptly inspect the Work performed by Honeywell identified therein and execute each such Certificate of Substantial Completion as soon as reasonably possible, but in no event later than ten (10) days after delivery of the same by Honeywell, unless Customer provides Honeywell with a written statement identifying specific material performance deficiencies that it wishes Honeywell to correct. Honeywell will use reasonably diligent efforts to correct all such material deficiencies and will give written notice to Customer when all such items have been corrected. The Parties intend that a Final Project Acceptance Certificate will be executed for the Work as soon as all Work is installed and operating. Execution by Customer of such Final Project Acceptance Certificate with respect to the Work shall constitute "Final Acceptance" of such Work performed by Honeywell pursuant to the Installation Schedule. The date of Customer's signature of the Final Project Acceptance Certificate shall be known as the date of Final Project Acceptance.

ARTICLE 6

PRICE AND PAYMENT

6.1 Price

6.1.1 The "Price" for the Work is Two Million Four Hundred Three Thousand Five Hundred Dollars (\$2,403,500), subject to the adjustments set forth in Articles 5 and 7.

6.1.2 The price for Support Services is set forth in Attachment D hereto, subject to the adjustments described therein.

6.1.3 The Price is based upon laws, codes and regulations in existence as of the Effective Date. Any changes in or to applicable laws, codes and regulations affecting the cost of the Work shall be the responsibility of Customer and shall entitle Honeywell to an equitable adjustment in the price and schedule. Honeywell reserves the right, in its discretion, to increase the price payable by Customer in the event that tariffs (or similar governmental charges) imposed by the United States or other countries result in any increase in the costs that Honeywell used to determine such price.

6.1.4 The Price will be modified for delays caused by Customer and for Changes in the Work, all pursuant to Article 7.

6.1.5 Reserved.

6.2 Payment

6.2.1 Upon execution of this Agreement, Customer shall pay or cause to be paid to Honeywell the full Price in accordance with the Payment Schedule, Attachment E. Customer shall make payments for the Support Services in accordance with Attachment D.

6.2.2 Payments for the Work past due more than five (5) days shall accrue interest from the due date to the date of payment at the rate of one and one half percent (1.5%) per month, compounded monthly, or the highest legal rate then allowed. Customer shall pay all attorney and/or collection fees incurred by Honeywell in collecting any past due amounts.

ARTICLE 7

CHANGES IN THE PROJECT

7.1 A Change Order is a written order signed by Customer and Honeywell authorizing a change in the Work or adjustment in the Price, or a change to the Installation Schedule described in Attachment C.

7.2 Customer may request Honeywell to submit proposals for changes in the Work. Unless otherwise specifically agreed to in writing by both parties, if Honeywell submits a proposal pursuant to such request but Customer chooses not to proceed, Customer shall issue a Change Order to reimburse Honeywell for any and all costs incurred in preparing the proposal.

7.3 Claims for Concealed or Unknown Conditions: If conditions are encountered at any Site that are (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents, or (2) unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, then notice by the observing party shall be given to the other party promptly before conditions are disturbed and in no event later than twenty-one (21) days after first observance of the conditions, and, if appropriate, an equitable adjustment to the Price and Installation Schedule shall be made by a Change Order. If agreement cannot be reached by the Parties, the party seeking an adjustment in the Price or Installation Schedule may assert a claim in accordance with Paragraph 7.4.

7.4 If Honeywell wishes to make a claim for an increase in the Price or an extension in the Installation Schedule it shall give Customer written notice thereof within a reasonable time after the occurrence of the event giving rise to such claim. This notice shall be given by Honeywell before proceeding to execute the Work, except in an emergency endangering life or property, in which case Honeywell shall have the authority to act, in its discretion, to prevent threatened damage, injury or loss. Claims arising from delay shall be made within a reasonable time after the delay. Increases based upon design and estimating costs with respect to possible changes requested by Customer shall be

made within a reasonable time after the decision is made not to proceed with the change. No such claim shall be valid unless so made. If Customer and Honeywell cannot agree on the amount of the adjustment in the Price, or the Installation Schedule, it shall be determined pursuant to the provisions of Article 12. Any change in the Price or the Installation Schedule resulting from such claim shall be authorized by Change Order.

7.5 Emergencies: In any emergency affecting the safety of persons or property, Honeywell shall act, at its discretion, to prevent threatened damage, injury or loss. Any increase in the Price or extension of time claimed by Honeywell on account of emergency work shall be determined as provided in Section 7.4.

ARTICLE 8

INSURANCE, INDEMNITY, WAIVER OF SUBROGATION, AND LIMITATION OF LIABILITY

8.1 Indemnity

8.1.1 Honeywell agrees to indemnify and hold Customer, and Customer's consultants, agents and employees harmless from all claims for bodily injury and property damages, other than the Work itself and other property insured under Paragraph 8.4, to the extent such claims result from or arise under Honeywell's negligent actions or willful misconduct in its performance of the Work or the Support Services. **PROVIDED THAT, NOTHING IN THIS ARTICLE SHALL BE CONSTRUED OR UNDERSTOOD TO ALTER THE LIMITATIONS OF LIABILITY CONTAINED IN THIS ARTICLE, ARTICLE 2, OR THE INDEMNIFICATION CONTAINED IN SECTION 3.8.**

8.1.2 Customer shall indemnify and hold harmless Honeywell and Honeywell's consultants, agents and employees from and against all claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of, or resulting from, any act or omission of Customer or Customer's contractors, consultants, agents or employees.

8.1.3 Customer shall require any other contractor who may have a contract on this project with Customer to perform work in the areas where Work will be performed under this Agreement to agree to indemnify Customer and Honeywell and hold them harmless from all claims for bodily injury and property damage that may arise from that contractor's operations. Such provisions shall be in a form satisfactory to Honeywell.

8.2 Contractor's Insurance: Honeywell shall, at its own expense, carry and maintain in force at all times from the signature date of the Contract through final completion of the work the following insurance. Honeywell will not issue coverage on a per project basis. It is agreed, however, that Honeywell has the right to insure or self-insure any of the insurance coverages listed below:

- (a) Commercial General Liability Insurance to include contractual liability and products/completed operations liability with a combined single limit of USD \$5,000,000 per occurrence and aggregate. Such policy will be written on an occurrence form basis;
- (b) If automobiles are used in the execution of the Agreement, Automobile Liability Insurance with a minimum combined single limit of USD \$5,000,000 per occurrence. Coverage will include all Honeywell owned, leased, non-owned and hired vehicles.
- (c) Where applicable, "All Risk" Property Insurance, including Builder's Risk insurance, for physical damage to property which is assumed by Honeywell in the Agreement.
- (d) Workers' Compensation Insurance Coverage for Honeywell employees: A - Statutory limits and Coverage B- Employer's Liability Insurance with limits of USD \$1,000,000 for bodily injury each accident or disease.

8.2.1 Honeywell will furnish evidence of said insurance coverage in the form of a Memorandum of Insurance which is accessible at: <http://honeywell.com/sites/moi/>. All insurance required in this Article will be written by companies with a rating of no less than "A-, XII" by A.M. Best or equivalent rating agency. Honeywell will endeavor to provide a thirty (30) day notice of cancellation or non-renewal to the Customer. In the event that a self-insured program is implemented, Honeywell will provide adequate proof of financial responsibility.

8.3. CUSTOMER's Liability Insurance

8.3.1 Customer shall be responsible for purchasing and maintaining its own commercial general liability, automobile liability and workers compensation insurances and, at its option, may purchase and maintain such insurance as will protect it against claims that may arise from operations under this Agreement.

8.4 Insurance to Protect Project

8.4.1 Customer shall purchase and maintain all risk full cost replacement property insurance in a form acceptable to Honeywell for the length of time to complete the Project. This insurance shall include as named additional insureds Honeywell and Honeywell's Subcontractors and Sub-subcontractors and shall include, at a minimum, coverage for fire, windstorm, flood, earthquake, theft, vandalism, malicious mischief, transit, collapse, testing, offsite storage, and damage resulting from defective design, workmanship, or material. Customer will increase limits of coverage, if necessary, to reflect estimated replacement costs. Customer will be responsible for any co-insurance penalties or deductibles. If the Work covers an addition to or is adjacent to an existing building, Honeywell and its Subcontractors and Sub-subcontractors shall be named additional insureds under Customer's Property Insurance covering such building and its contents.

8.4.1.1 If Customer finds it necessary to occupy or use a portion or portions of the Sites prior to Substantial Completion thereof, such occupancy shall not commence prior to a time mutually agreed to by Customer and Honeywell and to which the insurance company or companies providing the property insurance have consented by endorsement to the policy or policies. This insurance shall not be canceled or lapsed on account of such partial occupancy. Consent of Honeywell and of the insurance company or companies to such occupancy or use shall not be unreasonably withheld.

8.4.2 Customer shall purchase and maintain such insurance as will protect Customer and Honeywell against loss of use of Customer's property due to those perils insured pursuant to Subparagraph 8.4.1. Such policy will provide coverage for expenses of expediting materials, continuing overhead of Customer and Honeywell, necessary labor expense including overtime, loss of income by Customer and other determined exposures. Exposures of Customer and Honeywell shall be determined by mutual agreement and separate limits of coverage fixed for each item.

8.4.3 Customer shall provide evidence of Insurance to HONEYWELL before work on the Project begins. All insurance coverage(s) must be with a carrier rated A- or better by one of the National Insurance Rating Agencies such as A.M. Best. HONEYWELL will be given thirty (30) days notice of cancellation, non-renewal, or any endorsements restricting or reducing coverage.

8.5 Property Insurance Loss Adjustment

8.5.1 Any insured loss covered under insurances required pursuant to Article 8.4 shall be adjusted with Customer and Honeywell and made payable to Customer and Honeywell as trustees for the insureds, as their interests may appear, subject to any applicable mortgagee clause.

8.5.2 Upon the occurrence of an insured loss, monies received will be deposited in a separate account and the trustees shall make distribution in accordance with the agreement of the parties in interest, or in the absence of such agreement, in accordance with an arbitration award pursuant to Article 12. If the trustees are unable to agree between themselves on the settlement of the loss, such dispute shall also be submitted to arbitration pursuant to Article 12.

8.6 Limitation of Liability

8.6.1 NOTWITHSTANDING ANY OTHER PROVISION OF THIS AGREEMENT, (I) IN NO EVENT WILL HONEYWELL BE LIABLE FOR ANY SPECIAL, INCIDENTAL, INDIRECT, SPECULATIVE, REMOTE, CONSEQUENTIAL, PUNITIVE OR EXEMPLARY DAMAGES; AND (II) THE AGGREGATE LIABILITY OF HONEYWELL FOR ANY CLAIMS ARISING OUT OF OR RELATED TO THIS AGREEMENT WILL IN NO CASE EXCEED THE "PRICE." TO THE EXTENT PERMITTED BY APPLICABLE LAW, THESE LIMITATIONS AND EXCLUSIONS WILL APPLY WHETHER LIABILITY ARISES FROM BREACH OF CONTRACT, INDEMNITY, WARRANTY, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY, MOLD, MOISTURE OR INDOOR AIR QUALITY, OPERATION OF LAW, OR OTHERWISE.

8.6.2 NOTWITHSTANDING ANYTHING TO THE CONTRARY HEREIN, IF A PORTION OF THE WORK OR SUPPORT SERVICES INVOLVES THE INSTALLATION AND/OR MAINTENANCE OF SYSTEMS ASSOCIATED WITH SECURITY AND/OR THE DETECTION OF AND/OR REDUCTION OF RISK OF LOSS ASSOCIATED WITH FIRE, HONEYWELL'S TOTAL LIABILITY ARISING OUT OF OR AS A RESULT OF ITS PERFORMANCE UNDER THIS AGREEMENT SHALL NOT EXCEED THE AMOUNT OF \$100,000.

ARTICLE 9
TERMINATION OF THE AGREEMENT

9.1 If Honeywell defaults in, or fails or neglects to carry forward the Work in accordance with this Agreement, Customer may provide notice in writing of its intention to terminate this Agreement to Honeywell. If Honeywell, following receipt of such written notice, neglects to cure or correct the identified deficiencies within thirty (30) business days, Customer may provide a second written notice. If Honeywell has not, within thirty (30) business days after receipt of such notice, acted to remedy and make good such deficiencies, Customer may terminate this Agreement and take possession of the Site together with all materials thereon, and move to complete the Work itself expeditiously. If the unpaid balance of the Price exceeds the expense of finishing the Work, the excess shall be paid to Honeywell, but if the expense exceeds the unpaid balance, Honeywell shall pay the difference to Customer.

9.2 If Customer fails to make payments as they become due, or otherwise defaults or breaches its obligations under this Agreement, Honeywell may give written notice to Customer of Honeywell's intention to terminate this Agreement. If, within seven (7) days following receipt of such notice, Customer fails to make the payments then due, or otherwise fails to cure or perform its obligations, Honeywell may, by written notice to Customer, terminate this Agreement and recover from Customer payment for Work executed and for losses sustained for materials, tools, construction equipment and machinery, including but not limited to, reasonable profit and applicable damages.

ARTICLE 10
ASSIGNMENT AND GOVERNING LAW

10.1 This Agreement shall be governed by the law of the State where the Work is performed.

10.2 Neither party to the Agreement shall assign this Agreement or sublet it as a whole without the written consent of the other party. Such consent shall not be unreasonably withheld, except that HONEYWELL may assign to another party the right to receive payments due under this Agreement. HONEYWELL may enter into subcontracts for the Work without obtaining Customer's consent.

ARTICLE 11
MISCELLANEOUS PROVISIONS

11.1 The Table of Contents and headings in this Agreement are for information and convenience only and do not modify the obligations of this Agreement.

11.2 **Confidentiality.** As used herein, the term "Confidential Information" shall mean any information in readable form or in machine-readable form, including software supplied to Customer by Honeywell that has been identified or labeled as "Confidential" and/or "Proprietary" or with words of similar import. Confidential Information shall also mean any information that is disclosed orally and is designated as "Confidential" and/or "Proprietary" or with words of similar import at the time of disclosure and is reduced to writing, marked as "Confidential" and/or "Proprietary" or with words of similar import, and supplied to the receiving party within ten (10) days of disclosure. The electronic platform, code and arrangement upon which the legible Energy Savings Calculations are published is "Proprietary."

All rights in and to Confidential Information and to any proprietary and/or novel features contained in Confidential Information disclosed are reserved by the disclosing party; and the party receiving such disclosure will not use the Confidential Information for any purpose except in the performance of this Agreement and will not disclose any of the Confidential Information to benefit itself or to damage the disclosing party. This prohibition includes any business information (strategic plans, etc.) that may become known to either party.

Each party shall, upon request of the other party or upon completion or earlier termination of this Agreement, return the other party's Confidential Information and all copies thereof.

Notwithstanding the foregoing provisions, neither party shall be liable for any disclosure or use of information disclosed or communicated by the other party if the information:

- (a) is publicly available at the time of disclosure or later becomes publicly available other than through breach of this Agreement; or
- (b) is known to the receiving party at the time of disclosure; or
- (c) is subsequently rightfully obtained from a third party on an unrestricted basis; or
- (d) is approved for release in writing by an authorized representative of the disclosing party.

The obligation of this Article shall survive any expiration, cancellation or termination of this Agreement.

11.3 Customer retains all rights that it already holds in data and other information that Customer or persons acting on its behalf input, upload, transfer, or make accessible in relation to, or which is collected from Customer's devices or equipment pursuant to, this Agreement ("Input Data"). Honeywell and its affiliates have the right to collect, retain, transfer, disclose, duplicate, analyze, modify and otherwise use Input Data to provide, protect, improve or develop any products or services. Honeywell and its affiliates may also use Input Data for any other purpose provided it is in an anonymized form that does not identify Customer. Any Customer Personal Data contained within Input Data shall only be used or processed in accordance with applicable law and any data privacy terms agreed upon by the parties. To the extent required by Honeywell in order to perform its obligations under this Agreement, Customer will enable Internet connectivity between its applicable system(s) and the Honeywell Sentience™ cloud platform, or other Honeywell-utilized system(s), and hereby consents to such connectivity throughout the term of this Agreement. All information, analysis, insights, inventions and algorithms derived from Input Data by or on behalf of Honeywell and/or its affiliates (but excluding Input Data itself) and any intellectual property rights related thereto, are owned exclusively and solely by Honeywell and are Honeywell's confidential information. This Section survives expiration or termination of this Agreement and shall apply notwithstanding any other provision of this Agreement or any other agreement.

11.4 Risk of loss for all equipment and materials provided by Honeywell hereunder shall transfer to Customer upon delivery to Customer's Sites from Honeywell or its Subcontractor and title shall pass upon final acceptance or final payment by Customer to Honeywell, whichever occurs later.

11.5 Final notice or other communications required or permitted hereunder shall be sufficiently given if personally delivered to the person specified below, or if sent by registered or certified mail, return receipt requested, postage prepaid, addressed as follows:

To Honeywell:
HONEYWELL BUILDING SOLUTIONS
General Counsel
715 Peachtree Street, N.E.
Atlanta, GA 30308

To Customer:
VILLAGE OF DOBBS FERRY
112 Main Street
Dobbs Ferry, New York 10522
Attention: Melissa Ferraro

11.6 Waiver. Honeywell's failure to insist upon the performance or fulfillment of any of Customer's obligations under this Agreement shall not be deemed or construed as a waiver or relinquishment of the future performance of any such right or obligation hereunder.

11.7 Honeywell guarantees Customer will realize the Guarantee Savings as defined in Attachment D during the term of this Agreement. **NOTWITHSTANDING THE FOREGOING, HONEYWELL (A) MAKES NO REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO ANY FINANCIAL PROJECTIONS, CASH FLOW MODELS, PRO FORMA FINANCIAL STATEMENTS OR OTHER DOCUMENTS, DATA OR INFORMATION PROVIDED BY OR ON BEHALF OF HONEYWELL TO CUSTOMER OR ITS REPRESENTATIVES PRIOR TO THE EXECUTION AND DELIVERY OF THIS AGREEMENT THAT ARE NOT INCLUDED IN THIS AGREEMENT, INCLUDING ITS ATTACHMENTS AND EXHIBITS (COLLECTIVELY, THE "PRIOR PROJECTIONS"), AND (B) HEREBY DISCLAIMS ALL IMPLIED WARRANTIES WITH RESPECT TO SUCH PRIOR PROJECTIONS. CUSTOMER HEREBY ACKNOWLEDGES AND AGREES THAT (i) HONEYWELL DOES NOT GUARANTEE THAT ANY RESULTS SET FORTH IN ANY PRIOR PROJECTIONS WILL BE ACHIEVED, (ii) ACTUAL RESULTS MAY VARY MATERIALLY FROM THE PRIOR PROJECTIONS, AND (iii) CUSTOMER HAS NOT RELIED UPON ANY SUCH PRIOR PROJECTIONS IN DETERMINING TO ENTER INTO THIS AGREEMENT AND CONSUMMATE THE TRANSACTIONS CONTEMPLATED HEREBY.**

11.8 Severability; Blue-Pencil. The terms of this Agreement will, where possible, be interpreted and enforced so as to sustain their legality and enforceability, read as if they cover only the specific situation to which they are being applied and enforced to the fullest extent permissible under applicable law. If any term of this Agreement is

determined to be invalid, illegal or incapable of being enforced, then all other terms of this Agreement will nevertheless remain in full force and effect, and such term automatically will be amended so that it is valid, legal and enforceable to the maximum extent permitted by applicable law, but as close to the parties' original intent as is permissible.

11.9 HONEYWELL IS NOT, NOR IS HONEYWELL COMPENSATED AS, A MUNICIPAL ADVISOR OR FIDUCIARY ACTING ON CUSTOMER'S BEHALF. ANY AND ALL FINANCIAL AND OTHER INFORMATION PROVIDED ABOUT OR RELATING TO MUNICIPAL SECURITIES OR OTHER MUNICIPAL FINANCIAL PRODUCTS IS PROVIDED FOR GENERAL INFORMATIONAL AND EDUCATIONAL PURPOSES ONLY AND SHOULD NOT BE CONSTRUED AS ADVICE, IS PROVIDED "AS-IS" WITHOUT WARRANTY OF ANY KIND (EXPRESS OR IMPLIED) AND WITHOUT ANY REPRESENTATION WITH RESPECT TO ACCURACY OR COMPLETENESS, AND MUST NOT BE RELIED UPON IN CONNECTION WITH ANY SECURITIES, INVESTMENT OR FINANCIAL DECISION OR OTHER ACTION/INACTION. CUSTOMER SHOULD OBTAIN THE ADVICE OF A FINANCIAL ADVISOR, MUNICIPAL ADVISOR OR OTHER THIRD PARTY LICENSED AND QUALIFIED TO ADVISE YOU REGARDING ANY OF THE INFORMATION PROVIDED ABOUT, OR THE POTENTIAL SUITABILITY OF, MUNICIPAL SECURITIES OR MUNICIPAL FINANCIAL PRODUCTS.

11.10 This Agreement represents the entire agreement between Customer and Honeywell relating to the subject matter hereof and supersedes all prior negotiations, representations or agreements, whether oral or written, between the parties related to such subject matter. Honeywell's performance is expressly limited to the terms and conditions expressly set forth in this Agreement, notwithstanding receipt of, or acknowledgment by, Honeywell of any purchase order, provisions of the documents for construction, or any other specification, document, instrument or understanding issued by Customer, any and all of which will be deemed to be material alterations and are rejected and not binding upon Honeywell and will not be a part of this Agreement or any resulting order. This Agreement may be modified or amended only by a written instrument signed by both parties.

11.11 This Agreement may be executed in counterparts, each of which shall be deemed an original and all of which shall constitute one and the same instrument. The Parties agree that a scanned or electronically reproduced copy or image of this Agreement bearing the signatures of the Parties hereto shall be deemed an original and may be introduced or submitted in any action or proceeding as competent evidence of the execution, terms and existence of this Agreement notwithstanding the failure or inability to produce or tender an original, executed counterpart of this Agreement and without the requirement that the unavailability of such original, executed counterpart of this Agreement first be proven.

11.12 Economic Surcharges. Honeywell may, from time to time and in its sole discretion, issue surcharges to this Agreement in order to mitigate and/or recover increased operating costs arising from or related to, without limitation: (a) foreign currency exchange variation; (b) increased cost of third-party content, labor and materials; (c) impact of duties, tariffs, and other government actions; and (d) any other circumstances that increase Honeywell's costs, including, without limitation, increases in freight, labor, material or component costs, and increased costs due to inflation (collectively, "Economic Surcharges").

Honeywell will invoice Customer, through a revised or separate invoice, and Customer agrees to pay for the Economic Surcharges pursuant to the standard payment terms in this Agreement. If a dispute arises with respect to Economic Surcharges, and that dispute remains open for more than fifteen (15) days, Honeywell may, in its sole discretion, withhold performance and future shipments or combine any other rights and remedies as may be provided under this Agreement or permitted by law until the dispute is resolved.

The terms of this section shall prevail in the event of inconsistency with any other terms in this Agreement. Any Economic Surcharges, as well as the timing, effectiveness, and method of determination thereof, will be separate from and in addition to any changes to pricing that are affected by any other provisions in this Agreement.

ARTICLE 12
ARBITRATION

12.1 With the exception of any controversy or claim arising out of or related to the installation, monitoring, and/or maintenance of fire and/or security systems, the Parties agree that any controversy or claim between Honeywell and Customer arising out of or relating to this Agreement, or the breach thereof, shall be settled and administered by arbitration in a neutral venue, conducted in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association.

Any award rendered by the arbitrator shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof. Any controversy or claim arising out of or related to the installation, monitoring, and/or maintenance of systems associated with security and/or the detection of, and/or reduction of risk of loss associated with fire shall be resolved in a court of competent jurisdiction.

APPROVALS:

The parties hereby execute this Agreement as of the date first set forth herein by the signatures of their duly authorized representatives:

HONEYWELL INTERNATIONAL INC.

VILLAGE OF DOBBS FERRY

By _____

By _____

Name _____

Name _____

Title _____

Title _____

Date _____

Date _____

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ATTACHMENT A SCOPE OF WORK

PART 1 – PRODUCTS & EXECUTION

Contractors will be required to pay prevailing wage rates in accordance with New York State Department of Labor regulations.

All work must be performed and installed in accordance with applicable laws, rules, regulations, codes, and ordinances.

ECM 1: LED Lighting & Controls Upgrade

Table A-1.1 is a summary of the facilities included for lighting and lighting controls upgrades.

Building
Village Hall
Public Library
Embassy Club
Memorial Park Building
Department of Public Works
Ambulance Corps. Building
Ogden Engine Company
Pool House & Offices at Gould Park

TABLE A-1.1

Scope of Work:

- 1) Honeywell shall provide all equipment, materials, and labor, for the buildings listed in Table A-1.1, to implement the lighting retrofit project as specified in Exhibit D-5-1: Lighting Line by Line attached hereto and incorporated herein by reference
- 2) Coordinate all lighting retrofit activities with Customer's Engineer or Customer's designated representative to minimize disruptions
- 3) Properly dispose of and recycle replaced fixtures and lamps and provide a certificate to the Customer
- 4) Ensure all work meets applicable codes and standards
- 5) Repair or replacement of fixture lenses is not included
- 6) Provide training to Customer operating and maintenance personnel
- 7) The upgrades included in the contract are limited to those listed in Exhibit D-5-1; Honeywell shall provide a price for any additional work at the written request of the Customer
- 8) The Customer shall contact the manufacturer directly for warranty replacement lamps and ballasts after the initial installation period is complete, and any labor associated with the replacement after the initial installation is the responsibility of the Customer
- 9) At completion of the work, the Customer will be supplied with a 2% maintenance stock
- 10) The warranty for the lighting is as follows:
 - a) Exterior photocells are covered by a manufacturer warranty for a period of one (1) year
 - b) LED exterior fixtures are covered by a manufacturer warranty for a period of five (5) years
 - c) LED interior fixtures are covered by a manufacturer warranty for a period of ten (10) years
 - d) LED retrofit kits are covered by a manufacturer warranty for a period of five (5) years
 - e) LED screw-ins are covered by a manufacturer warranty for a period of five (5) years

- f) Linear LED lamps (2', 3', and 4') are covered by a manufacturer warranty for a period of five (5) years
- g) Occupancy sensors are covered by a manufacturer warranty for a period of five (5) years

ECM 2: Street Lighting Upgrades

Existing Lighting Description	Existing Qty	Proposed Lighting Description	Proposed Qty
Sodium vapor – 100 W	10	LED Retrofit Kit - 24 W	10
Sodium vapor – 100 W	5	LED Retrofit Kit - 45 W	5
Sodium vapor – 105 W	1	LED Retrofit Kit - 24 W	1
Sodium vapor – 105 W	1	LED Retrofit Kit - 45 W	1
Sodium vapor – 105 W	4	LED Retrofit Kit - 50 W	4
Sodium vapor – 130 W	2	LED Retrofit Kit - 45 W	2
Sodium vapor – 133 W	1	LED Retrofit Kit - 45 W	1
Sodium vapor – 141 W	1	LED Retrofit Kit - 45 W	1
Sodium vapor – 141 W	2	LED Retrofit Kit - 100 W	2
Sodium vapor – 146 W	3	LED Retrofit Kit - 24 W	3
Sodium vapor – 146 W	4	LED Retrofit Kit - 50 W	4
Sodium vapor – 150 W	2	LED Retrofit Kit - 45 W	2
Metal halide – 175 W	2	LED Retrofit Kit - 45 W	2
Sodium vapor – 190 W	1	LED Retrofit Kit - 50 W	1
Sodium vapor – 199 W	2	LED Retrofit Kit - 100 W	2
Sodium vapor – 250 W	3	LED Retrofit Kit - 45 W	3
Sodium vapor – 275 W	2	LED Retrofit Kit - 45 W	2
Metal halide – 275 W	1	LED Retrofit Kit - 100 W	1
Metal halide – 288 W	7	LED Retrofit Kit - 100 W	7
Metal halide – 295 W	1	LED Retrofit Kit - 100 W	1

Scope of Work

- 1) Existing high pressure sodium, mercury vapor, and metal halide street lighting fixtures will be upgraded to high efficiency Light Emitting Diode (LED) technology as described in the table above.
- 2) Honeywell shall provide equipment, materials, and labor to implement the street lighting upgrade project as detailed in Exhibit D-5-2: Street Lighting Upgrades.
- 3) The scope is based on the detailed street lighting survey performed during the Investment Grade Audit (IGA). Honeywell's scope does not include repairs or replacement of existing light poles or retrofit of fixtures outside of those specified in Exhibit D-5-2. Honeywell shall provide a proposal for any additional work identified and Customer has the option of adding to the scope of work by Change Order.
- 4) Coordinate installation with the Village of Dobbs Ferry's Department of Public Works as necessary.
- 5) Installations will be completed on a first shift basis, Monday – Friday.
- 6) Existing poles are assumed to be structurally sound; no new poles or pole repairs are included.
- 7) Existing street lighting wiring is assumed to be in good condition, no new wiring or wiring repairs are included.
- 8) Honeywell warrants the installation for a period of one (1) year. Additional limited manufacturer warranties shall be assigned to the Customer directly. The Customer shall send

warranted parts back to the manufacturer in exchange for new parts provided by the manufacturer and installed by the Customer's workforce.

- 9) The warranty for the street lighting is as follows:
 - a) New LED fixtures are covered by a manufacturer warranty for a period of five (5) years for RAB and Sylvania and ten (10) years for Lumec
 - b) Screw in LED lamps for HID replacement are covered by LED Efficiency Design (LED) manufacturer warranty for a period of five (5) years
 - c) LED exterior retrofit kits are covered by a manufacturer warranty for a period of ten (10) years for Lumec
- 10) Make any necessary changes to the Con-Ed/NYPA Street Light Billing System to ensure the cost savings are realized for the above scope, as well as the Street Lighting project completed in 2016.

ECM 3: Boiler Plant Upgrades

Boiler Replacement:

Building	PROPOSED HOT WATER BOILERS				
	Boiler Make	Boiler Model	Qty	Input (Each)	Fuel
Village Hall	Buderus	GB162-80	3	290 MBH	Natural gas
Village Hall	Buderus	GB162-100	1	333 MBH	Natural gas

TABLE A-3.1

Scope of Work

- 1) Disconnect existing piping, fuel lines, power, and control wiring from existing boilers
- 2) Demolish and legally dispose of the existing boilers and all associated piping, burners, and control panels
- 3) Furnish and install boilers as per Table A-3.1 above, or equivalent
- 4) Furnish and install power wiring and local control wiring
- 5) Provide initial water treatment required for boiler start-up
- 6) Furnish and install condensate neutralizer, route to nearest drain
- 7) Rigging and setting in place the new equipment
- 8) Furnish and install new combustion air duct, connect to boiler(s) directly and terminate outdoors
- 9) Insulate new piping and install insulation on adjacent piping damaged during construction
- 10) Provide startup, testing and commissioning

ECM 4: Air Handling Unit Replacement

Building	PROPOSED AIR HANDLING UNITS					
	Area Served	Make	Model	Qty	Type	Capacity
Village Hall	Fire Station	Trane	TWE06043AAA	1	Hot Water	2,000 CFM
	Lounge Room					
	Locker Rooms	Trane	TWE06043AAA	1	Hot Water	2,000 CFM
	Fire Station Meeting Room					
	1st Floor Police Station	Trane	TWE12043AAA	1	Hot Water	4,000 CFM

TABLE A-4.1

Scope of Work

- 1) Disconnect piping, duct, wiring and control connections to the existing Air Handling Units
- 2) Remove and dispose of existing Air Handling Units
- 3) Provide new Air Handling Units per Table A-4.1 above
- 4) Rigging and setting in place of all new equipment
- 5) Reconnect existing piping, wiring and ducts to the new Air Handling Units
- 6) Modifications to existing duct work are limited to making Air Handling Unit connections; no new ductwork downstream is included
- 7) Provide insulation on new piping and on adjacent piping damaged during construction
- 8) Provide start up, testing and commissioning

ECM 5: Rooftop Unit Replacements

Building	PROPOSED ROOF TOP UNITS				
	Equipment	Make	Model	Capacity	Qty
Village Hall	RTU	TempMaster	ZYE06A2C1AB1A321A3	5 ton	1
	RTU	TempMaster	ZYE06A2C1AB1A321A3	5 ton	1
	RTU	TempMaster	ZYE06A2C1AB1A321A3	5 ton	1
	RTU	TempMaster	ZYE06A2C1AB1A321A3	5 ton	1
	RTU	TempMaster	ZYE05A2C1AB1C321A3	4 ton	1
	RTU	TempMaster	ZYE08A2B3AB1C321A3	7.5 ton	1

TABLE A-5.1**Scope of Work**

- 1) Disconnect piping, wiring, control connections, and ducts from the existing RTUs
- 2) Remove and dispose of existing RTUs
- 3) Furnish and install new RTUs per Table A-5.1 above, or approved equivalent
- 4) Rigging and setting in place the above described new equipment
- 5) Reconnect existing piping, wiring, control connections, and ducts to the new RTUs
- 6) Modifications to existing ductwork are limited to making RTU connections; no new ductwork is included
- 7) Provide insulation on adjacent piping and ductwork damaged during construction
- 8) Provide start-up, testing, commissioning, and balancing
- 9) The roof structure is assumed to be adequate; any structural upgrades are excluded

ECM 6: Condensing Unit Replacements

Building	PROPOSED CONDENSING UNITS					
	Equipment	Make	Model	Qty	Type	AHU Served
Village Hall	Condensing Unit	Trane	4TTA3060D	1	Air Cooled	Fire Station Lounge Room
	Condensing Unit	Trane	4TTA3060D	1	Air Cooled	Locker Rooms
	Condensing Unit	Trane	TTA09043A	1	Air Cooled	Fire Station Meeting Room
	Condensing Unit	Trane	TTA12043CAB	1	Air Cooled	1st Floor Police Station

TABLE A-6.1**Scope of Work**

- 1) Evacuate and reclaim refrigerant from existing condensing units
- 2) Disconnect refrigerant piping, wiring and control connections from existing condensing units
- 3) Remove and dispose of existing condensing units
- 4) Furnish and install new condensing units per Table A-6.1 above, or equivalent
- 5) Furnish and install new DX coils of similar capacity to accommodate new refrigerant

- 6) Furnish and install required refrigerant piping to DX coils
- 7) Provide required refrigerant charging as necessary
- 8) Reconnect wiring and control connections to new condensing units
- 9) Provide refrigerant piping insulation as required
- 10) Provide start-up, testing and commissioning
- 11) The roof structure is assumed to be adequate; any structural upgrades are excluded

ECM 7: Pump & Motor Replacement

Building	PUMP/MOTOR UPGRADES		
	Equipment	Qty	Motor HP
Village Hall	HW Pump 1	1	2.0
	HW Pump 2	1	2.0

Table A-7.1

Scope of Work

- 1) Honeywell shall provide equipment, materials and labor to complete the pump upgrade work as summarized in Table A-7.1
- 2) Disconnect piping, power and control wiring from existing pumps and motors
- 3) Remove and dispose of existing pumps and motors
- 4) Furnish and install new pumps with NEMA Premium efficiency motors as listed in the Table A-7.1.
- 5) Reconnect piping, power and control wiring to new pumps and motors
- 6) Align new pump and motor.
- 7) Start equipment and verify operating parameters.

ECM 8: Building Management System Upgrades

Honeywell shall provide necessary equipment, materials, and labor to implement the following Building Management System (BMS) upgrades for the facilities listed in Table A-8.1.

Building
Village Hall
Public Library
Embassy Club
Memorial Park Building
Department of Public Works
Ambulance Corps. Building
Ogden Engine Company
Pool House & Offices at Gould Park

TABLE A-8.1

Scope of Work:

General

1) Install New Tridium Niagara N4 Web Supervisor

Provide and install a new Tridium Niagara N4 Supervisor BMS on a customer provided virtual server. Integrate the new Tridium Niagara N4 JACE network controllers in each building

listed herein. Provide new graphics, alarms, and trending for all buildings which will reside on the new Tridium Niagara N4 Supervisor. LAN drops and IT configuration will be provided as needed.

Public Library

1) Install New Tridium N4 JACE Network Controller

Provide and install new Tridium N4 JACE. Integrate the existing Reliable Controls DDC points into the Tridium Niagara N4 Supervisor. Provide new equipment and floor plan graphics, alarms, trending, and M&V summary screens. The following table lists the existing Reliable Controls DDC that will be integrated into the new Tridium Niagara N4 Supervisor.

Reliable Controls DDC to be Integrated	
Equipment	Quantity
Hot Water Boilers	1
Hot Water Pumps	2
Air Handling Units	2
Variable Air Volume Boxes	18
Cabinet Unit Heaters	5
Fin Tube Radiation	9
Unit Heaters	5
Exhaust Fans	4

Additional Scope Details:

- Modify existing equipment runtime schedules and occupied/unoccupied temperature setpoints to drive energy savings.

2) Retro-Commission Existing Reliable Controls DDC System

Provide point-to-point checkout and functional testing for existing Reliable Controls DDC equipment as per the existing sequence of operations. The following is a list of equipment currently controlled by the Reliable Controls DDC system that will be retro-commissioned and integrated into the new Tridium Niagara N4 JACE controller.

Reliable Controls DDC to be Retro-Commissioned	
Equipment	Quantity
Hot Water Boilers	1
Hot Water Pumps	2
Air Handling Units	2
Variable Air Volume Boxes	18
Cabinet Unit Heaters	5
Fin Tube Radiation	9
Unit Heaters	5
Exhaust Fans	4

- a. ***Provide the required maintenance and mechanical repairs to provide a fully functional system. Issues that were identified during the site visit and BMS review include:***

- Replace defective damper actuator in VAV serving children's library.

- Replace belts on all fans.
- Lubricate all fan bearings
- Lubricate all damper linkages to ensure they fully open and fully close when commanded by the BMS.
- Replace all air filters
- Clean all coils and ensure outside air intakes are clean and free from debris.
- Replace eight (8) failed VAV box reheat valves identified during commissioning.
- Replace defective damper actuators identified during commissioning.
- Provide report showing deficiencies identified during construction that are not included in the scope above.

b. Existing BMS Optimization

Provide programming to implement the following energy savings strategies for improved system operation and to achieve energy saving targets.

- **Boiler Plant Optimization:** Provide the following boiler plant sequence of operation improvements:
 - Morning Warm-up - During morning warmup mode when the OAT is less than 30°F, the hot water supply temperature setpoint will be set to 180°F until the average space temperature is at the occupied setpoint. Once the average space temperature is at the occupied setpoint, the system will revert back to its normal outside air reset schedule.
 - Unoccupied Offset - During the unoccupied mode, the hot water reset setpoint will be offset lower by 30°F from the current setpoint.
 - Unoccupied OAT lockout - During the unoccupied mode the boilers and pumps will be off if the outside air temperature greater than 38°F and all space temperatures are above the unoccupied setpoint.
 - Provide graphics to identify which mode the plant is operating in (warmup, occupied, unoccupied standby, freeze protection, etc.)
- **AHU-1 and AHU-2 Return Air Fan Control:**
 - Re-program the return air fan VFD to track the supply air fan VFD so that the AHU maintains a slightly negative pressure in the mixed air plenum.

Village Hall

1) Install New Tridium N4 JACE Network Controller

Provide and install new Tridium N4 JACE. Integrate new DDC controls into the Village's Tridium Niagara N4 Supervisor. Provide graphics, trending and alarms, scheduling, and M&V summary screens.

2) Boiler Plant Control Upgrade

Provide BACnet integration for four (4) new condensing hot water boiler to be installed as part of this project. The boiler plant will include two (2) new hot water pumps. Integrate into the BMS and provide new graphics, trending, and alarms. Provide outside air reset, morning hot water boost, occupied / unoccupied outside air lockout, and unoccupied hot water offset of 20°F (adj). Points to include:

Boiler Plant Control	AI	AO	DI	DO
Boiler Enable				4

Boiler Plant Control	AI	AO	DI	DO
Boiler Status			4	
Boiler Alarm			4	
Hot Water Supply Temp	1			
Hot Water Return Temp	1			
Hot Water Supply Setpoint		1		
Pump Start/Stop				2
Pump Status			2	
Outside air Temperature	1			

Additional Scope Details:

- Provide communication bus wiring
- Ensure OAT sensor is installed on the North side of the building to ensure its not impacted by sun.
- Furnish controls and instrumentation as necessary to accomplish the design intent described, including controllers, sensors, end-devices.

3) Air Handling Unit Control Upgrade

Provide and install BACnet thermostats for four (4) new air handling units serving the basement and 1st floor that will be installed as part of this project. These units will have hot water heating coils and DX cooling associated with them. Integrate into the BMS and provide new graphics, trending, and alarms. Provide space temperature control, morning warm-up, occupancy schedule and setpoints. Points to include:

Air Handling Unit Control	AI	AO	DI	DO
Fan Enable				4
Fan Status			4	
Heating Valve		4		
DX Cooling Command				4
Discharge Air Temperature	4			
Space Temperature	4			

Additional Scope Details:

- Provide communication bus wiring.
- Furnish and install new DDC valves.
- Furnish controls and instrumentation as necessary to accomplish the design intent described, including controllers, sensors, end-devices.

4) Rooftop Unit Control Upgrade

Provide and install BACnet thermostats for six (6) new rooftop units to be installed as part of this project and provide heating and cooling to the 2nd floor. These units have existing interior hot water heating coils and DX cooling coils associated with them. Integrate into the BMS and provide new graphics, trending, and alarms. Provide space temperature control, OAT DX lockout, occupancy schedule and setpoints. Points to include:

Rooftop Unit Control	AI	AO	DI	DO
Fan Enable				6
Fan Status			6	

Rooftop Unit Control	AI	AO	DI	DO
Re-Heat valve		6		
Freeze stat			6	
DX Cooling command				6
Discharge Air Temperature (after re-heat coil)	6			
Space Temperature	6			

Additional Scope Details:

- Provide communication bus wiring.
- Furnish and install new DDC reheat valves.
- Install freeze stat to protect the reheat coil.
- Furnish controls and instrumentation as necessary to accomplish the design intent described, including controllers, sensors, end-devices.

5) Garage Bay Unit Heater Control Upgrade

Provide and install BACnet thermostats for four (4) unit heaters that provide heating to the Fire Department garage bay. Integrate into the BMS and provide new graphics, trending, and alarms. Provide space temperature control, OAT lockout, occupancy schedule and setpoints. Points to include:

Unit heater Control	AI	AO	DI	DO
Fan Start / Stop				4
Space Temperature	4			

Additional Scope Details:

- Provide communication bus wiring.
- Furnish controls and instrumentation as necessary to accomplish the design intent described, including controllers, sensors, end-devices.

6) Fin-tube Radiation Control Upgrade

Provide and install new DDC for six (6) pieces of fin-tube radiation serving the basement and 1st floor. Integrate into the BMS and provide new graphics, trending, and alarms. Provide space temperature control, occupancy schedule and setpoints. Points to include:

Fin-tube Radiation Control	AI	AO	DI	DO
Heating Valve		6		
Space Temperature	6			

Additional Scope Details:

- Furnish and install new DDC valves.

7) Cabinet Unit Heater Control Upgrade

Provide new DDC to provide fan control for one (1) cabinet unit heater serving the main front entryway. Integrate into the BMS and provide new graphics, trending, and alarms. Provide space temperature control, occupancy schedule and setpoints. Points to include:

Cabinet Unit Heater Control	AI	AO	DI	DO
Fan Start / Stop				1

Cabinet Unit Heater Control	AI	AO	DI	DO
Space Temperature	1			

Additional Scope Details:

- Provide communication bus wiring.

Memorial Park Building

1) *Furnace Control Upgrade*

Furnish and install one (1) Honeywell Web Enabled Wi-Fi programmable thermostat for control over the natural gas fired furnace. Provide occupancy/unoccupied schedule and setpoints to drive energy savings.

Additional Scope Details:

- Hyperlink for access to Wi-Fi programmable thermostat schedules and setpoints to be added to graphics of Tridium Niagara N4 Web Supervisor.

DPW Office

1) *Install New Tridium N4 JACE Network Controller*

Provide and install new Tridium N4 JACE. Integrate new DDC controls into the Village's Tridium Niagara N4 Supervisor. Provide graphics, trending and alarms, scheduling, and M&V summary screens.

2) *Garage Air Handling Unit (GAHUs) Control Upgrade*

Provide and install BACnet thermostats for seven (7) garage air handling units (GAHU's) that provide heating to the garage bays. Two (2) GAHU's serving the mechanics bay, one (1) in the wash bay, and four (4) in the main equipment garage. Integrate into the BMS and provide new graphics, trending, and alarms. Provide space temperature control, alarming, OAT lockout, occupancy schedule and setpoints. Point to Include:

Air Handling Unit Control	AI	AO	DI	DO
Fan Enable				7
Heating command				7
Space Temperature	7			

Additional Scope Details:

- Provide communication bus wiring.
- The AHUs only operate when there is a call for heat, or as needed for makeup air for the associated EFs.
- Furnish controls and instrumentation as necessary to accomplish the design intent described, including controllers, sensors, end-devices.

3) *Break Room Packaged Air Conditioner Control Upgrade*

Provide and install a BACnet thermostat for one (1) package air conditioning unit (PACU) that serves the breakroom in the main garage. Integrate into the BMS and provide new graphics, trending, and alarms. Provide space temperature control, OAT lockout, occupancy schedule and setpoints. Points to include:

Package Air Conditioner Control	AI	AO	DI	DO
Fan Start / Stop				1
Heating command				1
Cooling command				1
Space Temperature	1			

Additional Scope Details:

- Integrate into Tridium N4 Supervisor.
- Furnish and install new BACnet communicating thermostat.
- Provide communication bus wiring.

4) Office Air Handling Unit Control Upgrade

Provide and install a BACnet thermostat for two (2) air handling units that provide heating and cooling to the main office and mechanics office area. Integrate into the BMS and provide new graphics, trending, and alarms. Provide space temperature control, OAT lockout, occupancy schedule and setpoints. Points to include:

Air Handling Unit Control	AI	AO	DI	DO
Fan Start / Stop				2
Heating Command				2
Cooling Command				2
Space Temperature	2			

Additional Scope Details:

- Integrate into Tridium N4 Supervisor.
- Furnish and install new BACnet communicating thermostat.
- Provide communication bus wiring.

5) Radiant Floor Heating Control Upgrade

Provide and install DDC control for two (2) radiant floor heating zones on the existing radiant floor heating system. Integrate into the BMS and provide new graphics, trending, and alarms. Provide occupancy scheduling, and OAT lockout. Points will include:

In-Floor Radiant Control	AI	AO	DI	DO
Boiler Enable / Disable				1

Additional Scope Details:

- Integrate into Tridium N4 Supervisor.

Ambulance Corps. Building

1) Hot Water Zone, Electric Baseboard and Air Handling Unit Control Upgrade

Furnish and install five (5) Honeywell Web Enabled Wi-Fi programmable thermostats. Two (2) thermostats for control over the hot water zone pumps, two (2) for control over bathroom electric baseboard radiation, and one (1) for control over the air handling unit. Provide occupied/unoccupied schedule and setpoints to drive energy savings.

Additional Scope Details:

- Hyperlink for access to Wi-Fi programmable thermostat schedules and setpoints to be added to graphics of Tridium Niagara N4 Web Supervisor.

Ogden Engine Company

1) *Hot Water Zone Control Upgrade*

Furnish and install two (2) Honeywell Web Enabled Wi-Fi programmable thermostats for control over the hot water zone pumps. Provide occupied/unoccupied schedule and setpoints to drive energy savings.

Additional Scope Details:

- Hyperlink for access to Wi-Fi programmable thermostat schedules and setpoints to be added to graphics of Tridium Niagara N4 Web Supervisor.

Pool House & Offices at Gould Park

1) *Hot Water Zone & Unit Heater Control Upgrade*

Furnish and install two (2) Honeywell Web Enabled Wi-Fi programmable thermostats for control over the hot water zone pumps. Provide occupied/unoccupied schedule and setpoints to drive energy savings.

Additional Scope Details:

- Hyperlink for access to Wi-Fi programmable thermostat schedules and setpoints to be added to graphics of Tridium Niagara N4 Web Supervisor.

Embassy Club

1) *Install New Tridium N4 JACE Network Controller*

Provide and install new Tridium N4 JACE. Integrate the existing Andover Continuum DDC points into the Tridium Niagara N4 Supervisor. Provide new graphics for each piece of equipment, floor plan graphics, alarms, and trending. The following table lists the existing Andover Continuum DDC that will be integrated into the new Tridium Niagara N4 Supervisor.

Andover Continuum DDC to be Integrated	
Equipment	Quantity
Hot Water Boilers	2
Hot Water Pumps	3
Air Handling Units	2
Rooftop Units	1
Makeup Air Unit	1
Variable Air Volume Boxes	4
Fin Tube Radiation	2
Radiant Floor System	1
Exhaust Fans	4

Additional Scope Details:

- Modify existing equipment runtime schedules and occupied/unoccupied temperature setpoints to drive energy savings.

ECM 9: Building Envelope Improvements

Building
Village Hall
Public Library
Embassy Club
Memorial Park Building
Ambulance Corps. Building
Ogden Engine Company

TABLE A-9.1**Scope of Work:**

- 1) Honeywell shall provide all equipment, materials, and labor to implement the building envelope improvements detailed below for the buildings listed in Tables A-9.1; all linear footages and square footages shown are approximate values
- 2) Coordinate all retrofit activities with all building personnel to minimize disruptions
- 3) No painting, patching, door, door operator, or floor repair is included, unless otherwise damaged by Honeywell during installation

Building	Door Weather Stripping – Double (Units)	Door Weather Stripping – Single (Units)	Door Jamb Spacer (Units)	Window Weatherization (Units)
Ambulance Corps Building	-	2	-	-
Embassy Community Center	-	3	-	-
Memorial Park Building	-	2	2	-
Public Library	5	-	-	-
Ogden Engine Co.	1	-	-	-
Village Hall	2	2	-	24

Table A-9.2

Building	Door Weather Stripping – Overhead (Units)	Install Attic Soffit Baffles (Units)	Retrofit Existing Attic Hatch (Unit)	Install New Attic Hatch (Unit)
Ambulance Corps Building	2	-	-	-
Embassy Community Center	-	-	-	-
Memorial Park Building	-	-	-	1
Public Library	-	-	-	-
Ogden Engine Co.	1	-	1	1
Village Hall	1	48	-	-

Table A-9.3

Building	Add Attic Open Blow Cellulose Insulation (Square Ft.)	Wall Air Sealing (Square Ft.)	Attic Air Sealing (Square Ft.)	Attic Air Sealing (Linear Ft.)
Ambulance Corps Building	-	-	-	-
Embassy Community Center	-	-	-	-
Memorial Park Building	800	-	800	64

Building	Add Attic Open Blow Cellulose Insulation (Square Ft.)	Wall Air Sealing (Square Ft.)	Attic Air Sealing (Square Ft.)	Attic Air Sealing (Linear Ft.)
Public Library	-	-	-	-
Ogden Engine Co.	-	40	-	-
Village Hall	-	-	-	-

Table A-9.4

Building	Retrofit Pull-Down Stairs (Units)	Caulking (Linear Ft.)
Ambulance Corps Building	3	-
Embassy Community Center	-	17
Memorial Park Building	-	-
Public Library	-	-
Ogden Engine Co.	-	-
Village Hall	-	6

Table A-9.5

ECM 10: Pipe Insulation

Scope of Work:

- 1) Install pipe insulation as detailed in Table A-10.1, A-10.2, and A-10.3 below; the equivalent linear footages shown are approximate values
- 2) Insulation will be in conformance with the Energy Conservation Construction Code of New York State in effect as of the date of contract signature

Equivalent Linear Feet of Pipe [ft.] per Pipe Diameter Size [in]											
HEATING HOT WATER											
Building	14" +	8"	6"	5"	4"	3"	2.5"	2"	1.5"	1"	0.75"
Ambulance Corps. Building	-	-	-	-	-	-	-	-	-	30.8	139.0
Embassy Club	-	-	-	-	-	-	-	-	-	117.1	-
Public Library	-	7.9	-	-	13.0	19.6	-	-	-	-	-
Village Hall	-	7.9	-	-	10.8	74.7	-	6.0	-	-	-

TABLE A-10.1

Equivalent Linear Feet of Pipe [ft.] per Pipe Diameter Size [in]											
DOMESTIC HOT WATER											
Building	14" +	8"	6"	5"	4"	3"	2.5"	2"	1.5"	1"	0.75"
Ambulance Corps. Building	-	-	-	-	-	-	-	-	-	-	50.8

TABLE A-10.2

MINIMUM PIPE INSULATION (thickness in inches)							
FLUID OPERATING TEMPERATURE RANGE	INSULATION CONDUCTIVITY		NOMINAL PIPE DIAMETER				
	Conductivity Btu-in./(h-ft ² -°F)	Mean Rating Temperature, °F	≤ 1.0"	1.0" to < 1.5"	1.5" to < 4.0"	4.0" to < 8.0"	≥ 8.0"
>350°F	0.32-0.34	250	4.5	5.0	5.0	5.0	5.0
251°F - 350°F	0.29-0.32	200	3.0	4.0	4.5	4.5	4.5
201°F - 250°F	0.27-0.30	150	2.5	2.5	2.5	3.0	3.0
141°F - 200°F	0.25-0.29	125	1.5	1.5	2.0	2.0	2.0
105°F - 140°F	0.22-0.28	100	1.0	1.0	1.5	1.5	1.5

TABLE A-10.3

ECM 11: Desktop Computer Power Management

Building	Desktop Computer Count	Laptop Computer Count	Total
Public Library	15	6	21
Village Hall	9	17	26
Memorial Park Building	1	3	4
Ambulance Corps. Building	1	2	3
Ogden Engine Company	2	0	2
DPW Office	2	1	3
TOTAL	30	29	59

TABLE A-11.1

Device Management Policies			
Day	Time	Display Timeout	CPU Timeout
Monday – Friday	12:00a – 7:30a	15 minutes idle	30 minutes idle
	7:30a – 4:00p	20 minutes idle	120 minutes idle
	4:00p – 12:00a	15 minutes idle	30 minutes idle
Saturday – Sunday	12:00a – 12:00a	15 minutes idle	30 minutes idle

TABLE A-11.2

Scope of Work:

- 1) Furnish fifty-nine (59) licenses for WakeSmart software, or equivalent
- 2) Honeywell shall provide a price proposal for additional licenses requested by the Customer
- 3) Honeywell will work with the Customer to provide technical assistance to expedite the installation of the new software; the Customer shall install the software and push it down to the end-user machines
- 4) Furnish one (1) year of software maintenance; Customer to work directly with WakeSmart (or equivalent software vendor) on any on-going support, maintenance issues, or software upgrades during this period
- 5) No new servers, network device hardware or upgrades are included
- 6) WakeSmart software is provided subject to the terms and conditions in the WakeSmart Software License

Exclusions:

- a) Installation of the WakeSmart software
- b) Any computer BIOS or other software modifications for the WakeSmart software to operate properly

ECM 12: Roof Replacement

Scope of Work:

- 1) Roof in rear that ties into a metal roof:
 - a. Remove existing flashings, terminations, pitch pockets, etc.
 - b. Remove 2 ft high steel fence on top of stone coping and dispose
 - c. Change all pitch pockets to new
 - d. Install new wood blocking as needed
 - e. Slice open and cut existing EPDM roofing, mechanically fasten a ½" cover board over the existing substrate
 - f. Install a new Carlisle 115 MIL mechanically fastened fleece back roof system as per manufacturer's specifications
 - g. Flash all penetrations and terminate
 - h. Wrap walls up and over and install a new twenty (20) year Kynar aluminum coping or gravel stop where needed
 - i. Install walk pads to hatch and mechanical units
- 2) Roof closest to Main Street:
 - a. Remove existing EPDM membrane and dispose
 - b. Change any wet insulation needed
 - c. Install a new ½" recovery board
 - d. Change all pitch pockets to new
 - e. Install a new Carlisle 115 MIL mechanically fastened fleece back roof system as per manufacturer's specifications
 - f. Flash all penetrations and terminate
 - g. Wrap walls up and over and install a new twenty (20) year Kynar aluminum coping or gravel stop where needed
 - h. Install walk pads to hatch and mechanical units
 - i. Supply all dumpsters
- 3) The roof structure is assumed to be adequate; any structural upgrades are excluded
- 4) Upon completion, the manufacturer will inspect the roof installation and issue a twenty (20) year labor and material full system warranty



PART 2 – GENERAL

A. GENERAL CONDITIONS

1. Honeywell is not responsible for bringing existing lighting/electrical systems up to code.
2. If Honeywell encounters any materials or substances classified as toxic or hazardous in performance of the Work, including asbestos, Honeywell will notify Customer and will stop work in that area until such area has been made safe by the Customer, or Customer's Representative, at Customer's expense. In the event such conditions cause a delay in Honeywell's performance, Honeywell shall be entitled to recovery of all costs associated with such delay, as well as an extension of time of performance.
3. Where demolition of certain areas of a building are required for removal and installation of equipment and that demolition is included in the scope of work defined herein, Honeywell will make every effort to replace such areas with similar materials as available. If such materials are not available, materials of similar quality will be supplied and installed.
4. Electrical: Honeywell will only be responsible for repairing existing electrical wiring problems that occur within three feet (36 inches) of the device being installed or the nearest wall or ceiling penetration, whichever is smaller.
5. Piping: Honeywell will only be responsible for repairing existing piping problems that occur within two feet (24 inches) of the device being installed or the nearest wall or ceiling penetration, whichever is smaller. Piping includes, but is not limited to, domestic hot and cold water, cooling cold water, heating hot water, condensate, fuel oil, and cooling tower condensing water.
6. Routine Maintenance: Routine maintenance such as vacuuming, coil cleaning and filter change of air handling devices, etc. is the responsibility of the Customer, or as included in Attachment D.

7. Utility Meter: If new utility meters are required, provision and coordination of utility meters is the responsibility of the customer.
8. Remote Access: CUSTOMER is responsible for implementation and costs for remote Honeywell access through CUSTOMER's firewall(s) to the controllers and front-end computer(s) by one (1) remote user designated by Honeywell using one or more of the following processes:
 - TCP/IP Remote Access: A dedicated static IP address, installation and on-going maintenance and subscription and licensing fees for access hardware and software and one (1) station license dedicated to the remote user, or
 - Phone Lines: To be provided by customer for off-site monitoring, up to two (2) lines for each front end, as needed, one (1) line for each separate remote bus, as well as on-going maintenance of the lines.If remote access is interrupted, at any time during the Guarantee Term, Honeywell reserves the right to suspend any reporting requirements until remote access has been restored.
9. Efficiency Values: Honeywell will install equipment and lighting components (hereto referred as "equipment") under the scope described herein with specific energy and water efficiency values. The customer is required to replace any failed "equipment" no longer warranted by Honeywell or a Honeywell subcontractor, with "equipment" of equal or greater efficiency for the full contract guarantee term.
10. Limitation of Liability – Security Systems, Fire Alarm Systems and/or Components - Honeywell's total liability for damages of any kind or nature arising out of or relating to any aspect or component of the security or fire alarm systems and/or components provided under this Agreement is limited to \$100,000.
11. Honeywell will provide information necessary to apply for utility incentives. Actual dollar amount of incentive will be determined by the Utility and is not guaranteed by Honeywell.
12. The following areas are specifically excluded from this scope of work. Correction of problems in these areas, if required by Federal, State or local law or ordinance, will be considered additional work and will be chargeable (with approval) to the Customer.
 - a. Any work not specifically stated and outlined in this scope of work.
 - b. Painting and patching of areas beyond those areas directly related to work.
 - c. Existing non-code conditions (examples: existing electrical wiring which requires correction or approval by appropriate inspectors, existing penetrations in need of fire stopping, etc).
13. Extended Warranties or Service Plans: Honeywell will transfer to the Customer manufacturer warranties and service plans to the extent they extend beyond the one year Honeywell warranty. Following the one year Honeywell warranty the Customer will contact the manufacturer directly for warranty or service issues. Honeywell does not guarantee that the manufacturer or service provider will be available throughout the term of the manufacturer's warranty.

B. RELATED WORK SPECIFIED ELSEWHERE

1. Provision of equipment, material, and labor to provide functional measurement and verification systems coordinated under Attachment D – Guarantee and Support Services Agreement.

ATTACHMENT C
INSTALLATION SCHEDULE

The Installation Schedule showing the achievement of all major project milestones, tasks and associated responsibilities included in the Scope of Work will be created using Microsoft Project and inserted behind this cover page.

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Attachment C Project Schedule - Village of Dobbs Ferry



ATTACHMENT D
GUARANTEE AND SUPPORT SERVICES AGREEMENT
(INCLUDING M&V SERVICES, GUARANTEE TERMS, AND SCHEDULE OF GUARANTEED SAVINGS)

Project Name: Village of Dobbs Ferry - Energy Performance Contract

Proposal Number: VODF052422

Date: 05-26-22

("Honeywell")

Honeywell International Inc.
300 South Tryon St., Ste 500
Charlotte, NC 28202

("Customer")

Village of Dobbs Ferry
Dobbs Ferry Village Hall
112 Main St, Dobbs Ferry, NY 10522

Service Location Name(s) and Address(s):

Village Hall	112 Main St, Dobbs Ferry, NY 10522
Public Library	55 Main St, Dobbs Ferry, NY 10522
Embassy Club	60 Palisade St, Dobbs Ferry, NY 10522
Memorial Park Building	105 Palisade St, Dobbs Ferry, NY 10522
Department of Public Works	1 Stanley Ave, Dobbs Ferry, NY 10522
Ambulance Corps. Building	81 Ashford Ave, Dobbs Ferry, NY 10522
Ogden Engine Company	198 Ashford Ave, Dobbs Ferry, NY 10522
Pool House & Offices at Gould Park	Ashford Ave and Beacon Hill Dr, Dobbs Ferry, NY 10522

Summary - The following summary is for informational purposes only. The specific terms, conditions and other specifications set forth in the details of this Guarantee and Support Services Agreement shall take precedence over this summary.

- | | |
|---|--|
| <input type="checkbox"/> Preferred Temperature Control Services | <input type="checkbox"/> Air Filter Services |
| <input type="checkbox"/> Flex Temperature Control Services | <input type="checkbox"/> Water Treatment Services |
| <input type="checkbox"/> Preferred Automation Maintenance Services | <input type="checkbox"/> Critical Parts Stocking |
| <input type="checkbox"/> Flex Automation Services | <input type="checkbox"/> Thermography Services |
| <input type="checkbox"/> Preferred Fire Alarm Maintenance Services | <input type="checkbox"/> Emergency Generator Services |
| <input type="checkbox"/> Fire Alarm Test and Inspect Services | <input type="checkbox"/> In Suite Services |
| <input type="checkbox"/> Preferred Security System Inspect Services | <input type="checkbox"/> Remote Monitoring/Radionics |
| <input type="checkbox"/> Flex Security System Services | <input type="checkbox"/> Indoor Air Quality Auditing Services |
| <input type="checkbox"/> Preferred Mechanical Maintenance Services | <input type="checkbox"/> Service Management Software |
| <input type="checkbox"/> Flex Mechanical Maintenance Services | <input type="checkbox"/> FM Worksite |
| <input type="checkbox"/> ServiceNet™ Remote Monitoring and Control Services | <input checked="" type="checkbox"/> Guarantee Special Provisions |
| <input type="checkbox"/> EBI Services | <input type="checkbox"/> Other/Special Provisions _____ |
| <input checked="" type="checkbox"/> M&V Services | <input type="checkbox"/> Honeywell Users Group |
| <input type="checkbox"/> Online Services | <input type="checkbox"/> Attune™ Advisory Services - Operations |
| <input type="checkbox"/> Advanced Support | <input type="checkbox"/> Attune™ Advisory Services - Energy Optimization |
| <input type="checkbox"/> Site Services | <input type="checkbox"/> Attune™ Advisory Services – Energy Awareness |
| <input type="checkbox"/> Honeywell Energy Analysis Reporting | <input type="checkbox"/> Attune™ Advisory Services – Lobby Digital Signage |

Support Services Agreement Term ("Support Services Term"): Twenty (20) years from the Support Services Effective Date.

Support Services Agreement Effective Date ("Support Services Effective Date"): First (1st) day of the month following the date of Final Project Acceptance of the Work.

Price for Year 1: Eleven Thousand Eight Hundred Sixty Seven Dollars, (\$11,867), (plus applicable taxes). See Section A.6.2 for price in subsequent years.

Payment Terms: Quarterly in Advance

☐ Sales/Use Tax will be Invoiced Separately ☐ Sales/Use Tax is Included in the Price ☒ This Sale is Tax Exempt

Honeywell International Inc., through its Honeywell Building Solutions strategic business unit ("Honeywell"), will provide, or cause to be provided, to Customer the services (the "Support Services") set forth in the attached work scope documents in Part B of this Attachment D ("Support Services Scope") with respect to the Service Location(s) in accordance with the Support Services Scope, and the terms and conditions set forth in Part A of this Attachment D, which together with the guarantee terms and Schedule of Guaranteed Savings set forth in Part C and Part D, respectively, of this Attachment D, constitute this Guarantee and Support Services Agreement (the "Support Services Agreement"). This Support Services Agreement is entered into as Attachment D to, and by execution of, the accompanying Honeywell Agreement between Honeywell and Customer (the "Main Agreement"). Together, the Main Agreement and Support Services Agreements are the "Agreement."

Part A – Support Services Terms & Conditions	
Part B – Support Services Scope Description, including M&V Services	
Part C – Guarantee Terms	
Part D – Schedule of Guaranteed Savings	
<u>Exhibits</u> - The following Exhibits are attached hereto and are made a part of the Agreements:	
Exhibit D-1	Baseline Operating Parameters
Exhibit D-2	Guarantee Period Operating Parameters
Exhibit D-3	Contractual Baseline Conditions, Utility Use, Utility Unit Costs
Exhibit D-4	Baseline Regression for Option C Meters
Exhibit D-5	Engineered Cost Avoidance Calculations
Exhibit D-6	Operations Cost Avoidance Methodology
Exhibit D-7	Detailed M&V Plan
Exhibit D-8	Data-logging Results

PART A. STANDARD TERMS AND CONDITIONS FOR SUPPORT SERVICES

The following terms and conditions, in Sections A.1 to A.8, apply to all Support Services, including M&V Services.

A.1 Terms Incorporated from Main Agreement

The following provisions set forth in the Main Agreement shall apply to the Support Services:

- A.1.1** The Patent Indemnity provision in Section 2.3.
- A.1.2** The Hazardous Substances provision in Section 3.8.
- A.1.3** The Taxes provision in Section 3.9.
- A.1.4** Reserved.
- A.1.5** The Force Majeure provision in Section 5.2.
- A.1.6** The Price Adjustment provision in Section 6.1.3.
- A.1.7** The Insurance provision in Section 8.2 shall apply through the final completion of the Support Services.
- A.1.8** The Indemnity provisions in Article 8.
- A.1.9** The Assignment, Governing Law and Miscellaneous provisions in Article 10 and Article 11.
- A.1.10** Disputes related to the Support Services shall be resolved in accordance with Article 12 of the Main Agreement.

A.2 Working Hours

A.2.1 Unless otherwise stated, all Support Services will be performed during the hours of 8:00am - 4:30pm local time Monday through Friday, excluding federal or state holidays. If for any reason Customer requests Honeywell to perform Support Services outside such hours, any overtime or additional expenses incurred by Honeywell will be billed to and paid by Customer.

A.3 Proprietary Information

A.3.1 All proprietary information (as defined herein) obtained by Customer from Honeywell in connection with this Support Services Agreement will remain the property of Honeywell, and Customer will not divulge such information to any third party or use such information (except as necessary to comply with its obligations under this Agreement) without prior written consent of Honeywell. The term "proprietary information" means confidential or non-public information, including but not limited to, software supplied to Customer, disclosed or made available to Customer by Honeywell. The electronic platform, code and arrangement upon which the legible Energy Savings Calculations are published is "Proprietary." The provisions set forth in Section 11.2 of the Main Agreement shall apply to the "proprietary information."

A.3.2 Customer agrees that Honeywell may use non-proprietary information pertaining to the Agreements, and the work or services performed under the Agreements, for press releases, case studies, data analysis, promotional purposes, and other similar documents or statements to be publicly released, as long as Honeywell submits any such document or statement to Customer for its approval, which approval will not be unreasonably withheld. Honeywell may, during and after the term of the Agreements, compile and use, and disseminate in anonymous and aggregated form, all data and information related to building optimization and energy usage obtained in connection with the Agreements. The rights and obligations in this Section A.3 shall survive termination or expiration of the Agreements.

A.4 Limitation of Liability

A.4.1 THE LIMITATIONS OF LIABILITY AND APPLICATION THEREOF, AS SET FORTH IN ARTICLE 2 AND ARTICLE 8 OF THE MAIN AGREEMENT, SHALL APPLY TO THE PROVISION OF THE SUPPORT SERVICES. NOTWITHSTANDING ANY OTHER PROVISION OF THIS AGREEMENT, THE AGGREGATE LIABILITY OF HONEYWELL FOR ANY CLAIMS ARISING OUT OF OR RELATED TO THIS SUPPORT SERVICES AGREEMENT WILL IN NO CASE EXCEED THE ANNUAL SUPPORT SERVICES AGREEMENT PRICE; PROVIDED, HOWEVER, THAT THIS LIMITATION SHALL NOT APPLY TO THE SPECIFIC SAVINGS GUARANTEE OBLIGATIONS OF HONEYWELL SET FORTH IN THIS ATTACHMENT D.

A.5 Coverage of Support Services

A.5.1 Customer agrees to provide Honeywell access to all equipment and software necessary to Honeywell's performance of the Support Services. Honeywell will be free to start and stop all equipment incidental to the operation of the mechanical, control, automation, and life safety system(s) as arranged with Customer's representative.

A.5.2 Honeywell has no obligation to repair or replace non-maintainable parts of any systems, including, but not limited to, ductwork, piping, shell and tube (for boilers, evaporators, condensers, and chillers), unit cabinets, boiler refractory material, heat exchangers, insulating material, electrical wiring, hydronic and pneumatic piping, structural supports and other non-moving parts. Costs to repair or replace such non-maintainable parts will be the sole responsibility of Customer.

A.5.3 Honeywell will not reload software, or make repairs or replacements necessitated by reason of negligence or misuse of any equipment by persons other than Honeywell or its employees, or necessitated by lightning, electrical storm, or other violent weather or by any other cause beyond Honeywell's control. Honeywell will provide such services at Customer's request and at an additional charge.

A.5.4 Honeywell is not responsible for maintaining a supply of, furnishing and/or replacing lost or needed chlorofluorocarbon (CFC) based refrigerants not expressly required to be provided by Honeywell under this Agreement. Customer is solely responsible for the cost of material and labor relating to any such refrigerant.

A.5.5 Honeywell is not obligated to provide replacement software, equipment, components and/or parts that represent a significant betterment or capital improvement to Customer's system(s) hereunder.

A.5.6 Unless otherwise expressly provided in this Support Services Agreement, Customer retains all responsibility for maintaining LANs, WANs, leased lines and/or other communication mediums incidental or essential to the operation of the system(s) or Covered Equipment.

A.6 Terms of Payment

A.6.1 Customer will pay or cause to be paid to Honeywell the full price for the Support Services, as specified on the first-year line of the Support Services Pricing Table (Section A.6.2) and such price may be adjusted in accordance with this Support Services Pricing Table. Honeywell will submit invoices to Customer in advance for Support Services to be performed during the subsequent billing period, and payment shall be due after Customer's receipt of each such invoice, as set forth in the "Payment Terms" provisions at the beginning of this Attachment D. Payments for Support Services past due more than five (5) days shall accrue interest from the due date to the date of payment at the rate of one and one-half percent (1.5%) per month, compounded monthly, or the highest legal rate, whichever is lower. Customer will pay all attorney and/or collection fees incurred by Honeywell in collecting any past due amounts.

A.6.2 Honeywell may annually adjust the amounts charged for the Support Services provided under the Support Services Agreement as set forth in the schedule below. In addition, Honeywell reserves the right, in its discretion, to increase the price payable by Customer in the event that tariffs (or similar governmental charges) imposed by the United States or other countries result in any increase in the costs that Honeywell used to determine such price.

YEAR	PRICE
1	\$11,867
2	\$12,223
3	\$12,590
4	\$12,967
5	\$13,356
6	\$13,757
7	\$14,170
8	\$14,595
9	\$15,033
10	\$15,484
11	\$15,948
12	\$16,427
13	\$16,920
14	\$17,427
15	\$17,950
16	\$18,488
17	\$19,043
18	\$19,614
19	\$20,203
20	\$20,809

A.7 Termination

A.7.1 Customer may terminate this Support Services Agreement for cause if Honeywell defaults in the performance of any material term of this Support Services Agreement, or fails or neglects to carry forward the Support Services in accordance with this Support Services Agreement, after giving Honeywell written notice of its intent to terminate. If, within thirty (30) days following receipt of such notice, Honeywell fails to cure such default, Customer may, by written notice to Honeywell, terminate this Support Services Agreement.

A.7.2 Honeywell may terminate this Agreement for cause (including, but not limited to, Customer's failure to make payments as agreed herein) if Customer breaches this Agreement. If, within thirty (30) days following Honeywell's notice of breach, Customer fails to make the payments then due, or otherwise fails to cure such breach, Honeywell may, by written notice to Customer, terminate this Agreement and recover from Customer payment for Work performed and for losses sustained, including but not limited to, reasonable overhead, profit and applicable damages.

A.7.3 Honeywell may terminate this Support Services Agreement in the event Honeywell equipment on Customer's premises is destroyed or substantially damaged. Likewise, Customer may terminate this Support Services Agreement in the event Customer's premises are destroyed. In the event of such termination under this Section A.7.3, neither party shall be liable for damages or subject to any penalty, except that Customer will remain liable for Support Services performed to the date of termination.

A.8 Appropriations and Essential Use

A.8.1 Customer reasonably believes that sufficient funds can be obtained to make all payments for the initial term, as described in the summary at the beginning of this Support Services Agreement. Customer hereby covenants that it shall do all things lawfully within its power to obtain funds from which such payments may be made, including making provisions for such payments, to the extent necessary, in each budget submitted for the purpose of obtaining funding, using its bona fide best efforts to have such portion of the budget approved and exhausting all available administrative reviews and appeals in the event such portion of the budget is not approved. It is Customer's intent to make the payments for the initial term if funds are legally available therefore and in that regard Customer represents that (a) the use of the Covered Equipment and Support Services is essential to its proper, efficient and economic functioning or to the services that is provided to its citizens; (b) Customer has an immediate need for and expects to make immediate use of substantially all the Covered Equipment and Support Services, which need is not temporary or expected to diminish in the foreseeable future; and (c) the Covered Equipment and Support Services shall be used by Customer only for the purpose of performing one or more of its governmental or proprietary functions consistent with the permissible scope of its authority.

A.8.2 In the event no funds or insufficient funds are appropriated and budgeted for the acquisition, retention or operation of the Covered Equipment and Support Services under the Support Services Agreement, then Customer shall, not less than sixty (60) days prior to the end of such applicable fiscal period, in writing, notify Honeywell (and its assignee, if any) of such occurrence. The Support Services Agreement shall thereafter terminate and be rendered null and void on the last day of the fiscal period for which appropriations were made without penalty, liability or expense to Customer of any kind, except as to (i) the portions of the payments herein agreed upon for which funds have been appropriated and budgeted or are otherwise available, and (ii) Customer's other obligations and liabilities under the Agreement relating to, accruing or arising prior to such termination. In the event of such termination, Customer agrees to peaceably surrender to Honeywell (or its assignee, if any) possession of any equipment that is provided by Honeywell under the Support Services Agreement, on the date of such termination, packed for shipment in accordance with manufacturer's specifications and eligible for manufacturer's maintenance, and freight prepaid and insured to any location in the continental United States designated by Honeywell, all at Customer's expense. Honeywell (or its assignee, if any) may exercise all available legal and equitable rights and remedies in retaking possession of any equipment provided by Honeywell under this Support Services Agreement.

A.8.3 Notwithstanding the foregoing, Customer agrees (a) that if the Support Services Agreement is terminated in accordance with the preceding paragraph, Customer shall not purchase, lease or rent equipment which performs the same functions as, or functions taking the place of, those performed by the Covered Equipment nor shall it contract for any services similar to or that take the place of the Support Services provided under the Support Services Agreement, and shall not permit such functions to be performed by its own employees or by any agency or entity affiliated with or hired by Customer for the balance of the fiscal period in which such termination occurs or the next succeeding fiscal period thereafter, and (b) that it shall not, during the initial term, give priority in the application of funds to any other functionally similar equipment or services.

The following terms and conditions, in Sections A.9 to A.12, apply to all Support Services, except for the M&V Services.

A.9 Warranty

Any equipment provided as part of the Support Services shall be covered by the warranties set forth in Section 2.4 of the Main Agreement. The warranty term for such equipment shall commence upon installation.

A.10 Refrigerant

A.10.1 Customer is responsible for the containment of any and all refrigerant stored on or about the premises. Customer accepts all responsibility for and agrees to indemnify and hold harmless Honeywell from and against any and all claims, damages, or causes of action that arise out of the storage, consumption, loss and/or disposal of refrigerant, except to the extent Honeywell has brought refrigerant onsite and is directly and solely negligent for its mishandling.

A.11 Coverage of Support Services (other than M&V Services)

A.11.1 It is understood that the repair, replacement, and emergency service provisions of this Support Services Agreement, if any, apply only to the Covered Equipment. "Covered Equipment" means the equipment covered by the Support Services other than M&V Services, if any, to be performed by Honeywell under this Support Services Agreement, and is limited to the equipment expressly identified as such in the Scope of Support Services.

A.11.2 Customer agrees to use Covered Equipment and software covered by the Support Services in accordance with the manufacturer's specifications.

A.11.3 Honeywell may install diagnostic devices and/or software at Honeywell's expense to enhance system operation and support. Upon termination or expiration of this Support Services Agreement, Honeywell may remove these devices and return the applicable system(s) to their original operation. Customer agrees to provide, at its sole expense, connection to the switched telephone network for the diagnostic devices and/or software.

A.11.4 This Support Services Agreement assumes that the applicable systems and/or Covered Equipment and applicable software are in maintainable condition. If repairs are necessary upon initial inspection or initial seasonal start-up, repair charges will be submitted for approval. Should these charges be declined, those non-maintainable items will be eliminated from coverage under this Support Services Agreement and the Support Services Price adjusted accordingly.

A.11.5 In the event that any applicable system or any equipment component thereof is altered, modified, changed or moved, this Support Services Agreement may be immediately adjusted or terminated, at Honeywell's sole option. Honeywell is not responsible for any damages resulting from such alterations, modifications, changes or movement.

A.11.6 Maintenance, repairs, and replacement of equipment parts and components are limited to restoring to proper working condition.

A.11.7 Customer will promptly notify Honeywell of any malfunction in the system(s) or Covered Equipment that comes to Customer's attention.

A.12 Automatic Renewal

A.12.1 After the initial Support Services Term, and only with respect to Support Services other than M&V Services, this Support Services Agreement will automatically renew for consecutive terms of one (1) year each unless terminated by either party by the delivery of written notice to the other at least sixty (60) days prior to the end of the Support Services Term or any renewal period thereof or unless terminated as otherwise provided herein.

PART B. SUPPORT SERVICES SCOPE DESCRIPTION

B.1 Guarantee Analysis Services

B.1.1 Scope – Honeywell will implement the guarantee analysis services outlined in Section B.1.3 (the “M&V Services”) for the following ECMs. The M&V Services are to be performed consistent with the terms of the guarantee set forth in Part C, and the Schedule of Guaranteed Savings and related provisions set forth in Part D, in each case of this Attachment D. Certain defined terms are set forth in Part C.

List of Covered Facilities, Meters, Energy Conservation Measures (“ECMs”) by Service Offering:

(a)	(b)	(c)	(d)
Facility	LDC-Meter # / Utility Type	ECMs (list only ECMs associated with meter listed in Column (b))	Related M&V Services Subsection
Public Library	Electric: NYPA Account #: 59-0906-0665-1800-6 Meter #: 9983281	ECM 1 – LED Lighting & Lighting Controls Upgrade ECM 8 – Building Management System Upgrades ECM 9 – Building Envelope Improvements	Option A
	Natural Gas: Con Edison Account #: 59-0906-0665-2100-0 Meter #: 3491993	ECM 1 – LED Lighting & Lighting Controls Upgrade ECM 8 – Building Management System Upgrades ECM 9 – Building Envelope Improvements ECM 10 – Pipe Insulation	Option C
Village Hall	Electric: NYPA Account #: 59-0906-0665-1900-4 Meter #: 9980097	ECM 1 – LED Lighting & Lighting Controls Upgrade ECM 5 – Roof Top Unit Replacement ECM 6 – Condensing Unit Replacement ECM 7 – Pump & Motor Replacement ECM 8 – Building Management System Upgrades ECM 9 – Building Envelope Improvements ECM 11 – Computer Power Management ECM 12 – Roof Replacement	Option A
	Natural Gas: Con Edison Account #: 59-0906-2765-1900-0 Meter #: 3435865	ECM 1 – LED Lighting & Lighting Controls Upgrade ECM 3 – Boiler Plant Upgrades ECM 4 – Air Handling Unit Replacement ECM 8 – Building Management System Upgrades ECM 9 – Building Envelope Improvements ECM 10 – Pipe Insulation ECM 12 – Roof Replacement	Option C
Memorial Park Building	Electric: NYPA Account #: 59-0906-0665-3600-8 Meter #: 9907900	ECM 1 – LED Lighting & Lighting Controls Upgrade ECM 8 – Building Management System Upgrades ECM 9 – Building Envelope Improvements	Option A

	Natural Gas: Con Edison Account #: 59-0906-2765-3600-4 Meter #: 3643584	ECM 1 – LED Lighting & Lighting Controls Upgrade ECM 8 – Building Management System Upgrades ECM 9 - Building Envelope Improvements	Option C
DPW	Electric: NYPA Account #: 59-0906-0665-4501-7 Meter #: 9987808	ECM 1 – LED Lighting & Lighting Controls Upgrade ECM 8 – Building Management System Upgrades	Option A
	Propane: Paraco Account #: 116842D	ECM 1 – LED Lighting & Lighting Controls Upgrade ECM 8 – Building Management System Upgrades	Option C
Ambulance Corps. Building	Electric: NYPA Account #: 59-0906-0665-1500-2 Meter #: 9860496	ECM 1 – LED Lighting & Lighting Controls Upgrade ECM 8 – Building Management System Upgrades ECM 9 - Building Envelope Improvements	Option A
	Natural Gas: Con Edison Account #: 59-0906-2765-1500-8 Meter #: 3128713	ECM 1 – LED Lighting & Lighting Controls Upgrade ECM 8 – Building Management System Upgrades ECM 9 - Building Envelope Improvements ECM 10 – Pipe Insulation	Option C
Ogden Engine Company	Electric: NYPA Account #: 59-0906-0665-4000-0 Meter #: 7405275 A/4351353	ECM 1 – LED Lighting & Lighting Controls Upgrade ECM 8 – Building Management System Upgrades ECM 9 - Building Envelope Improvements	Option A
	Natural Gas: Con Edison Account #: 59-0906-2765-4000-6 Meter #: 3900842	ECM 1 – LED Lighting & Lighting Controls Upgrade ECM 8 – Building Management System Upgrades ECM 9 - Building Envelope Improvements	Option C
Pool House and Offices at Gould Park	Electric: NYPA Account #: 59-0906-0665-4000-0 Meter #: 7405275 A/4351353	ECM 1 – LED Lighting & Lighting Controls Upgrade ECM 8 – Building Management System Upgrades	Option A
	Natural Gas: Con Edison Account #: 59-0906-2765-4000-6 Meter #: 3900842	ECM 1 – LED Lighting & Lighting Controls Upgrade ECM 8 – Building Management System Upgrades	Option C
Embassy Club	Electric: NYPA Account #: 59-0906-0665-2001-0 Meter #: 9360142	ECM 1 – LED Lighting & Lighting Controls Upgrade ECM 8 – Building Management System Upgrades ECM 9 - Building Envelope Improvements	Option A
	Natural Gas: Con Edison Account #: 59-0906-2765-3700-2 Meter #: 3971710	ECM 1 – LED Lighting & Lighting Controls Upgrade ECM 8 – Building Management System Upgrades	Option C
	Natural Gas: Con Edison Account #: 59-0906-2765-1700-4 Meter #: 4080205	ECM 9 - Building Envelope Improvements ECM 10 – Pipe Insulation	

Street Lighting	Electric: NYPA Account #: 65-0554-0000-0000-0	ECM 2 – Street Lighting Upgrades	Option A
	Electric: NYPA Account #: 65-0565-0000-0000-0		
	Electric: NYPA Account #: 65-1565-0000-0000-0		
	Electric: NYPA Account #: 65-1565-0000-0000-0		

B.1.1.1 General Descriptions – The following are general descriptions of one or more approaches to providing guarantee analysis services. The specific details of the M&V Services relating to the Retrofit as set forth in this Support Services Agreement take precedence over these descriptions.

Option A—Retrofit Isolation with Key Parameter Measurement

This option is based on a combination of measured and estimated factors when variations in factors are not expected. Measurements are spot or short-term and are taken at the component or system level, both in the baseline and post-installation cases. Measurements should include the key performance parameter(s) which define the energy use of the ECM. Estimated factors are supported by historical or manufacturer's data. Savings are determined by means of engineering calculations of baseline and post-installation energy use based on measured and estimated values. Savings are calculated using direct measurements and estimated values, engineering calculations and/or component or system models often developed through regression analysis. Adjustments to models are not typically required.

Option B—Retrofit Isolation with All Parameter Measurement

This option is based on periodic or continuous measurements of energy use taken at the component or system level when variations in factors are expected. Energy or proxies of energy use are measured continuously. Periodic spot or short-term measurements may suffice when variations in factors are not expected. Savings are determined from analysis of baseline and reporting period energy use or proxies of energy use. Savings are calculated using direct measurements, engineering calculations, and/or component or system models often developed through regression analysis. Adjustments to models may be required.

Option C – Utility Data Analysis

This option is based on long-term, continuous, whole-building utility meter, facility level, or sub-meter energy (or water) data. Savings are determined from analysis of baseline and reporting period energy data. Typically, regression analysis is conducted to correlate with and adjust energy use to independent variables such as weather, but simple comparisons may also be used. Savings calculations use regression analysis of utility meter data to account for factors that drive energy use. Adjustments to models are typically required.

Option D—Calibrated Computer Simulation

Computer simulation software is used to model energy performance of a whole-facility (or sub-facility). Models must be calibrated with actual hourly or monthly billing data from the facility. Implementation of simulation modeling requires engineering expertise. Inputs to the model include facility characteristics; performance specifications of new and existing equipment or systems; engineering estimates, spot-, short-term, or long-term measurements of system components; and long-term whole-building utility meter data. After the model has been calibrated, savings are determined by comparing a simulation of the baseline with either a simulation of the performance period or actual utility data. Savings calculations are done based on computer simulation model (such as eQUEST) calibrated with whole-building or end-use metered data or both. Adjustments to models are required.

B.1.2 Coverage – The M&V Services includes all labor, travel, and expenses to perform the services and frequency described in Section B.1.3. In general, and subject to details of the M&V Plan, Honeywell will provide a single (1) reporting submission of the determination of the amount of Cost Avoidance for each Guarantee Year. Services not explicitly described in Section B.1.3, including Customer Guarantee Responsibilities, are not included.

B.1.3 M&V Plan: In general, the M&V Services:

- (a) are required to be performed for the entire Guarantee Term;
- (b) may employ one or more of Options A, B, C or D; and
- (c) include delivering a report on an annual basis, for either the entire Guarantee Term, or for a shorter M&V reporting term.

The details of the M&V Services are set forth in the M&V Plan, as described in detail in Exhibit D-7, which takes precedence over the general description in this Section B.1.3.

B.1.4 M&V Offerings – In coordination with Section B.1.1, HONEYWELL will perform the Measurement & Verification (M&V) offerings checked below:

☒ **B.1.4.1 Retrofit Isolation Energy Audit for Option A Verified ECMs** – HONEYWELL will provide *Option A* energy guarantee auditing services as detailed in Attachment D, and Exhibits to Attachment D for specific Energy Conservation Measures (ECMs) identified in Attachment D and/or Exhibits to Attachment D as using *Option A* methodologies for Measurement and Verification. HONEYWELL will provide this one-time determination of the quantity of energy avoidance of the CUSTOMER'S facility for the First Guarantee Year only. Option A methods will be applied on an ECM specific basis (i.e., isolated to the retrofit) and Energy Cost Avoidance for a Guarantee Year will be quantified and summarized on an ECM basis. After the ECM's potential-to-save has been verified (Section B.1.3) HONEYWELL shall either stipulate the quantity of cost avoidance or determine the cost avoidance from engineering calculations and measurement of specific variables as described in Section D.1.1.1. Utility bill auditing (Option C) and reconciliation of Option A results to utility meter bill data is not included. The Option A retrofit isolation method was selected by the CUSTOMER to provide an economical reconciliation method and to minimize the interactive effects on the determination of cost avoidance due to changes to the site or facilities from the baseline conditions.

HONEYWELL will provide a single (1) reporting submission of the determination of energy avoidance for the First Guarantee Year. The Energy Avoidance quantified in the First Guarantee Year will be stipulated as the annual Energy Avoidance for each Guarantee Year of the remaining contract term. Reporting of Cost Avoidance will occur each year of the term and the monetization of Cost Avoidance will be determined as described in Section D.1.1.1.

Work Coverage: Utility Meters listed in Section B.1.1 designated as Option A

Term Coverage: Year 1 Monitoring; Year 2 to End of Term stipulated based on Year 1 Results

Option A Audit Report section will be submitted: ☐ 1-Time Only ☐ Quarterly
☐ Semi-Annually ☒ Annually

B.1.4.2. - Reserved

B.1.4.3. - Reserved

B.1.4.4. - Reserved

☒ **B.1.4.5 Utility Bill Energy Audit for Option C verified ECMs** – HONEYWELL will provide *Option C* energy guarantee auditing services as detailed in Attachment D and Exhibits to Attachment D for specific Energy Conservation Measures (ECMs) identified in Attachment D and/or Exhibits to Attachment D as using *Option C* methodologies for Measurement and Verification to quantify the derived Energy Cost Avoidance of the CUSTOMER's facility. Under *Option C* services, HONEYWELL will analyze CUSTOMER'S energy use and costs against an "established baseline" described in Attachment D and Exhibits to Attachment D. HONEYWELL will use energy auditing software to track monthly facility costs, energy consumption, and Energy Cost Avoidance and to quantify and report on changes in energy usage due to changes in billing periods and weather. HONEYWELL will adjust the baseline for changes in energy usage due to changes in variables including, but not limited to billing periods, weather, production, occupancy, building load, conditioned building area, equipment operation, and scheduling methodologies etc. as defined in Attachment D and Exhibits to Attachment D. These routine and non-routine baseline adjustments will be calculated using industry-standard engineering calculations. Reporting of Cost Avoidance will occur each year of the term and the monetization of Cost Avoidance will be determined as described in Section D.1.1.1.

Work Coverage: Utility Meters listed in Section B.1.1 designated as Option C

Term Coverage: Year 1 to End of Term

Option C Audit Report section will be submitted: ☐ 1-Time Only ☐ Quarterly
☐ Semi-Annually ☒ Annually

PART C. GUARANTEE TERMS

C.1. Definitions

When used in this Agreement, the following capitalized words shall have the meanings ascribed to them below:

“Annual Scheduled Savings” means for any applicable Guarantee Year, the amount set forth in the Schedule of Guaranteed Savings in Section D.1.

“Baseline” or **“Base Year”** is the description that defines the Baseline Usage unit costs and facilities, systems, or equipment operations and characteristics, and environmental conditions that are to be used as the benchmark for determining Cost Avoidance. It may not always be one contiguous element of time and may be different from a 365-day annual period.

“Baseline Period” is the period of time (specified in Part D) coordinated with the Baseline Usage, including for the purpose of utility bill analysis, to allow the comparison of a Guarantee Year against a Baseline. The Baseline Period may not always be one contiguous element of time and may be different from a 365-day annual period. Baseline information from non-contiguous elements of time may be normalized and assigned to a specified Baseline Period.

“Baseline,” “Baseline Usage” or “Baseline Demand” is the calculated or measured Energy usage (demand) by a piece of equipment or a site prior to the implementation of the ECMs. Baseline physical conditions, such as equipment counts, nameplate data, and control strategies, will typically be determined through surveys, inspections, and/or metering at the site.

“Construction Period” is the time period between the start of the project installation and the date of Final Project Acceptance.

“Cost Avoidance” means the difference between the actual cost incurred during a selected time period versus what the cost *would have been* had the ECM not been implemented, including without limitation avoided, defrayed, or reallocated costs.

“Customer Guarantee Practices” are those practices identified herein, intended to achieve Cost Avoidance or necessary to the analysis thereof, as set forth in Section C.4.

“Energy” means utilities and may include electricity and fuels to operate HVAC equipment, facility mechanical and lighting systems, and energy management systems, and water and sewer usage, and secondary utilities such as district steam or compressed air as applicable.

“Energy Costs” means the cost of Energy.

“ECM” means an energy conservation measure, which is the installation of equipment or systems, or modification of equipment or systems as described in Attachment A, for the purpose of avoiding utility (energy, water, etc.) consumption and demand and costs and/or non-utility (O&M, operational) costs.

“Excess Savings” means for any Guarantee Year, the amount, if any, by which the Cost Avoidance applicable to that Guarantee Year exceeds the Annual Scheduled Savings.

“Facilities” shall mean those buildings, or any other facility, location or infrastructure, where Savings will be realized.

“Financing Document” refers to that document, if any, executed between Customer and a third-party financing entity providing for payments from Customer to third-party financing entity.

“Final Project Acceptance” refers to date of Customer signature of the Final Project Acceptance Certificate (see Attachment J) indicating Customer acceptance of the installation of all of the ECMs.

“First Guarantee Year” is defined as the period beginning on the first (1st) day of the month following the date of Final Project Acceptance of the Work installed and ending on the day prior to the first (1st) anniversary thereof.

“Guarantee Period” is defined as the period beginning on the first (1st) day of the First Guarantee Year and ending on the last day of the final Guarantee Year, also known as the **“Measurement and Verification Phase”**, **“Measurement and Verification Period”**, **“Performance Period”**, or **“Performance Phase”**.

“Guarantee Year” is defined as the First Guarantee Year and each of the successive twelve (12) month periods commencing on the anniversary of the commencement of the First Guarantee Year throughout the Guarantee Term.

“Guaranteed Savings” is defined as the total scheduled amount of Cost Avoidance that Honeywell is guaranteeing, as set forth in Section D.1 of Part D.

“Guarantee Term” shall have the meaning as defined in Section C.2.1 hereof, also referred to as “Term.”

“M&V” means measurement and verification.

“M&V Systems and Equipment” as used in this Guarantee means the systems and equipment identified in Honeywell’s Scope of Work and M&V Services, including as set forth in Section C.4.1.

“Material Change” is defined as any change in the following which reasonably could be expected to increase or decrease Energy or Operational Costs at a Facility by a value more than five percent (5%) of the Annual Scheduled Savings per utility meter or submeter, as applicable:

- (1) manner of use of the Facility by Client;
- (2) hours of operation of any equipment, building or energy system contained in the Facility;
- (3) occupancy of the Facility;
- (4) structure of the Facility;
- (5) types of equipment used in the Facility; or
- (6) conditions affecting energy use in the Facility.

“Measurement and Verification Plan” or “M&V Plan” is defined as the plan providing details on how the Guaranteed Savings will be verified.

“Operational Costs” commonly referred to as O&M costs, shall include the cost of operating and maintaining the Facilities, such as, but not limited to, the cost of inside and outside labor to repair and maintain affected systems and equipment, the cost of custodial supplies, the cost of replacement parts, the cost of deferred maintenance, the cost of lamp and ballast disposal, and the cost of new capital equipment.

“Potential-to-Save” or “Potential-to-Perform” by an ECM is satisfied when a measure is properly installed and has the potential to generate predicted levels of Cost Avoidance. Verification of an ECM's "potential-to-save" is satisfied upon Customer's signing of a Certificate of Substantial Completion, as set forth in Attachment J, or its equivalent.

“Retrofit” is the work provided by Honeywell as defined by the “ECMs.”

“Retrofit Costs” are the sum of (i) the price for the Work; (ii) interest and other direct fees for financing required to be made by Customer pursuant to the Financing Document; and (iii) the payments required to be made by Customer for the M&V Services.

“Retrofit Isolation Method”, “RIM”, “RIM Approach” or “Retrofit Isolation Method Approach” is an M&V approach that verifies the Guaranteed Savings using techniques that isolate the Energy use of the ECM and affected systems separate from the Energy use of the rest of the Facility. This method is used to mitigate the interactive Energy effects of changes made to the Facility outside of Honeywell’s control.

“Savings” is another term for Cost Avoidance.

“Total Guarantee Year Savings” is defined as the summation of Cost Avoidance realized by Facilities in each Guarantee Year as a result of the Retrofit, and Support Services provided by Honeywell, as well as Excess Savings, if any, carried forward from previous years.

C.2. Term and Termination

C.2.1 Guarantee Term. The Guarantee Term shall commence on the first (1st) day of the month following the date of Final Project Acceptance of the Work installed pursuant to this Agreement, and shall terminate at the end of the Support Services Term (as defined at the beginning of this Attachment D), unless terminated earlier as provided for herein.

C.2.2 Guarantee Termination. Customer shall continue to contract with Honeywell for the M&V Services set forth in this Support Services Agreement for the entire Guarantee Term. Should this Support Services Agreement, or other existing agreements for the M&V Systems and Equipment not covered in this Support Services Agreement, be terminated in whole or in part for any reason, the Guarantee Term shall also terminate on the same date. The Guaranteed Savings for a Guarantee Year in which such termination becomes effective shall be prorated as of the effective date of such termination, with a reasonable adjustment for seasonal fluctuations in Energy Costs and Operational Costs, and the Guaranteed Savings for all subsequent Guarantee Years shall be null and void. M&V Services are conducted throughout the Guarantee Year and in the event Customer terminates during the year, Customer shall pay Honeywell the annual price for services prorated to the date of Honeywell's receipt of Customer's notice of termination.

C.3. Savings Guarantee

Guaranteed Savings Calculations Details

C.3.1 Guarantee of Savings. Honeywell guarantees to Customer that the identified Facilities will realize the total Guaranteed Savings through the combined value of all ECMs over the Guarantee Term, as defined herein.

C.3.1.1 Additional Savings Before Final Project Acceptance. All Cost Avoidance realized by Customer that result from activities undertaken by Honeywell prior to Final Project Acceptance, including any utility rebates or other incentives earned as a direct result of the installed ECMs or Support Services provided by Honeywell, will be applied toward the Guaranteed Savings for the First Guarantee Year.

C.3.1.2 Additional Savings After Final Project Acceptance. Additional Cost Avoidance, including any utility rebates or other incentives, that can be demonstrated, or earned, as a result of Honeywell's efforts that result in no additional costs to Customer beyond the costs identified in this Agreement will be included in the M&V Report (as defined in Section C.3.2 below) for the applicable Guarantee Year(s).

C.3.1.3 Satisfaction of Guarantee. The Guaranteed Savings in each Guarantee Year are considered satisfied if the Total Guarantee Year Savings for such Guarantee Year equals or exceeds the Annual Scheduled Savings.

C.3.1.4 Excess Savings. Excess Savings shall be carried forward and applied to any future Guarantee Year(s). In the event Honeywell has previously paid Customer for a Guaranteed Savings shortfall in a past Guarantee Year, pursuant to Section C.3.1.5, then Excess Savings in current Guarantee Year shall be billed to Customer (but only up to any amounts previously paid by Honeywell for a shortfall) and Customer shall pay Honeywell within thirty (30) days after receipt of such bill, and any remaining Excess Savings shall be carried forward and applied against Guaranteed Savings shortfalls in any future Guarantee Year.

C.3.1.5 Savings Shortfalls. In the event that the Total Guarantee Year Savings in any Guarantee Year is less than the Annual Scheduled Savings, after giving credit for any Excess Savings carried forward from previous Guarantee Years pursuant to Section C.3.1.4, Honeywell shall, upon receipt of written demand from Customer, compensate Customer the amount of any such shortfall, in such form as agreed to by the parties, limited by the total value of the Guaranteed Savings, within sixty (60) days. Resulting compensation shall be Honeywell's sole liability for any shortfall in the Guaranteed Savings. In case of a shortfall, Honeywell reserves the right, subject to Customer approval, which shall not be unreasonably withheld, to implement additional operational improvements or conservation measures, at no cost to Customer, that will generate additional savings in future years of the Guarantee Term, and Honeywell has the option of extending its M&V Services to verify successful performance.

C.3.1.6 Aggregation of Savings. The parties mutually agree that the Guaranteed Savings for this Agreement and the Guaranteed Savings for all previous active projects with guaranteed savings for this Customer shall be combined each year until the end of the original guarantee term for each project. Throughout the duration of the term for each specific phase the total savings will be utilized as an aggregate in satisfying the sum of the respective guarantees.

Guaranteed Savings Reconciliation Process

C.3.2 Guaranteed Savings Reconciliation Documentation. As part of the M&V Services, and as set forth in the M&V Plan, Honeywell will provide Customer with a Guaranteed Savings reconciliation report ("M&V Report") within ninety (90) days after receipt of the information Customer is to provide as part of the Customer Guarantee Practices that is reasonably necessary to the preparation of the M&V Report. Data and calculations utilized by Honeywell in the preparation of its M&V Report will be made available to Customer, along with such explanations and clarifications as Customer may reasonably request.

C.3.2.1 Acceptance of M&V Report. Customer will have forty-five (45) days to review the M&V Report and provide written notice to Honeywell of non-acceptance of the Guaranteed Savings for that Guarantee Year. Failure to provide written notice within forty-five (45) days of the receipt of the M&V Report will deem it accepted by Customer.

C.3.2.2 Guaranteed Savings Reconciliation. Guaranteed Savings will be determined in accordance with the methodology(s), operating parameters, formulas, and constants as described in this Attachment D and the exhibits, using the M&V Services as defined herein, and/or additional methodologies defined by Honeywell that may be negotiated with Customer at any time. Upon contract execution, Customer agrees to and accepts the standard methods that Honeywell uses to conduct M&V Services, including, but not limited to, RIM and Option C Utility Data Analysis (see Part C for RIM and Option C definitions as further detailed in the Measurement and Verification Plan in this Attachment D and the exhibits), as well as cost avoidance calculations, as inferred by, referenced by or included in the energy calculations developed by Honeywell and attached hereto as Exhibit D-5 Engineered Cost Avoidance Calculations.

C.3.2.3 Base Year Adjustments. The Baseline shall be adjusted to reflect:

- (a) changes in occupied square footage;
- (b) changes in energy-consuming equipment, including any repairs or improvements made to the equipment as part of this Agreement;
- (c) changes in the Facilities;
- (d) changes in Customer Guarantee Practices adversely affecting energy consumption and/or demonstrated operational changes;
- (e) changes in weather between the Baseline Period and the Guarantee Year; and
- (f) documented or otherwise conclusively established metering errors for the Baseline Period and/or any Guarantee Year adversely affecting Energy usage measurement.

C.3.2.4 Other Potential Guarantee Adjustments. Honeywell's Guaranteed Savings obligations under this Agreement are contingent upon:

- (a) Customer following each of the Customer Guarantee Practices set forth herein;
- (b) no alterations or additions being made by Customer to any of the M&V Systems and Equipment without prior notice to and agreement by Honeywell;
- (c) The absence of any event Customer is to report under Section C.4.5; and
- (d) Honeywell's ability to render services not being impaired by circumstances beyond its control.

To the extent Customer defaults in or fails to perform fully any of its obligations under the Agreement, including without limitation any of the Customer Guarantee Practices, or the occurrence of any event Customer is to report under Section C.4.5, Honeywell may, in its sole discretion, adjust its Guaranteed Savings obligation or deem it met; provided, however, that no adjustment hereunder shall be effective unless Honeywell has first provided Customer with written notice of Customer's default(s) or failure(s) to perform and Customer has failed to cure its default(s) or failure(s) to perform within thirty (30) days after the date of such notice.

In addition, if for any reason any Facility and/or utility meter covered under this Agreement is materially unoccupied, closed, or discontinued, the Savings will be deemed realized for such Facility or meter, and the Guaranteed Savings will be adjusted accordingly. Honeywell will provide written notice of such adjustment to the Customer.

C.3.2.5 Adjustments for Material Changes. In the event of any increase or decrease in energy consumption and demand for any month resulting from a reported Material Change (see Section C.4.5.1) or unreported Material Change (see Section C.3.2.6), the amount of that increase shall be subtracted from, or that decrease shall be added to, the total energy consumption and demand for that month prior to the calculation of energy savings. If a reported or unreported Material Change affected energy consumption and demand in the same calendar month in the preceding year, the *next preceding* contract year where a Material Change has not occurred will be used to compute the value of the Material Change and the energy savings for the current month.

C.3.2.6 Unreported Material Changes. In the absence of any Material Change in the Facilities or in their operations reported by Customer under Section C.4.5.1 below, energy consumption and demand should not change from year to year. Therefore, if energy consumption and demand per utility meter or submeter for any month increases by five percent (5%) or more of the Annual Scheduled Savings per meter from the Energy consumption and demand for the same month of the *preceding* year, after adjustment for changes to climactic conditions, then such increase shall be deemed to have resulted from a Material Change, except where such increase is due to equipment malfunction, faulty repair or other acts of negligence by Honeywell.

C.3.2.7 Guarantee Based on Agreement Only. Customer's request for proposal or qualifications, Honeywell's proposal and any other documents submitted by Honeywell to the Customer prior to negotiation of this Agreement are expressly excluded from and are not a part of this Agreement. The parties agree that although the Honeywell proposal may have contained scope items, guaranteed savings and M&V options other than those stated in the Agreement, the final scope of work, Schedule of Guaranteed Savings, and M&V Plan were developed jointly by the parties through negotiation. The Customer has chosen to purchase the scope of work set forth in Attachment A. The Customer accepts the Guaranteed Savings and agrees to the M&V Plan set forth herein.

C.4 Customer Guarantee Practices

C.4.1 Equipment Subject to these Provisions. M&V Systems and Equipment affecting the Guaranteed Savings include:

- (a) equipment provided as per Attachment A – Scope of Work;
- (b) modifications made to existing equipment as outlined in Attachment A – Scope of Work;
- (c) existing or new equipment not provided or modified under this Agreement, but materially affected by the work provided per Attachment A – Scope of Work and consuming energy or water via utility meters covered by the Agreement.

C.4.2 Hours and Practices. To achieve the Savings, Honeywell and Customer agree upon the Guaranteed Period operating parameters described in Exhibit(s) D-1 and D-2. The Customer agrees to operate, or cause to effect the operation of, the M&V Systems and Equipment in such manner that is in accordance with these Guaranteed Period operating parameters.

C.4.3 Customer Maintenance and Replacement Responsibilities. During the term of this Support Services Agreement, for all equipment affecting the Guaranteed Savings, the Customer shall perform on-going maintenance and accomplish component replacement and equipment repairs in accordance with manufacturer's standards and practices and take all reasonable measures to insure the equipment is operating at full efficiency. Component replacement and equipment repairs must be accomplished in a timely fashion. Additionally, Customer shall insure such equipment is operated at all times in accordance with applicable manufacturer's specifications, Honeywell specifications, and the requirements contained herein. For all non-Honeywell maintenance actions, Customer shall document and make available to Honeywell maintenance dates and tasks accomplished, the start date and duration of all deficient equipment operation and the subsequent corrective action and/or repair dates. Customer shall replace any vandalized or any failed equipment or component no longer warranted by Honeywell or the manufacturer, with equipment or components of equal or greater efficiency value than installed by Honeywell, for the full Guarantee Term. Customer shall be responsible to investigate and correct any reported deficiencies not covered under this Support Services Agreement.

C.4.4 Facility Operational Changes. Except in the case of emergencies, Customer agrees it will not, without the consent of an authorized representative of Honeywell:

- (a) make any significant deviations from the applicable Customer Guarantee Practices;
- (b) put any system or item of equipment in a permanent "on" position, if the same would constitute a deviation from the applicable Customer Guarantee Practices; or
- (c) assume manual control of any energy management system or item of equipment, if the same would constitute a deviation from the applicable Customer Guarantee Practices.

C.4.5 Customer Reporting Responsibilities. Customer shall report to Honeywell in writing within fifteen (15) days of the following changes or events:

- (a) any additional energy source or change in existing energy source or supplier that the Customer may negotiate during the term of this Guarantee and/or,
- (b) any material change in system or equipment status, including replacement of, addition to, or modification of existing energy and/or water consuming systems or equipment and/or,
- (c) any long term temporary (equal to or greater than 10 days) or permanent changes in operating schedules and/or,
- (d) any material changes in the payment schedule, such as due to refinancing or variable interest rate and/or,
- (e) for any reason any Facility and/or utility meter covered under this Agreement is materially unoccupied, closed, or discontinued

Customer shall promptly notify Honeywell of any other activities known to Customer which could adversely impact the ability to realize the Guaranteed Savings.

C.4.5.1 Reported Material Changes. Customer shall deliver to Honeywell a written notice describing and explaining all actual or proposed Material Changes (as defined above in Section C.1) in a Facility or in the operations in a Facility and their anticipated effect on Energy or Operational Costs. Said notice must be delivered to Honeywell no less than seven (7) days before any actual or proposed Material Change occurs.

C.4.6 Customer Granted Access for Remote Diagnostics. Customer shall allow Honeywell to perform remote diagnostics on all equipment associated with the Guaranteed Savings for operational compliance with the manufacturer's specifications, and the requirements contained herein. Customer is responsible for implementation and costs for remote Honeywell access through Customer's firewall(s) to the controllers and front-end computer(s) for one (1) remote user designated by Honeywell using one or more of the following processes:

- TCP/IP Remote Access: A dedicated static IP address, installation and on-going maintenance and subscription and licensing fees for access hardware and software and one (1) station license dedicated to the remote user, or
- Phone Lines: To be provided by customer for off-site monitoring, up to two (2) lines for each front end, as needed, one (1) line for each separate remote bus, as well as on-going maintenance of the lines.

If remote access is interrupted, at any time during the Guarantee Term, Honeywell reserves the right to suspend any reporting requirements until remote access has been restored.

C.4.7 Customer Provided Documentation. It will be the responsibility of the Customer to provide to an individual designated by Honeywell on a minimum monthly basis (unless noted otherwise):

- (a) Verification that equipment installed to perform the ECMs has been properly maintained, including but limited to provision of maintenance records.
- (b) Current status of the buildings (i.e., occupancy level and use, hours of operation, etc.).
- (c) Records of customer-initiated changes in equipment setpoints, start/stop conditions, usage patterns.
- (d) Records of customer-initiated changes in operation of mechanical systems, which may impact the ECMs.
- (e) Records regarding addition or deletion of equipment or building structure, which may impact the ECMs or the building energy consumption.
- (f) Copies of monthly utility bills and utility summary data on a *monthly* basis, and fuel storage tank levels, including without limitation fuel oil and biomass levels, in each case within two (2) weeks following the Customer's receipt thereof, and access to utility accounts through an authorization by the Customer to the Utility to allow the release of data to a Honeywell representative, together with access to relevant records relating to such utility costs.
- (g) Access to any maintenance records, drawings, control system trend data, or other data reasonably deemed necessary by Honeywell to perform the M&V Services.

C.4.8 Customer Governmental Unit Reporting Responsibilities. Customer is solely responsible for reports to be submitted to the Department of Commerce, Public Utilities/Services Commission, or any other governmental agency or governmental unit.

C.4.9 Customer Rebate and Ratchet Reset Responsibilities. It is understood that all energy rebates and/or refunds are the result of an agreement between Customer and the utility company and Honeywell assumes no responsibility for obtaining said rebates and/or refunds. It is understood that said rebates and/or refunds are not included in the Guaranteed Savings. The Customer is responsible for procuring a ratchet reset from the local utility company, as applicable.

PART D. SCHEDULE OF GUARANTEED SAVINGS

D.1. Schedule of Guaranteed Savings

The Guaranteed Savings over the Guaranteed Term is equal to or greater than \$2,840,567. The Guaranteed Savings and the Annual Scheduled Savings are set forth in the table below (such table, the “**Schedule of Guaranteed Savings**”):

YEAR	ENERGY	OPERATIONAL	TOTAL
1	\$79,091	\$26,623	\$105,714
2	\$81,463	\$27,422	\$108,885
3	\$83,907	\$28,244	\$112,151
4	\$86,424	\$29,092	\$115,516
5	\$89,017	\$29,965	\$118,982
6	\$91,688	\$30,864	\$122,552
7	\$94,438	\$31,789	\$126,227
8	\$97,271	\$32,743	\$130,014
9	\$100,190	\$33,725	\$133,915
10	\$103,195	\$34,737	\$137,932
11	\$106,291	\$35,779	\$142,070
12	\$109,480	\$36,853	\$146,333
13	\$112,764	\$37,958	\$150,722
14	\$116,147	\$39,097	\$155,244
15	\$119,632	\$40,270	\$159,902
16	\$123,221	\$41,478	\$164,699
17	\$126,917	\$42,722	\$169,639
18	\$130,725	\$44,004	\$174,729
19	\$134,647	\$45,324	\$179,971
20	\$138,686	\$46,684	\$185,370
TOTALS	\$2,125,194	\$715,373	\$2,840,567

Provided however, that, notwithstanding the above, in no event shall the Guaranteed Savings exceed the total Retrofit Costs over the Guaranteed Term. For sake of clarity, actual or pro forma budget neutral or positive cash flows are not guaranteed.

D.1.1 Energy Savings. The first year amount of Savings for Energy Costs is the sum of the below listed ECMs. Actual Savings may be lower than as set forth in the Schedule of Guaranteed Savings because of an absolute increase in Energy use due to the implementation of measures to increase environmental comfort as directed by the Customer, and other baseline adjustments (see Section D.2). The Guaranteed Savings are less than the projected Savings, represented in Exhibit D-5. Cost Avoidance is based on the Customer Guarantee Practices set forth in Section C.4.

Att A No. [a]	ECM Description	Electric Year 1	Nat Gas Year 1	Propane Year 1	Total Year 1
1	LED Lighting and Lighting Controls Upgrade	\$16,108	\$(288)	\$(223)	\$15,597
2	Street Lighting Upgrades	\$44,139	\$0	\$0	\$44,139
3	Boiler Plant Upgrades	\$0	\$1,639	\$0	\$1,639
4	Air Handling Unit Replacement	\$0	\$953	\$0	\$953
5	Roof Top Unit Replacement	\$715	\$0	\$0	\$715
6	Condensing Unit Replacement	\$91	\$0	\$0	\$91
7	Pump & Motor Replacement	\$33	\$0	\$0	\$33
8	Building Management System Upgrades	\$939	\$7,475	\$1,807	\$10,221
9	Building Envelope Improvements	\$392	\$1,716	\$0	\$2,108
10	Pipe Insulation	\$0	\$2,583	\$0	\$2,583
11	Desktop Computer Power Management	\$772	\$0	\$0	\$772
12	Roof Replacement	\$3	\$237	\$0	\$240
	Totals	\$63,192	\$14,315	\$1,584	\$79,091

[a] Att A: Attachment A – Scope of Work.

Customer agrees that the baseline for the unit cost of Energy will be adjusted each year of the Guarantee Term. This

Attachment D – Guarantee and Support Services Agreement

annually adjusted value of Energy unit cost is stipulated as the new baseline in each succeeding year. Customer agrees that Baseline adjustment is stipulated to be an escalation of 3% per year for the unit cost of electric utilities, 3% per year for gas utilities, and 3% per year for propane utilities, used in the determination of Cost Avoidance each year.

D.1.1.1 Calculating Cost Avoidance

(a) Customer agrees that the baseline for the unit cost of Utilities will be adjusted each year of the Guarantee Term to reflect a stipulated escalation of 3% per year for the unit cost of electric, natural gas, and propane. This annually adjusted value of Energy unit cost is stipulated as the new baseline in each succeeding year and may be used in the determination of Cost Avoidance each year in accordance with section D.1.1.1(b).

(b) The calculation of Cost Avoidance is defined below:

(i) For Option A, utility bills will not be used to evaluate the current year rate. The only rate to be used for Option A monetization is the baseline utility rate, defined in Exhibit D-3, plus annual escalation (see paragraph D.1.1.1 (a)).

(ii) Option C analysis utilizes Metrix™, an independent 3rd party industry-standard utility accounting and normalization software platform. The energy and cost avoidance for Option C analysis using Metrix or otherwise is determined on a monthly basis. Energy Avoidance is monetized by comparing the blended unit cost from each month's utility bill with the baseline contractual rate, escalated per section D.1.1.1 (a), to determine the rate to use for calculation of monthly cost avoidance. The calculation of Cost Avoidance for Option C is based upon the utility rate paid during the Guarantee Year, or the Baseline Period utility rate plus escalation, whichever produces the highest Cost Avoidance.

(c) Fuel Conversion: Reserved

(d) Cost Avoidance may also include, but is not limited to, savings from demand charges, power factor correction, taxes, ratchet charges, rate changes and other utility tariff charges that are reduced as a result of Honeywell involvement. In case the Customer does not procure any ratchet reset, rate change or other utility tariff charge reduction, or in the event that such ratchet, rate or tariff changes before the Guarantee Period ends, Cost Avoidance nonetheless will be calculated as if the ratchet, rate or tariff has been reset at the end of the installation of demand-reducing ECMs, or continues, as applicable.

(e) In the event, the current Guarantee Year utility tariff is significantly changed in structure from that which existed during the Baseline Period, including, but not limited to, the addition or deletion of measured or billed demand structures, Time of Use, Seasonal or Block & Tail billing structures, the Customer will not unreasonably withhold acceptance to abandon the new tariff (i.e., Current Rate) and will only use the baseline plus escalator as described in section D.1.1.1 (a).

(f) The constants and/or stipulated values defined in the Exhibits, or as defined herein, are mutually agreed to by the Customer to be reasonable and may be used in the determination of Cost Avoidance.

D.1.1.2 Acceptance of Measurement & Verification Methods

Upon contract execution, Customer accepts the standard methods that Honeywell uses to conduct Retrofit Isolation Method (RIM) and Option C Measurement & Verification (M&V), as well as cost avoidance calculations, as described herein and inferred by or included in the energy calculations and regression models attached hereto. Customer has the right and may to hire a consultant to review the calculations and comment before the contract is signed and the price accepted. Any future use of a consultant to review M&V methods and work product is at Customer's discretion and expense. Customer agrees that any such consultant's review shall be limited to the M&V methods as selected by the Customer prior to contract execution and as detailed and defined in this Agreement.

D.1.2 Operational Cost Savings. The first-year amount of Savings for Operational Costs is the sum of the below listed ECMs. The Savings are based on the Customer Guarantee Practices set forth in Section C.4. The Operational Costs Savings described below and identified in Section D.1 are deemed satisfied upon execution of the Main Agreement. The Customer acknowledges and agrees that, if it did not enter into this Agreement, it would have to take future steps to achieve the same ends as does the Work included in Attachment A, and that, in doing so, it would incur Operational Costs of at least the amount per year over the Guarantee Term as presented below and in the Schedule of Guaranteed Savings. The Customer agrees that, by entering into this Agreement, it will avoid future Operational Costs in at least these amounts.

Further, the Customer acknowledges that Operational Costs Savings categorized as capital cost avoidance are part of,

or are causally connected to the Work specified in Attachment A (i.e., the ECMs being implemented), and are documented by industry standard engineering methodologies acceptable to the Customer.

Customer agrees that the Baseline for the unit cost of Operational Costs will be adjusted each year of the Guarantee Term. This annually adjusted value of operational unit costs is stipulated as the new baseline in each succeeding year. Customer agrees that the Baseline adjustment is stipulated to be an escalation of 3% per year for Operational Costs used in the determination of Operational Costs Savings each year.

The Operational Costs Savings were identified, reviewed, and agreed to by a team of Customer's representatives including Melissa Ferraro (Village Administrator) and Jeff Chuhta (Treasurer).

OSD #	Operational Savings Description (OSD)	Att. A Ref.	Cost Avoidance Category (O&M, Capital,)	1 st Year Cost Avoidance
1	LED Lighting and Lighting Controls Upgrade	ECM 1	O&M	\$818
2	Street Lighting Upgrades	ECM 2	O&M	\$805
3	Boiler Plant Upgrades	ECM 3	O&M	\$5,000
4	Air Handling Unit Replacement	ECM 4	O&M	\$5,000
5	Roof Top Unit Replacement	ECM 5	O&M	\$5,000
6	Condensing Unit Replacement	ECM 6	O&M	\$5,000
7	Roof Replacement	ECM 12	O&M	\$5,000
			Total	\$26,623

[a] O&M: operations and maintenance.

D.2 Baseline Operations and Adjustments

D.2.1 "Baseline Operating Parameters" are the Facility(ies) and system(s) operations measured and/or observed before commencement of the Work. Baseline Operating Parameters are stipulated in, and incorporated herein, as Exhibit D-1 & D-2. See Energy Savings Calculations, attached hereto and incorporated herein as Exhibit D-5 for further information regarding stipulated Baseline Operating Parameters.

The data summarized will be used in the calculation of the Baseline energy consumption and/or demand and for calculating Baseline adjustments for changes in Facility operation that occur during the Guarantee Term. Honeywell and Customer agree that the Baseline Operating Parameters specified in this section are representative of equipment operating characteristics during the Baseline Period specified in this Agreement. The following data was collected with the assistance of Jeff Chuhta (Treasurer).

The Baseline Period is defined as 01/2021 to 01/2022.

The Baseline consists of the Baseline conditions and Baseline Operating Parameters collected from the Baseline Period and modified by Baseline adjustments, as necessary, as defined herein and by the Exhibits.

D.2.2 Pre-Retrofit Baseline Adjustments:

One pre-retrofit baseline adjustment was completed for the natural gas usage at the Village Hall. The building was designed to utilize four air handling units (AHUs) to provide the conditioned air to the basement and first floors. One of the four units was not functioning throughout the entire baseline period and the area it served was not being adequately heated. To account for the added gas usage when the AHU is replaced, the baseline was adjusted by using a bin analysis to estimate the annual natural gas usage for this unit. This additional gas usage was then added to the baseline usage and baseline cost for the facility.

D.2.3 Post-Retrofit Baseline Adjustments: Reserved.

D.3 Guarantee Term Operations

D.3.1 "Guarantee Term Operating Parameters" are the Facility(ies) and system(s) operations as measured and/or observed after completion of Work. The data summarized will be used in the calculation of the post-retrofit Energy consumption and/or demand. Honeywell and Customer agree that the Guarantee Term Operating Parameters specified in this section are representative of equipment operating characteristics during the Guarantee Term specified in this Agreement. And, further, that they are agreed to be reasonable and may be used in the calculation of the Cost Avoidance, as if the site is actually operating per the Guarantee Term Operating Parameters outlined in this section.

Guarantee Term Operating Parameters are stipulated in Guarantee Period Operating Parameters attached hereto and incorporated herein as Exhibit D-1 & D-2.

D.3.2 Operational Cost Avoidance: The following parameters, methodologies, and/or calculations were used in determining the Operational Costs and/or Cost Avoidance due to the Retrofit and Support Services implementation and are agreed to be reasonable and may be used in the calculation of Savings.

Operational Costs Savings methodology and/or calculation details are attached hereto and are incorporated herein as the exhibits outlined in the following table.

OSD#	Operational Savings Description	Cost Avoidance Methodology	Exhibit
1	LED Lighting and Lighting Controls Upgrade	Longer material life than existing equipment	D-6
2	Street Lighting Upgrades	Longer material life than existing equipment	D-6
3	Boiler Plant Upgrades	Reduction in current spend on existing equip.	D-6
4	Air Handling Unit Replacement	Reduction in current spend on existing equip.	D-6
5	Roof Top Unit Replacement	Reduction in current spend on existing equip.	D-6
6	Condensing Unit Replacement	Reduction in current spend on existing equip.	D-6
7	Roof Replacement	Reduction in current spend on existing equip.	D-6
The operational savings measures and which budget line items or invoice categories that are affected, are cross-referenced in each Operational Costs Savings Detail in the Exhibits.			

[a] O&M: operations and maintenance.

D.4 Other Energy and Operational Savings Measures

The following measures *were* not included in the Guaranteed Savings but may be used during the Guarantee Term in the determination of realized Cost Avoidance, or calculation of performance versus the Guaranteed Savings, or to show value-add to the Customer:

Att A No.	Description of Attachment A Tasks not included in Sections D.1.1 or D.1.2 above
NA	NA

**ATTACHMENT E
PAYMENT SCHEDULE**

1. The following payment schedule has been established for the Work:

1.1 The payment schedule reflected below has been established for the Work. Payment shall be made net thirty (30) days of the invoice date. If issues surrounding lack of payment are not remedied within ten (10) business days, HONEYWELL may suspend all work until payment is made.

Total payments are: \$2,403,500

Honeywell's price is based upon the contract being signed and the financing being secured by July 29, 2022. Should any of these events be delayed beyond that date Honeywell reserves the right to adjust its price subject to Customer's written approval. Any change to the contract price shall be documented by a change order signed by both parties.

1.2 Progress Payments

	<u>Percentage Due</u>	<u>Amount Due</u>
Initial Payment upon Contract		
Signature and securing of Financing:	50%	\$1,201,750
Monthly Progress Payments:	50%	\$1,201,750
Total Payments:		\$2,403,500

The entire contract price less the initial payment will be billed monthly as a percentage complete. Following the end of each month, during the construction period of the Project, HONEYWELL will provide to CUSTOMER an invoice together with a report in sufficient detail to reasonably identify the work performed during that month, and all applicable payroll certifications in accordance with Article 8 of the NYS Labor Law.

2. The following payment schedule has been established for Support Services:

2.1 The first invoice will be issued upon completion of the Work and prior to commencement of Support Services and CUSTOMER shall pay or cause to be paid to HONEYWELL the price for the Services as specified in Attachment D.

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ATTACHMENT J

PROJECT ACCEPTANCE PROCEDURE

As portions of the Project near completion, the Honeywell Project Manager will start the project close-out process.

The following Exhibits and Tables are attached hereto and made a part of the Agreement:

Exhibit J-1	Schedule of Substantial Completion Acceptance
Exhibit J-2	Certificate of Substantial Completion
Exhibit J-3	Final Project Acceptance Certificate

A.1 Substantial Completion Procedure

The Honeywell Project Manager shall use the Scope-of-Work (SOW) listed in Attachment A as the basis for the close-out process and shall demonstrate to the Customer's Representative that each separate item of the SOW is substantially complete. The sign off process will be by portion of the Scope of Work, by building/site/Equipment Unit or by individual Energy Conservation Measure (ECM) as listed in Exhibit J-1 below. After each portion of the Scope of Work has been demonstrated and a "Punch List" detailing minor deficiencies, if any, is generated, the Customer's Representative shall execute the Exhibit J-2 Certificate of Substantial Completion (CSC) to acknowledge substantial completion and Honeywell will complete the "Punch List" within two weeks. Exhibit J-1 based on the Customer's signature dates will track the progress towards Final Project Acceptance. Warranty shall start in accordance with the terms of the Agreement.

Exhibit J-1

SCHEDULE OF SUBSTANTIAL COMPLETION

Schedule of Substantial Completion: The acceptance process will be performed according to the following schedule.

Schedule of Certificates of Substantial Completion (CSC)		
Scope of Work Segmentation	CSC Acceptance By:	Punchlist Acceptance By:
ECM 1: LED Lighting and Controls Upgrade		
ECM 2: Street Lighting Upgrades		
ECM 3: Boiler Plant Upgrades		
ECM 4: Air Handling Unit Replacement		
ECM 5: Rooftop Unit Replacements		
ECM 6: Condensing Unit Replacements		
ECM 7: Pump & Motor Replacement		
ECM 8: Building Management System Upgrades		
ECM 9: Building Envelope Improvements		
ECM 10: Pipe Insulation		
ECM 11: Desktop Computer Power Management		
ECM 12: Roof Replacement		

A.2 Final Project Acceptance Procedure

Once Exhibit J-1 and all punch lists are complete the Honeywell Project Manager and Customer shall use Exhibit J-3 to signify Final Project Acceptance.

Exhibit J-2

CERTIFICATE OF SUBSTANTIAL COMPLETION

Project Name: _____

Building/Site/Equipment Unit or individual Energy Conservation Measure (ECM): _____

To: Honeywell International Inc.

Reference is made to the above listed Agreement between the undersigned and Honeywell International Inc. and to the Scope of Work as defined in Attachment A herein. In connection therewith, we confirm to you the following:

1. The Building/Site/Equipment Unit or individual Energy Conservation Measure (ECM) referenced above and also listed in Attachment A of the Agreement has been demonstrated to the satisfaction of the Customer's Representative as being substantially complete.
2. The Punch List [circle which applies]:
 - (a) has been developed by the parties and delivered to Honeywell and the deficiencies noted therein will be corrected within 2 weeks of the date hereon; or
 - (b) has not been developed by the parties and delivered to Honeywell but will be developed and delivered on or before _____, 202_ after which the deficiencies noted therein will be corrected within 2 weeks of the date thereon.
3. All of the Work has been delivered to and received by the undersigned and that said Work has been examined and /or tested and is in good operating order and condition and is in all respects satisfactory to the undersigned and as represented, and that said Work has been accepted by the undersigned and complies with all terms of the Agreement. Consequently, you are hereby authorized to invoice for payment, as defined in Attachment E, Payment Schedule.
4. Warranty shall start in accordance with the terms of the Agreement.
5. If Customer will be self-performing maintenance on equipment associated with this ECM, then as of the date of Customer signature the Customer is responsible for maintenance.
6. If Honeywell will be performing maintenance on equipment associated with this ECM, then Honeywell will start the Support Services Agreement on the Support Services Effective Date as defined in accordance with Attachment D.

Customer Name: _____

By: _____	_____
(Authorized Signature)	(Authorized Signature)
_____	_____
(Printed Name and Title)	(Printed Name and Title)
_____	_____
(Date)	(Date)

Exhibit J-3

FINAL PROJECT ACCEPTANCE CERTIFICATE

Project Name: _____

Scope-of-Work (SOW): _____

To: Honeywell International Inc.

Reference is made to the above listed Agreement between the undersigned and Honeywell International Inc. and to the Scope of Work as defined in Attachment A herein. In connection therewith, we confirm to you the following:

1. The entirety of the Scope of Work (SOW) referenced above and set forth in Attachment A of the Agreement has been demonstrated to the satisfaction of the Customer's Representative as being accepted as is evidenced by Customer's signature on Certificates of Substantial Completion for the entirety of the Work.
2. The Punch List(s) has been completed.
3. You are hereby authorized to invoice for Final Payment, as defined in Attachment E, Payment Schedule.
4. The date of Customer's signature below shall be known as the date of Final Project Acceptance.

Customer Name:

By: _____
(Authorized Signature)

(Printed Name and Title)

(Date)

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Village of Dobbs Ferry
Exhibit D-1 & D-2
Baseline Operating Parameters & Guarantee Period Operating Parameters

Public Library

The existing HVAC system operating schedule is generally from 9:00am to 5:30pm Sunday through Saturday. All other hours the HVAC system operates in unoccupied mode. During the guarantee period, the HVAC system operating schedule shall be 9:00am to 5:30pm Sunday through Saturday, with unoccupied operation during all other hours.

The existing occupied heating setpoint is 73°F and the unoccupied heating setpoint is 73°F. During the guarantee period, the occupied heating setpoint shall be 68°F and the unoccupied heating setpoint shall be 55°F.

Data logging was performed during the heating season, thus existing cooling setpoints are estimated at 72°F occupied and 76°F unoccupied. During the guarantee period, the occupied cooling setpoint shall be 74°F and the unoccupied cooling setpoint shall be 85°F.

WEEKDAY		WEEKEND	
Existing HVAC Start Time	Proposed HVAC Start Time	Existing HVAC Start Time	Proposed HVAC Start Time
9:00am	9:00am	9:00am	9:00am
Existing HVAC Stop Time	Proposed HVAC Stop Time	Existing HVAC Stop Time	Proposed HVAC Stop Time
5:30pm	5:30pm	5:30pm	5:30pm

HEATING		COOLING	
Existing Occupied Setpoint	Proposed Occupied Setpoint	Existing Occupied Setpoint	Proposed Occupied Setpoint
73°F	68°F	72°F	74°F
Existing Unoccupied Setpoint	Proposed Unoccupied Setpoint	Existing Unoccupied Setpoint	Proposed Unoccupied Setpoint
73°F	55°F	76°F	85°F

Notes:

- 1) All HVAC system run times allow for a minimum of one (1) hour warm up period prior to occupant arrival
- 2) Existing schedules and setpoints are based on detailed review of Building Management Systems/thermostats, interviews with staff, and a review of temperature data logging results
- 3) Proposed schedules based on information provided by the Facilities Department
- 4) Evening and weekend events in isolated areas (i.e. office space, meeting space, etc.) shall be separately scheduled for occupancy wherever possible to prevent having to set the entire buildings into occupied mode
- 5) Guaranteed contractual savings are based on the proposed schedules and setpoints listed in the tables above
- 6) For additional operating parameters, please see Exhibit D-5

Village of Dobbs Ferry
Exhibit D-1 & D-2
Baseline Operating Parameters & Guarantee Period Operating Parameters

Village Hall

The existing HVAC system operating schedule is generally from 12:00am to 12:00am Sunday through Saturday. During the guarantee period, the HVAC system operating schedule shall be 12:00am to 12:00am Sunday through Saturday, with no unoccupied hours of operation.

The existing occupied heating setpoint is 73°F and the unoccupied heating setpoint is 73°F. During the guarantee period, the occupied heating setpoint shall be 68°F and the unoccupied heating setpoint shall be 55°F.

Data logging was performed during the heating season, thus existing cooling setpoints are estimated at 72°F occupied and 76°F unoccupied. During the guarantee period, the occupied cooling setpoint shall be 74°F and the unoccupied cooling setpoint shall be 85°F.

WEEKDAY		WEEKEND	
Existing HVAC Start Time	Proposed HVAC Start Time	Existing HVAC Start Time	Proposed HVAC Start Time
12:00am	12:00am	12:00am	12:00am
Existing HVAC Stop Time	Proposed HVAC Stop Time	Existing HVAC Stop Time	Proposed HVAC Stop Time
12:00am	12:00am	12:00am	12:00am

HEATING		COOLING	
Existing Occupied Setpoint	Proposed Occupied Setpoint	Existing Occupied Setpoint	Proposed Occupied Setpoint
73°F	68°F	72°F	74°F
Existing Unoccupied Setpoint	Proposed Unoccupied Setpoint	Existing Unoccupied Setpoint	Proposed Unoccupied Setpoint
73°F	55°F	76°F	85°F

Notes:

- 1) All HVAC system run times allow for a minimum of one (1) hour warm up period prior to occupant arrival
- 2) Existing schedules and setpoints are based on detailed review of Building Management Systems/thermostats, interviews with staff, and a review of temperature data logging results
- 3) Proposed schedules based on information provided by the Facilities Department
- 4) Evening and weekend events in isolated areas (i.e. office space, meeting space, etc.) shall be separately scheduled for occupancy wherever possible to prevent having to set the entire buildings into occupied mode
- 5) Guaranteed contractual savings are based on the proposed schedules and setpoints listed in the tables above
- 6) For additional operating parameters, please see Exhibit D-5

Village of Dobbs Ferry
Exhibit D-1 & D-2
Baseline Operating Parameters & Guarantee Period Operating Parameters

Memorial Park Building

The existing HVAC system operating schedule is generally from 8:00am to 5:00pm Sunday through Saturday. All other hours the HVAC system operates in unoccupied mode. During the guarantee period, the HVAC system operating schedule shall be 8:00am to 5:00pm Sunday through Saturday, with unoccupied operation during all other hours.

The existing occupied heating setpoint is 75°F and the unoccupied heating setpoint is 75°F. During the guarantee period, the occupied heating setpoint shall be 68°F and the unoccupied heating setpoint shall be 55°F.

Data logging was performed during the heating season, thus existing cooling setpoints are estimated at 72°F occupied and 76°F unoccupied. During the guarantee period, the occupied cooling setpoint shall be 74°F and the unoccupied cooling setpoint shall be 85°F.

WEEKDAY		WEEKEND	
Existing HVAC Start Time	Proposed HVAC Start Time	Existing HVAC Start Time	Proposed HVAC Start Time
8:00am	8:00am	8:00am	8:00am
Existing HVAC Stop Time	Proposed HVAC Stop Time	Existing HVAC Stop Time	Proposed HVAC Stop Time
5:00pm	5:00pm	5:00pm	5:00pm

HEATING		COOLING	
Existing Occupied Setpoint	Proposed Occupied Setpoint	Existing Occupied Setpoint	Proposed Occupied Setpoint
75°F	68°F	72°F	74°F
Existing Unoccupied Setpoint	Proposed Unoccupied Setpoint	Existing Unoccupied Setpoint	Proposed Unoccupied Setpoint
75°F	55°F	76°F	85°F

Notes:

- 1) All HVAC system run times allow for a minimum of one (1) hour warm up period prior to occupant arrival
- 2) Existing schedules and setpoints are based on detailed review of Building Management Systems/thermostats, interviews with staff, and a review of temperature data logging results
- 3) Proposed schedules based on information provided by the Facilities Department
- 4) Evening and weekend events in isolated areas (i.e. office space, meeting space, etc.) shall be separately scheduled for occupancy wherever possible to prevent having to set the entire buildings into occupied mode
- 5) Guaranteed contractual savings are based on the proposed schedules and setpoints listed in the tables above
- 6) For additional operating parameters, please see Exhibit D-5

Village of Dobbs Ferry
Exhibit D-1 & D-2
Baseline Operating Parameters & Guarantee Period Operating Parameters

DPW

The existing HVAC system operating schedule is generally from 12:00am to 12:00am Sunday through Saturday. During the guarantee period, the HVAC system operating schedule shall be 12:00am to 12:00am Sunday through Saturday, with no unoccupied hours of operation.

The existing occupied heating setpoint is 72°F and the unoccupied heating setpoint is 72°F. During the guarantee period, the occupied heating setpoint shall be 68°F and the unoccupied heating setpoint shall be 55°F.

Data logging was performed during the heating season, thus existing cooling setpoints are estimated at 72°F occupied and 76°F unoccupied. During the guarantee period, the occupied cooling setpoint shall be 74°F and the unoccupied cooling setpoint shall be 85°F.

WEEKDAY		WEEKEND	
Existing HVAC Start Time	Proposed HVAC Start Time	Existing HVAC Start Time	Proposed HVAC Start Time
12:00am	12:00am	12:00am	12:00am
Existing HVAC Stop Time	Proposed HVAC Stop Time	Existing HVAC Stop Time	Proposed HVAC Stop Time
12:00am	12:00am	12:00am	12:00am

HEATING		COOLING	
Existing Occupied Setpoint	Proposed Occupied Setpoint	Existing Occupied Setpoint	Proposed Occupied Setpoint
72°F	68°F	72°F	74°F
Existing Unoccupied Setpoint	Proposed Unoccupied Setpoint	Existing Unoccupied Setpoint	Proposed Unoccupied Setpoint
72°F	55°F	76°F	85°F

Notes:

- 1) All HVAC system run times allow for a minimum of one (1) hour warm up period prior to occupant arrival
- 2) Existing schedules and setpoints are based on detailed review of Building Management Systems/thermostats, interviews with staff, and a review of temperature data logging results
- 3) Proposed schedules based on information provided by the Facilities Department
- 4) Evening and weekend events in isolated areas (i.e. office space, meeting space, etc.) shall be separately scheduled for occupancy wherever possible to prevent having to set the entire buildings into occupied mode
- 5) Guaranteed contractual savings are based on the proposed schedules and setpoints listed in the tables above
- 6) For additional operating parameters, please see Exhibit D-5

Village of Dobbs Ferry
Exhibit D-1 & D-2
Baseline Operating Parameters & Guarantee Period Operating Parameters

Ambulance Corps. Building

The existing HVAC system operating schedule is generally from 12:00am to 12:00am Sunday through Saturday. During the guarantee period, the HVAC system operating schedule shall be 12:00am to 12:00am Sunday through Saturday, with no unoccupied hours of operation.

The existing occupied heating setpoint is 75°F and the unoccupied heating setpoint is 75°F. During the guarantee period, the occupied heating setpoint shall be 68°F and the unoccupied heating setpoint shall be 55°F.

Data logging was performed during the heating season, thus existing cooling setpoints are estimated at 72°F occupied and 76°F unoccupied. During the guarantee period, the occupied cooling setpoint shall be 74°F and the unoccupied cooling setpoint shall be 85°F.

WEEKDAY		WEEKEND	
Existing HVAC Start Time	Proposed HVAC Start Time	Existing HVAC Start Time	Proposed HVAC Start Time
12:00am	12:00am	12:00am	12:00am
Existing HVAC Stop Time	Proposed HVAC Stop Time	Existing HVAC Stop Time	Proposed HVAC Stop Time
12:00am	12:00am	12:00am	12:00am

HEATING		COOLING	
Existing Occupied Setpoint	Proposed Occupied Setpoint	Existing Occupied Setpoint	Proposed Occupied Setpoint
75°F	68°F	72°F	74°F
Existing Unoccupied Setpoint	Proposed Unoccupied Setpoint	Existing Unoccupied Setpoint	Proposed Unoccupied Setpoint
75°F	55°F	76°F	85°F

Notes:

- 1) All HVAC system run times allow for a minimum of one (1) hour warm up period prior to occupant arrival
- 2) Existing schedules and setpoints are based on detailed review of Building Management Systems/thermostats, interviews with staff, and a review of temperature data logging results
- 3) Proposed schedules based on information provided by the Facilities Department
- 4) Evening and weekend events in isolated areas (i.e. office space, meeting space, etc.) shall be separately scheduled for occupancy wherever possible to prevent having to set the entire buildings into occupied mode
- 5) Guaranteed contractual savings are based on the proposed schedules and setpoints listed in the tables above
- 6) For additional operating parameters, please see Exhibit D-5

Village of Dobbs Ferry
 Exhibit D-1 & D-2
 Baseline Operating Parameters & Guarantee Period Operating Parameters

Ogden Engine Company

The existing HVAC system operating schedule is generally from 12:00am to 12:00am Sunday through Saturday. During the guarantee period, the HVAC system operating schedule shall be 12:00am to 12:00am Sunday through Saturday, with no unoccupied hours of operation.

The existing occupied heating setpoint is 70°F and the unoccupied heating setpoint is 70°F. During the guarantee period, the occupied heating setpoint shall be 68°F and the unoccupied heating setpoint shall be 55°F.

Data logging was performed during the heating season, thus existing cooling setpoints are estimated at 72°F occupied and 76°F unoccupied. During the guarantee period, the occupied cooling setpoint shall be 74°F and the unoccupied cooling setpoint shall be 85°F.

WEEKDAY		WEEKEND	
Existing HVAC Start Time	Proposed HVAC Start Time	Existing HVAC Start Time	Proposed HVAC Start Time
12:00am	12:00am	12:00am	12:00am
Existing HVAC Stop Time	Proposed HVAC Stop Time	Existing HVAC Stop Time	Proposed HVAC Stop Time
12:00am	12:00am	12:00am	12:00am

HEATING		COOLING	
Existing Occupied Setpoint	Proposed Occupied Setpoint	Existing Occupied Setpoint	Proposed Occupied Setpoint
70°F	68°F	72°F	74°F
Existing Unoccupied Setpoint	Proposed Unoccupied Setpoint	Existing Unoccupied Setpoint	Proposed Unoccupied Setpoint
70°F	55°F	76°F	85°F

Notes:

- 1) All HVAC system run times allow for a minimum of one (1) hour warm up period prior to occupant arrival
- 2) Existing schedules and setpoints are based on detailed review of Building Management Systems/thermostats, interviews with staff, and a review of temperature data logging results
- 3) Proposed schedules based on information provided by the Facilities Department
- 4) Evening and weekend events in isolated areas (i.e. office space, meeting space, etc.) shall be separately scheduled for occupancy wherever possible to prevent having to set the entire buildings into occupied mode
- 5) Guaranteed contractual savings are based on the proposed schedules and setpoints listed in the tables above
- 6) For additional operating parameters, please see Exhibit D-5

Village of Dobbs Ferry
Exhibit D-1 & D-2
Baseline Operating Parameters & Guarantee Period Operating Parameters

Pool House and Offices at Gould Park

The existing HVAC system operating schedule is generally from 8:00am to 4:00pm Sunday through Saturday. All other hours the HVAC system operates in unoccupied mode. During the guarantee period, the HVAC system operating schedule shall be 8:00am to 4:00pm Sunday through Saturday, with unoccupied operation during all other hours.

The existing occupied heating setpoint is 68°F and the unoccupied heating setpoint is 68°F. During the guarantee period, the occupied heating setpoint shall be 68°F and the unoccupied heating setpoint shall be 55°F.

Data logging was performed during the heating season, thus existing cooling setpoints are estimated at 72°F occupied and 76°F unoccupied. During the guarantee period, the occupied cooling setpoint shall be 74°F and the unoccupied cooling setpoint shall be 85°F.

WEEKDAY		WEEKEND	
Existing HVAC Start Time	Proposed HVAC Start Time	Existing HVAC Start Time	Proposed HVAC Start Time
8:00am	8:00am	8:00am	8:00am
Existing HVAC Stop Time	Proposed HVAC Stop Time	Existing HVAC Stop Time	Proposed HVAC Stop Time
4:00pm	4:00pm	4:00pm	4:00pm

HEATING		COOLING	
Existing Occupied Setpoint	Proposed Occupied Setpoint	Existing Occupied Setpoint	Proposed Occupied Setpoint
68°F	68°F	72°F	74°F
Existing Unoccupied Setpoint	Proposed Unoccupied Setpoint	Existing Unoccupied Setpoint	Proposed Unoccupied Setpoint
68°F	55°F	76°F	85°F

Notes:

- 1) All HVAC system run times allow for a minimum of one (1) hour warm up period prior to occupant arrival
- 2) Existing schedules and setpoints are based on detailed review of Building Management Systems/thermostats, interviews with staff, and a review of temperature data logging results
- 3) Proposed schedules based on information provided by the Facilities Department
- 4) Evening and weekend events in isolated areas (i.e. office space, meeting space, etc.) shall be separately scheduled for occupancy wherever possible to prevent having to set the entire buildings into occupied mode
- 5) Guaranteed contractual savings are based on the proposed schedules and setpoints listed in the tables above
- 6) For additional operating parameters, please see Exhibit D-5

Village of Dobbs Ferry
Exhibit D-1 & D-2
Baseline Operating Parameters & Guarantee Period Operating Parameters

Embassy Club

The existing HVAC system operating schedule is generally from 10:00am to 5:00pm Sunday through Saturday. All other hours the HVAC system operates in unoccupied mode. During the guarantee period, the HVAC system operating schedule shall be 10:00am to 5:00pm Sunday through Saturday, with unoccupied operation during all other hours.

The existing occupied heating setpoint is 70°F and the unoccupied heating setpoint is 70°F. During the guarantee period, the occupied heating setpoint shall be 68°F and the unoccupied heating setpoint shall be 55°F.

Data logging was performed during the heating season, thus existing cooling setpoints are estimated at 72°F occupied and 76°F unoccupied. During the guarantee period, the occupied cooling setpoint shall be 74°F and the unoccupied cooling setpoint shall be 85°F.

WEEKDAY		WEEKEND	
Existing HVAC Start Time	Proposed HVAC Start Time	Existing HVAC Start Time	Proposed HVAC Start Time
10:00am	10:00am	10:00am	10:00am
Existing HVAC Stop Time	Proposed HVAC Stop Time	Existing HVAC Stop Time	Proposed HVAC Stop Time
5:00pm	5:00pm	5:00pm	5:00pm

HEATING		COOLING	
Existing Occupied Setpoint	Proposed Occupied Setpoint	Existing Occupied Setpoint	Proposed Occupied Setpoint
70°F	68°F	72°F	74°F
Existing Unoccupied Setpoint	Proposed Unoccupied Setpoint	Existing Unoccupied Setpoint	Proposed Unoccupied Setpoint
70°F	55°F	76°F	85°F

Notes:

- 1) All HVAC system run times allow for a minimum of one (1) hour warm up period prior to occupant arrival
- 2) Existing schedules and setpoints are based on detailed review of Building Management Systems/thermostats, interviews with staff, and a review of temperature data logging results
- 3) Proposed schedules based on information provided by the Facilities Department
- 4) Evening and weekend events in isolated areas (i.e. office space, meeting space, etc.) shall be separately scheduled for occupancy wherever possible to prevent having to set the entire buildings into occupied mode
- 5) Guaranteed contractual savings are based on the proposed schedules and setpoints listed in the tables above
- 6) For additional operating parameters, please see Exhibit D-5

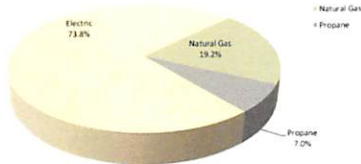
Village of Dobbs Ferry
Exhibit D-3 - Utility Baseline
Utility Summary (Calendar year 2021)

Building	Square Footage	Electric										Fuel Designation	Natural Gas						Propane				Total Thermal				Total Energy			
		Total Cost	Total kWh	Demand Cost	Fixed Costs	Total kW Demand	Demand Months	S/W	Blended Rate	Unblended Rate	\$ per Square Ft.		Total Cost	Fixed Costs	Total Therms	Blended Rate	Unblended Rate	\$ per Square Ft.	Total Cost	Fixed Costs	Gal.	Price per Gallons	\$ per Square Ft.	Total Cost	MMBtu/yr Total	\$/MMBtu	\$ per Square Ft.	\$ per BBTU per Square Ft.	Total Cost	
Public Library	16,000	\$ 35,442	233,040	\$ 22,083	\$ -	850	12	\$ 25.99	\$ 0.153	\$ 0.058	\$ 2.22	Natural Gas	\$ 12,882	\$ 417	8,759	\$ 1.47	\$ 1.42	\$ 0.81	\$ -	\$ -	\$ -	\$ -	\$ 12,882	876	\$ 14.71	\$ 0.81	\$ 3.02	104.0	\$ 48,325	
Village Hall	9,000	\$ 28,500	196,240	\$ 16,827	\$ -	599	12	\$ 28.11	\$ 0.143	\$ 0.057	\$ 1.12	Natural Gas	\$ 15,997	\$ 417	10,825	\$ 1.48	\$ 1.44	\$ 1.78	\$ -	\$ -	\$ -	\$ -	\$ 15,997	1,083	\$ 14.78	\$ 1.78	\$ 4.90	194.7	\$ 44,096	
Memorial Park Building	1,600	\$ 2,933	9,364	\$ -	\$ -	-	12	\$ -	\$ 0.307	\$ 0.307	\$ 1.83	Natural Gas	\$ 8,369	\$ 408	2,017	\$ 1.67	\$ 1.47	\$ 2.15	\$ -	\$ -	\$ -	\$ -	\$ 8,369	202	\$ 16.71	\$ 2.15	\$ 1.94	146.5	\$ 6,203	
City Office	23,800	\$ 34,509	92,446	\$ 9,878	\$ -	277	12	\$ 32.75	\$ 0.157	\$ 0.059	\$ 0.61	Propane	\$ -	\$ -	-	\$ -	\$ -	\$ -	\$ 20,286	110	9,132	\$ 2.21	\$ 0.85	\$ 20,286	836	\$ 24.28	\$ 0.85	\$ 1.46	48.4	\$ 34,795
Ambulance Corps. Building	2,000	\$ 5,382	17,280	\$ -	\$ -	-	12	\$ -	\$ 0.306	\$ 0.306	\$ 2.64	Natural Gas	\$ 4,634	\$ 417	2,811	\$ 1.58	\$ 1.43	\$ 2.22	\$ -	\$ -	\$ -	\$ -	\$ 4,634	281	\$ 15.77	\$ 2.22	\$ 4.86	170.0	\$ 9,716	
Ogden Engine Company	4,000	\$ 5,558	30,618	\$ 8,781	\$ -	109	12	\$ 34.55	\$ 0.182	\$ 0.058	\$ 1.39	Natural Gas	\$ 8,491	\$ 431	4,217	\$ 2.01	\$ 1.92	\$ 2.12	\$ -	\$ -	\$ -	\$ -	\$ 8,491	422	\$ 20.14	\$ 2.12	\$ 3.51	131.5	\$ 14,049	
Pool House and Offices at Gould Park E	2,000	\$ 12,811	101,420	\$ 6,831	\$ -	256	12	\$ 26.64	\$ 0.125	\$ 0.058	\$ 6.41	Natural Gas	\$ 2,007	\$ 385	1,110	\$ 1.81	\$ 1.46	\$ 1.00	\$ -	\$ -	\$ -	\$ -	\$ 2,007	111	\$ 18.08	\$ 1.00	\$ 7.41	230.2	\$ 14,817	
Embassy Club	4,000	\$ 9,567	42,400	\$ 6,001	\$ -	210	12	\$ 28.62	\$ 0.153	\$ 0.057	\$ 2.39	Natural Gas	\$ 6,558	\$ 833	5,386	\$ 1.59	\$ 1.43	\$ 2.14	\$ -	\$ -	\$ -	\$ -	\$ 6,558	539	\$ 15.89	\$ 2.14	\$ 4.53	187.9	\$ 18,125	
Street Lighting		\$ 30,170	334,638	\$ -	\$ -	-	12	\$ -	\$ 0.299	\$ 0.299	\$ -		\$ -	\$ -	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-	\$ -	\$ -	\$ -	-	\$ 100,170	
TOTALS	62,600	\$ 214,373	1,076,666	\$ 64,603	\$ -	2,301		\$ 28.07	\$ 0.199	\$ 0.139	\$ 3.44		\$ 55,738	\$ 1,288	35,125	\$ 1.59	\$ 1.49	\$ 0.89	\$ 20,286		9,132	\$ 2.22	\$ 0.33	\$ 76,024	4,348	\$ 17.48	\$ 1.22	\$ 4.65	128.6	\$ 290,397

Electric	\$ 214,373
Natural Gas	\$ 55,738
Propane	\$ 20,286
Total	\$ 290,397

Heating Content of Fuels	
Natural Gas	100,000 BTU/Therm
Propane	91,500 BTU/Gallon

Utility Costs by Type



Village Hall includes adjustment for 1 AHU that is not functioning

Village of Dobbs Ferry
Exhibit - Utility Data
Electric Data

Account #	Meter #	Rate Structure	Location	Billing Start Date	Billing End Date	Billing Days	Delivery By	Billed kW	Billed kWh	kW Cost	kWh Cost	Fixed Cost	Total Cost
59-0906-0665-1200-9	9953752	GOV_WES_69	Ashford Ave Play	12/9/2021	1/10/2022	32	NYP&	20.9	6,444	\$ 397.49	\$ 509.95	\$ -	\$ 907.4
59-0906-0665-1200-9	9953752	GOV_WES_69	Ashford Ave Play	11/5/2021	12/9/2021	34	NYP&	20.9	6,282	\$ 429.30	\$ 397.96	\$ -	\$ 827.3
59-0906-0665-1200-9	9953752	GOV_WES_69	Ashford Ave Play	10/7/2021	11/5/2021	29	NYP&	20.9	5,508	\$ 599.92	\$ 286.70	\$ -	\$ 886.6
59-0906-0665-1200-9	9953752	GOV_WES_69	Ashford Ave Play	9/8/2021	10/7/2021	29	NYP&	24.5	11,826	\$ 781.45	\$ 781.82	\$ -	\$ 1,563.3
59-0906-0665-1200-9	9953752	GOV_WES_69	Ashford Ave Play	8/9/2021	9/8/2021	30	NYP&	25.7	12,978	\$ 845.97	\$ 744.16	\$ -	\$ 1,590.1
59-0906-0665-1200-9	9953752	GOV_WES_69	Ashford Ave Play	7/9/2021	8/9/2021	31	NYP&	27.9	13,968	\$ 930.66	\$ 973.44	\$ -	\$ 1,904.1
59-0906-0665-1200-9	9953752	GOV_WES_69	Ashford Ave Play	6/9/2021	7/9/2021	30	NYP&	26.5	12,906	\$ 854.85	\$ 739.26	\$ -	\$ 1,594.1
59-0906-0665-1200-9	9953752	GOV_WES_69	Ashford Ave Play	5/10/2021	6/9/2021	30	NYP&	24.3	10,746	\$ 787.38	\$ 458.43	\$ -	\$ 1,245.8
59-0906-0665-1200-9	9953752	GOV_WES_69	Ashford Ave Play	4/12/2021	5/10/2021	28	NYP&	16.2	4,626	\$ 301.22	\$ 192.35	\$ -	\$ 493.6
59-0906-0665-1200-9	9953752	GOV_WES_69	Ashford Ave Play	3/12/2021	4/12/2021	31	NYP&	16.2	5,850	\$ 312.21	\$ 413.89	\$ -	\$ 726.1
59-0906-0665-1200-9	9953752	GOV_WES_69	Ashford Ave Play	2/10/2021	3/12/2021	30	NYP&	16.2	5,652	\$ 296.32	\$ 261.65	\$ -	\$ 558.0
59-0906-0665-1200-9	9953752	GOV_WES_69	Ashford Ave Play	1/10/2021	2/10/2021	31	NYP&	16.2	5,634	\$ 295.87	\$ 218.3	\$ -	\$ 514.2
59-0906-0665-1500-2	9860495	GOV_WES_62	81 Ashford Ave Gar	12/9/2021	1/10/2022	32	NYP&	-	1,584	\$ -	\$ 537.95	\$ -	\$ 538.0
59-0906-0665-1500-2	9860496	GOV_WES_62	81 Ashford Ave Gar	11/5/2021	12/9/2021	34	NYP&	-	2,232	\$ -	\$ 733.30	\$ -	\$ 733.3
59-0906-0665-1500-2	9860496	GOV_WES_62	81 Ashford Ave Gar	10/7/2021	11/5/2021	29	NYP&	-	1,206	\$ -	\$ 357.97	\$ -	\$ 358.0
59-0906-0665-1500-2	9860496	GOV_WES_62	81 Ashford Ave Gar	9/8/2021	10/7/2021	29	NYP&	-	1,008	\$ -	\$ 313.64	\$ -	\$ 313.6
59-0906-0665-1500-2	9860496	GOV_WES_62	81 Ashford Ave Gar	8/9/2021	9/8/2021	30	NYP&	-	1,422	\$ -	\$ 429.37	\$ -	\$ 429.4
59-0906-0665-1500-2	9860496	GOV_WES_62	81 Ashford Ave Gar	7/9/2021	8/9/2021	31	NYP&	-	1,908	\$ -	\$ 609.54	\$ -	\$ 609.5
59-0906-0665-1500-2	9860496	GOV_WES_62	81 Ashford Ave Gar	6/9/2021	7/9/2021	30	NYP&	-	1,080	\$ -	\$ 337.11	\$ -	\$ 337.1
59-0906-0665-1500-2	9860496	GOV_WES_62	81 Ashford Ave Gar	5/10/2021	6/9/2021	30	NYP&	-	1,080	\$ -	\$ 314.85	\$ -	\$ 314.9
59-0906-0665-1500-2	9860496	GOV_WES_62	81 Ashford Ave Gar	4/12/2021	5/10/2021	28	NYP&	-	1,386	\$ -	\$ 375.57	\$ -	\$ 375.6
59-0906-0665-1500-2	9860496	GOV_WES_62	81 Ashford Ave Gar	3/12/2021	4/12/2021	31	NYP&	-	1,206	\$ -	\$ 388.96	\$ -	\$ 389.0
59-0906-0665-1500-2	9860496	GOV_WES_62	81 Ashford Ave Gar	2/10/2021	3/12/2021	30	NYP&	-	1,530	\$ -	\$ 437.23	\$ -	\$ 437.2
59-0906-0665-1500-2	9860496	GOV_WES_62	81 Ashford Ave Gar	1/11/2021	2/10/2021	30	NYP&	-	1,638	\$ -	\$ 446.78	\$ -	\$ 446.8
59-0906-0665-1800-6	9983281	GOV_WES_69	55 Main St Libr	12/9/2021	1/10/2022	32	NYP&	67.8	18,370	\$ 1,269.99	\$ 1,457.65	\$ -	\$ 2,727.6
59-0906-0665-1800-6	9983281	GOV_WES_69	55 Main St Libr	11/5/2021	12/9/2021	34	NYP&	67.8	18,320	\$ 1,352.20	\$ 1,160.58	\$ -	\$ 2,512.8
59-0906-0665-1800-6	9983281	GOV_WES_69	55 Main St Libr	10/7/2021	11/5/2021	29	NYP&	67.8	15,760	\$ 1,492.73	\$ 816.29	\$ -	\$ 2,309.0
59-0906-0665-1800-6	9983281	GOV_WES_69	55 Main St Libr	9/8/2021	10/7/2021	29	NYP&	72.0	18,240	\$ 2,123.10	\$ 1,205.86	\$ -	\$ 3,329.0
59-0906-0665-1800-6	9983281	GOV_WES_69	55 Main St Libr	8/9/2021	9/8/2021	30	NYP&	90.4	23,840	\$ 2,980.86	\$ 1,367.00	\$ -	\$ 4,347.9
59-0906-0665-1800-6	9983281	GOV_WES_69	55 Main St Libr	7/9/2021	8/9/2021	31	NYP&	76.8	27,120	\$ 2,630.61	\$ 1,890.01	\$ -	\$ 4,520.6
59-0906-0665-1800-6	9983281	GOV_WES_69	55 Main St Libr	6/9/2021	7/9/2021	30	NYP&	72.8	26,000	\$ 2,409.81	\$ 1,489.29	\$ -	\$ 3,899.1
59-0906-0665-1800-6	9983281	GOV_WES_69	55 Main St Libr	5/10/2021	6/9/2021	30	NYP&	70.4	20,560	\$ 2,338.92	\$ 877.11	\$ -	\$ 3,216.0
59-0906-0665-1800-6	9983281	GOV_WES_69	55 Main St Libr	4/12/2021	5/10/2021	28	NYP&	66.0	14,480	\$ 1,420.39	\$ 602.08	\$ -	\$ 2,022.5
59-0906-0665-1800-6	9983281	GOV_WES_69	55 Main St Libr	3/12/2021	4/12/2021	31	NYP&	66.0	15,600	\$ 1,476.70	\$ 1,103.70	\$ -	\$ 2,580.4
59-0906-0665-1800-6	9983281	GOV_WES_69	55 Main St Libr	2/10/2021	3/12/2021	30	NYP&	66.0	15,840	\$ 1,148.27	\$ 733.28	\$ -	\$ 1,881.6
59-0906-0665-1800-6	9983281	GOV_WES_69	55 Main St Libr	1/11/2021	2/10/2021	30	NYP&	66.0	16,960	\$ 1,239.44	\$ 656.62	\$ -	\$ 1,896.1
59-0906-0665-1900-4	9980097	GOV_WES_69	112 Main St TNHL	12/9/2021	1/10/2022	32	NYP&	46.2	14,480	\$ 993.76	\$ 1,145.10	\$ -	\$ 2,138.9
59-0906-0665-1900-4	9980097	GOV_WES_69	112 Main St TNHL	11/5/2021	12/9/2021	34	NYP&	46.2	16,000	\$ 1,181.36	\$ 1,013.61	\$ -	\$ 2,195.0
59-0906-0665-1900-4	9980097	GOV_WES_69	112 Main St TNHL	10/7/2021	11/5/2021	29	NYP&	46.2	13,920	\$ 1,122.17	\$ 719.79	\$ -	\$ 1,842.0
59-0906-0665-1900-4	9980097	GOV_WES_69	112 Main St TNHL	9/8/2021	10/7/2021	29	NYP&	47.2	15,760	\$ 1,562.03	\$ 1,021.90	\$ -	\$ 2,583.9
59-0906-0665-1900-4	9980097	GOV_WES_69	112 Main St TNHL	8/9/2021	9/8/2021	30	NYP&	58.4	20,560	\$ 1,945.63	\$ 1,178.93	\$ -	\$ 3,124.6
59-0906-0665-1900-4	9980097	GOV_WES_69	112 Main St TNHL	7/9/2021	8/9/2021	31	NYP&	55.2	21,200	\$ 1,895.07	\$ 1,477.44	\$ -	\$ 3,372.5
59-0906-0665-1900-4	9980097	GOV_WES_69	112 Main St TNHL	6/9/2021	7/9/2021	30	NYP&	61.6	20,800	\$ 2,023.07	\$ 1,191.43	\$ -	\$ 3,214.5
59-0906-0665-1900-4	9980097	GOV_WES_69	112 Main St TNHL	5/10/2021	6/9/2021	30	NYP&	60.0	16,880	\$ 1,975.10	\$ 720.11	\$ -	\$ 2,695.2
59-0906-0665-1900-4	9980097	GOV_WES_69	112 Main St TNHL	4/12/2021	5/10/2021	28	NYP&	44.4	12,880	\$ 997.99	\$ 535.55	\$ -	\$ 1,533.5
59-0906-0665-1900-4	9980097	GOV_WES_69	112 Main St TNHL	3/12/2021	4/12/2021	31	NYP&	44.4	14,480	\$ 1,096	\$ 1,024.46	\$ -	\$ 2,120.4
59-0906-0665-1900-4	9980097	GOV_WES_69	112 Main St TNHL	2/10/2021	3/12/2021	30	NYP&	44.4	14,560	\$ 1,019.07	\$ 674.03	\$ -	\$ 1,693.1
59-0906-0665-1900-4	9980097	GOV_WES_69	112 Main St TNHL	1/11/2021	2/10/2021	30	NYP&	44.4	14,720	\$ 1,016.19	\$ 570.08	\$ -	\$ 1,586.3
59-0906-0665-2001-0	9360142	GOV_WES_69	60 Palisade St ENT	12/9/2021	1/10/2022	32	NYP&	14.4	5,880	\$ 478.99	\$ 460.85	\$ -	\$ 939.8

Village of Dobbs Ferry
Exhibit - Utility Data
Electric Data

Account #	Meter #	Rate Structure	Location	Billing Start Date	Billing End Date	Billing Days	Delivery By	Billed kW	Billed kWh	kW Cost	kWh Cost	Fixed Cost	Total Cost
59-0906-0665-2001-0	9360142	GOV_WES_69	60 Palisade St ENT	11/5/2021	12/9/2021	34	NYP&	14.4	4,320	\$ 471.79	\$ 273.67	\$ -	\$ 745.5
59-0906-0665-2001-0	9360142	GOV_WES_69	60 Palisade St ENT	10/7/2021	11/5/2021	29	NYP&	14.4	2,280	\$ 353.69	\$ 121.14	\$ -	\$ 474.8
59-0906-0665-2001-0	9360142	GOV_WES_69	60 Palisade St ENT	9/8/2021	10/7/2021	29	NYP&	14.4	4,200	\$ 479.49	\$ 277.66	\$ -	\$ 757.2
59-0906-0665-2001-0	9360142	GOV_WES_69	60 Palisade St ENT	8/9/2021	9/8/2021	30	NYP&	19.2	6,120	\$ 647.98	\$ 350.93	\$ -	\$ 998.9
59-0906-0665-2001-0	9360142	GOV_WES_69	60 Palisade St ENT	7/9/2021	8/9/2021	31	NYP&	19.2	6,000	\$ 664.00	\$ 418.14	\$ -	\$ 1,082.1
59-0906-0665-2001-0	9360142	GOV_WES_69	60 Palisade St ENT	6/9/2021	7/9/2021	30	NYP&	19.2	5,760	\$ 640.80	\$ 329.94	\$ -	\$ 970.7
59-0906-0665-2001-0	9360142	GOV_WES_69	60 Palisade St ENT	5/10/2021	6/9/2021	30	NYP&	18.9	5,400	\$ 426.22	\$ 230.36	\$ -	\$ 656.6
59-0906-0665-2001-0	9360142	GOV_WES_69	60 Palisade St ENT	4/12/2021	5/10/2021	28	NYP&	18.9	4,800	\$ 373.80	\$ 199.59	\$ -	\$ 573.4
59-0906-0665-2001-0	9360142	GOV_WES_69	60 Palisade St ENT	3/12/2021	4/12/2021	31	NYP&	18.9	5,520	\$ 472.95	\$ 390.55	\$ -	\$ 863.5
59-0906-0665-2001-0	9360142	GOV_WES_69	60 Palisade St ENT	2/10/2021	3/12/2021	30	NYP&	18.9	5,880	\$ 568.32	\$ 272.20	\$ -	\$ 840.5
59-0906-0665-2001-0	9360142	GOV_WES_69	60 Palisade St ENT	1/11/2021	2/10/2021	30	NYP&	18.9	6,240	\$ 422.55	\$ 241.79	\$ -	\$ 664.3
59-0906-0665-3200-7	8741373	GOV_WES_69	Station Plaza PKLT	12/9/2021	1/10/2022	32	NYP&	-	1,512	\$ -	\$ 114.99	\$ -	\$ 115.0
59-0906-0665-3200-7	8741373	GOV_WES_69	Station Plaza PKLT	11/5/2021	12/9/2021	34	NYP&	-	1,656	\$ -	\$ 105.85	\$ -	\$ 105.9
59-0906-0665-3200-7	8741373	GOV_WES_69	Station Plaza PKLT	10/7/2021	11/5/2021	29	NYP&	2.8	1,422	\$ -	\$ 78.09	\$ -	\$ 78.1
59-0906-0665-3200-7	8741373	GOV_WES_69	Station Plaza PKLT	9/8/2021	10/7/2021	29	NYP&	2.8	1,440	\$ -	\$ 112.04	\$ -	\$ 112.0
59-0906-0665-3200-7	8741373	GOV_WES_69	Station Plaza PKLT	8/9/2021	9/8/2021	30	NYP&	2.8	1,278	\$ -	\$ 80.01	\$ -	\$ 80.0
59-0906-0665-3200-7	8741373	GOV_WES_69	Station Plaza PKLT	7/9/2021	8/9/2021	31	NYP&	2.8	1,386	\$ -	\$ 104.33	\$ -	\$ 104.3
59-0906-0665-3200-7	8741373	GOV_WES_69	Station Plaza PKLT	6/9/2021	7/9/2021	30	NYP&	3.2	1,386	\$ -	\$ 88.18	\$ -	\$ 88.2
59-0906-0665-3200-7	8741373	GOV_WES_69	Station Plaza PKLT	5/10/2021	6/9/2021	30	NYP&	3.2	1,404	\$ -	\$ 69.91	\$ -	\$ 69.9
59-0906-0665-3200-7	8741373	GOV_WES_69	Station Plaza PKLT	4/12/2021	5/10/2021	28	NYP&	8.8	1,314	\$ -	\$ 66.43	\$ -	\$ 66.4
59-0906-0665-3200-7	8741373	GOV_WES_69	Station Plaza PKLT	3/12/2021	4/12/2021	31	NYP&	3.2	1,476	\$ -	\$ 116.17	\$ -	\$ 116.2
59-0906-0665-3200-7	8741373	GOV_WES_69	Station Plaza PKLT	2/10/2021	3/12/2021	30	NYP&	3.2	1,530	\$ -	\$ 83.72	\$ -	\$ 83.7
59-0906-0665-3200-7	8741373	GOV_WES_69	Station Plaza PKLT	1/11/2021	2/10/2021	30	NYP&	3.2	1,800	\$ -	\$ 83.49	\$ -	\$ 83.5
59-0906-0665-3600-8	9907900	GOV_WES_62	Palisade St Recr	12/9/2021	1/10/2022	32	NYP&	-	1,056	\$ -	\$ 356.18	\$ -	\$ 356.2
59-0906-0665-3600-8	9907900	GOV_WES_62	Palisade St Recr	11/5/2021	12/9/2021	34	NYP&	-	1,008	\$ -	\$ 336.44	\$ -	\$ 336.4
59-0906-0665-3600-8	9907900	GOV_WES_62	Palisade St Recr	10/7/2021	11/5/2021	29	NYP&	-	720	\$ -	\$ 214.13	\$ -	\$ 214.1
59-0906-0665-3600-8	9907900	GOV_WES_62	Palisade St Recr	9/8/2021	10/7/2021	29	NYP&	-	636	\$ -	\$ 197.59	\$ -	\$ 197.6
59-0906-0665-3600-8	9907900	GOV_WES_62	Palisade St Recr	8/9/2021	9/8/2021	30	NYP&	-	612	\$ -	\$ 192.31	\$ -	\$ 192.3
59-0906-0665-3600-8	9907900	GOV_WES_62	Palisade St Recr	7/9/2021	8/9/2021	31	NYP&	-	588	\$ -	\$ 196.21	\$ -	\$ 196.2
59-0906-0665-3600-8	9907900	GOV_WES_62	Palisade St Recr	6/9/2021	7/9/2021	30	NYP&	-	732	\$ -	\$ 222.63	\$ -	\$ 222.6
59-0906-0665-3600-8	9907900	GOV_WES_62	Palisade St Recr	5/10/2021	6/9/2021	30	NYP&	-	612	\$ -	\$ 180.81	\$ -	\$ 180.8
59-0906-0665-3600-8	9907900	GOV_WES_62	Palisade St Recr	4/12/2021	5/10/2021	28	NYP&	-	660	\$ -	\$ 184.42	\$ -	\$ 184.4
59-0906-0665-3600-8	9907900	GOV_WES_62	Palisade St Recr	3/12/2021	4/12/2021	31	NYP&	-	756	\$ -	\$ 244.14	\$ -	\$ 244.1
59-0906-0665-3600-8	9907900	GOV_WES_62	Palisade St Recr	2/10/2021	3/12/2021	30	NYP&	-	960	\$ -	\$ 274.19	\$ -	\$ 274.2
59-0906-0665-3600-8	9907900	GOV_WES_62	Palisade St Recr	1/11/2021	2/10/2021	30	NYP&	-	1,224	\$ -	\$ 334.35	\$ -	\$ 334.4
59-0906-0665-4000-0	7405275 A	GOV_WES_69	Ashford Ave Fire	12/9/2021	1/10/2022	32	NYP&	9.9	2,430	\$ 361.32	\$ 184.80	\$ -	\$ 546.1
59-0906-0665-4000-0	7405275 A	GOV_WES_69	Ashford Ave Fire	11/5/2021	12/9/2021	34	NYP&	10.3	2,340	\$ 387.93	\$ 148.25	\$ -	\$ 536.2
59-0906-0665-4000-0	7405275 A	GOV_WES_69	Ashford Ave Fire	10/7/2021	11/5/2021	29	NYP&	9.7	2,106	\$ 324.85	\$ 109.15	\$ -	\$ 434.0
59-0906-0665-4000-0	7405275 A	GOV_WES_69	Ashford Ave Fire	9/8/2021	10/7/2021	29	NYP&	10.1	2,304	\$ 330.81	\$ 152.31	\$ -	\$ 483.1
59-0906-0665-4000-0	7405275 A	GOV_WES_69	Ashford Ave Fire	8/9/2021	9/8/2021	30	NYP&	9.4	3,132	\$ 321.53	\$ 179.59	\$ -	\$ 501.1
59-0906-0665-4000-0	7405275 A	GOV_WES_69	Ashford Ave Fire	7/9/2021	8/9/2021	31	NYP&	8.6	4,194	\$ 306.65	\$ 292.28	\$ -	\$ 598.9
59-0906-0665-4000-0	7405275 A	GOV_WES_69	Ashford Ave Fire	6/9/2021	7/9/2021	30	NYP&	8.8	3,150	\$ 300.97	\$ 180.43	\$ -	\$ 481.4
59-0906-0665-4000-0	7405275 A	GOV_WES_69	Ashford Ave Fire	5/10/2021	6/9/2021	30	NYP&	7.6	2,070	\$ 262.42	\$ 88.30	\$ -	\$ 350.7
59-0906-0665-4000-0	7405275 A	GOV_WES_69	Ashford Ave Fire	4/12/2021	5/10/2021	28	NYP&	8.8	2,088	\$ 285.31	\$ 86.82	\$ -	\$ 372.1
59-0906-0665-4000-0	7405275 A	GOV_WES_69	Ashford Ave Fire	3/12/2021	4/12/2021	31	NYP&	8.8	2,322	\$ 307.98	\$ 164.28	\$ -	\$ 472.3
59-0906-0665-4000-0	7405275 A	GOV_WES_69	Ashford Ave Fire	2/10/2021	3/12/2021	30	NYP&	8.8	2,250	\$ 298.68	\$ 104.15	\$ -	\$ 402.8
59-0906-0665-4000-0	7405275 A	GOV_WES_69	Ashford Ave Fire	1/11/2021	2/10/2021	30	NYP&	8.6	2,232	\$ 292.71	\$ 86.43	\$ -	\$ 379.1
59-0906-0665-4501-7	9987808	GOV_WES_69	1 Stanley Ave Gar	12/9/2021	1/10/2022	32	NYP&	26	9,800	\$ 955.72	\$ 745.29	\$ -	\$ 1,701.0
59-0906-0665-4501-7	9987808	GOV_WES_69	1 Stanley Ave Gar	11/5/2021	12/9/2021	34	NYP&	23.2	9,920	\$ 880.28	\$ 628.44	\$ -	\$ 1,508.7

Village of Dobbs Ferry
Exhibit - Utility Data
Electric Data

Account #	Meter #	Rate Structure	Location	Billing Start Date	Billing End Date	Billing Days	Delivery By	Billed kW	Billed kWh	kW Cost	kWh Cost	Fixed Cost	Total Cost
59-0906-0665-4501-7	9987808	GOV_WES_69	1 Stanley Ave Gar	10/7/2021	11/5/2021	29	NYP&	24.0	7,320	\$ 798.59	\$ 377.17	\$ -	\$ 1,175.8
59-0906-0665-4501-7	9987808	GOV_WES_69	1 Stanley Ave Gar	9/8/2021	10/7/2021	29	NYP&	20.4	4,000	\$ 632.46	\$ 264.44	\$ -	\$ 896.9
59-0906-0665-4501-7	9987808	GOV_WES_69	1 Stanley Ave Gar	8/9/2021	9/8/2021	30	NYP&	20.4	5,360	\$ 585.78	\$ 307.35	\$ -	\$ 893.1
59-0906-0665-4501-7	9987808	GOV_WES_69	1 Stanley Ave Gar	7/9/2021	8/9/2021	31	NYP&	20.4	6,960	\$ 574.01	\$ 485.05	\$ -	\$ 1,059.1
59-0906-0665-4501-7	9987808	GOV_WES_69	1 Stanley Ave Gar	6/9/2021	7/9/2021	30	NYP&	20.4	7,080	\$ 611.25	\$ 405.55	\$ -	\$ 1,016.8
59-0906-0665-4501-7	9987808	GOV_WES_69	1 Stanley Ave Gar	5/10/2021	6/9/2021	30	NYP&	20.4	6,960	\$ 671.96	\$ 296.92	\$ -	\$ 968.9
59-0906-0665-4501-7	9987808	GOV_WES_69	1 Stanley Ave Gar	4/12/2021	5/10/2021	28	NYP&	23.2	6,720	\$ 739.79	\$ 279.41	\$ -	\$ 1,019.2
59-0906-0665-4501-7	9987808	GOV_WES_69	1 Stanley Ave Gar	3/12/2021	4/12/2021	31	NYP&	26.0	8,680	\$ 889.54	\$ 614.11	\$ -	\$ 1,503.7
59-0906-0665-4501-7	9987808	GOV_WES_69	1 Stanley Ave Gar	2/10/2021	3/12/2021	30	NYP&	27.2	9,520	\$ 901.20	\$ 440.71	\$ -	\$ 1,341.9
59-0906-0665-4501-7	9987808	GOV_WES_69	1 Stanley Ave Gar	1/11/2021	2/10/2021	30	NYP&	25	8,960	\$ 837.30	\$ 348.14	\$ -	\$ 1,185.4

Village of Dobbs Ferry
Exhibit - Utility Data
Street Light Data

Account #	Service Classification	Billing Start Date	Billing End Date	Billing Days	Billed kWh	Total Delivery Cost	Total Supply Cost	Total Cost
65-0554-0000-0000-0	GOV_WES_66	1/11/2021	2/21/2021	41	36	\$ 8.73	\$ 1.21	\$ 9.94
65-0554-0000-0000-0	GOV_WES_66	2/21/2021	3/12/2021	19	36	\$ 8.76	\$ 1.48	\$ 10.24
65-0554-0000-0000-0	GOV_WES_66	3/12/2021	4/12/2021	31	31	\$ 7.63	\$ 2.03	\$ 9.66
65-0554-0000-0000-0	GOV_WES_66	4/12/2021	5/10/2021	28	28	\$ 7.08	\$ 1.03	\$ 8.11
65-0554-0000-0000-0	GOV_WES_66	5/10/2021	6/9/2021	30	26	\$ 6.57	\$ 0.89	\$ 7.46
65-0554-0000-0000-0	GOV_WES_66	6/9/2021	7/9/2021	30	27	\$ 6.78	\$ 1.32	\$ 8.10
65-0554-0000-0000-0	GOV_WES_66	7/9/2021	8/9/2021	31	30	\$ 7.52	\$ 1.83	\$ 9.35
65-0554-0000-0000-0	GOV_WES_66	8/9/2021	9/8/2021	30	33	\$ 8.22	\$ 1.61	\$ 9.83
65-0554-0000-0000-0	GOV_WES_66	9/8/2021	10/7/2021	29	39	\$ 9.48	\$ 2.39	\$ 11.87
65-0554-0000-0000-0	GOV_WES_66	10/7/2021	11/5/2021	29	41	\$ 10.08	\$ 1.90	\$ 11.98
65-0554-0000-0000-0	GOV_WES_66	11/5/2021	12/9/2021	34	43	\$ 10.39	\$ 2.50	\$ 12.89
65-0554-0000-0000-0	GOV_WES_66	12/9/2021	1/10/2022	32	42	\$ 10.65	\$ 3.00	\$ 13.65
65 0565 0000 0000 0	GOV_WES_66	1/11/2021	2/21/2021	41	28,392	\$ 6,903.92	\$ 956.11	\$ 7,860.03
65 0565 0000 0000 0	GOV_WES_66	2/21/2021	3/12/2021	19	28,312	\$ 6,905.74	\$ 1,166.82	\$ 8,072.56
65 0565 0000 0000 0	GOV_WES_66	3/12/2021	4/12/2021	31	24,349	\$ 6,021.46	\$ 1,599.00	\$ 7,620.46
65 0565 0000 0000 0	GOV_WES_66	4/12/2021	5/10/2021	28	22,439	\$ 5,681.46	\$ 819.03	\$ 6,500.49
65 0565 0000 0000 0	GOV_WES_66	5/10/2021	6/9/2021	30	20,303	\$ 5,153.04	\$ 693.36	\$ 5,846.40
65 0565 0000 0000 0	GOV_WES_66	6/9/2021	7/9/2021	30	21,603	\$ 5,428.36	\$ 1,053.59	\$ 6,481.95
65 0565 0000 0000 0	GOV_WES_66	7/9/2021	8/9/2021	31	23,968	\$ 6,013.53	\$ 1,466.37	\$ 7,479.90
65 0565 0000 0000 0	GOV_WES_66	8/9/2021	9/8/2021	30	26,106	\$ 6,516.81	\$ 1,274.76	\$ 7,791.57
65 0565 0000 0000 0	GOV_WES_66	9/8/2021	10/7/2021	29	30,229	\$ 7,376.12	\$ 1,844.88	\$ 9,221.00
65 0565 0000 0000 0	GOV_WES_66	10/7/2021	11/5/2021	29	31,905	\$ 7,862.50	\$ 1,478.35	\$ 9,340.85
65 0565 0000 0000 0	GOV_WES_66	11/5/2021	12/9/2021	34	34,500	\$ 8,343.59	\$ 2,010.33	\$ 10,353.92
65 0565 0000 0000 0	GOV_WES_66	12/9/2021	1/10/2022	32	33,817	\$ 8,578.61	\$ 2,419.28	\$ 10,997.89
65 1565 0000 0000 0	GOV_WES_66	12/9/2021	1/10/2022	32	707	\$ 182.18	\$ 50.58	\$ 232.76
65 1565 0000 0000 0	GOV_WES_66	11/5/2021	12/9/2021	34	707	\$ 174.06	\$ 41.20	\$ 215.26
65 1565 0000 0000 0	GOV_WES_66	10/7/2021	11/5/2021	29	684	\$ 171.43	\$ 31.80	\$ 203.23
65 1565 0000 0000 0	GOV_WES_66	9/8/2021	10/7/2021	29	707	\$ 173.65	\$ 43.15	\$ 216.80
65 1565 0000 0000 0	GOV_WES_66	8/9/2021	9/8/2021	30	684	\$ 170.02	\$ 33.40	\$ 203.42
65 1565 0000 0000 0	GOV_WES_66	7/9/2021	8/9/2021	31	707	\$ 174.42	\$ 43.26	\$ 217.68
65 1565 0000 0000 0	GOV_WES_66	6/9/2021	7/9/2021	30	707	\$ 172.91	\$ 34.48	\$ 207.39
65 1565 0000 0000 0	GOV_WES_66	5/10/2021	6/9/2021	30	684	\$ 168.14	\$ 23.36	\$ 191.50
65 1565 0000 0000 0	GOV_WES_66	4/12/2021	5/10/2021	28	707	\$ 174.60	\$ 25.81	\$ 200.41
65 1565 0000 0000 0	GOV_WES_66	3/12/2021	4/12/2021	31	684	\$ 167.31	\$ 44.92	\$ 212.23
65 1565 0000 0000 0	GOV_WES_66	2/21/2021	3/12/2021	19	707	\$ 172.47	\$ 29.14	\$ 201.61
65 1565 0000 0000 0	GOV_WES_66	1/11/2021	2/21/2021	41	638	\$ 156.64	\$ 21.46	\$ 178.10

Account #	Meter #	Rate Structure	Location	Billing Start Date	Billing End Date	Billing Days	Delivery By	Billed CCF	Billed Therms	Therm Cost	Fixed Cost	Total Delivery Cost	Supply By	Total Supply Cost	Total Cost
59-0906-0665-2100-0	3491993	GS2 Rate II Non-Residential	55 Main Street	12/9/2021	1/10/2022	32	ConEdison	1,748	1,795	\$ 1,709	\$ 38	\$ 1,747.18	ConEdison	\$ 1,243.60	\$ 2,990.78
59-0906-0665-2100-0	3491993	GS2 Rate II Non-Residential	55 Main Street	11/5/2021	12/9/2021	34	ConEdison	1,259	1,293	\$ 1,047	\$ 39	\$ 1,085.64	ConEdison	\$ 879.78	\$ 1,965.42
59-0906-0665-2100-0	3491993	GS2 Rate II Non-Residential	55 Main Street	10/7/2021	11/5/2021	29	ConEdison	318	327	\$ 347	\$ 33	\$ 380.42	ConEdison	\$ 219.12	\$ 599.54
59-0906-0665-2100-0	3491993	GS2 Rate II Non-Residential	55 Main Street	9/8/2021	10/7/2021	29	ConEdison	58	60	\$ 64	\$ 33	\$ 97.49	ConEdison	\$ 36.38	\$ 133.87
59-0906-0665-2100-0	3491993	GS2 Rate II Non-Residential	55 Main Street	8/9/2021	9/8/2021	30	ConEdison	9	9	\$ 7	\$ 34	\$ 41.04	ConEdison	\$ 5.42	\$ 46.46
59-0906-0665-2100-0	3491993	GS2 Rate II Non-Residential	55 Main Street	7/9/2021	8/9/2021	31	ConEdison	-	-	\$ -	\$ 36	\$ 35.65	ConEdison	\$ -	\$ 35.65
59-0906-0665-2100-0	3491993	GS2 Rate II Non-Residential	55 Main Street	6/9/2021	7/9/2021	30	ConEdison	-	-	\$ -	\$ 35	\$ 34.54	ConEdison	\$ -	\$ 34.54
59-0906-0665-2100-0	3491993	GS2 Rate II Non-Residential	55 Main Street	5/10/2021	6/9/2021	30	ConEdison	109	112	\$ 99	\$ 34	\$ 133.04	ConEdison	\$ 50.71	\$ 183.75
59-0906-0665-2100-0	3491993	GS2 Rate II Non-Residential	55 Main Street	4/12/2021	5/10/2021	28	ConEdison	385	395	\$ 317	\$ 32	\$ 349.26	ConEdison	\$ 185.11	\$ 534.37
59-0906-0665-2100-0	3491993	GS2 Rate II Non-Residential	55 Main Street	3/12/2021	4/12/2021	31	ConEdison	770	791	\$ 766	\$ 35	\$ 801.72	ConEdison	\$ 406.38	\$ 1,208.10
59-0906-0665-2100-0	3491993	GS2 Rate II Non-Residential	55 Main Street	2/10/2021	3/12/2021	30	ConEdison	1,860	1,910	\$ 1,387	\$ 34	\$ 1,455.33	ConEdison	\$ 1,032.05	\$ 2,487.38
59-0906-0665-2100-0	3491993	GS2 Rate II Non-Residential	55 Main Street	1/11/2021	2/10/2021	30	ConEdison	2,013	2,067	\$ 1,476	\$ 34	\$ 1,510.22	ConEdison	\$ 1,152.18	\$ 2,662.40
59-0906-2765-1500-8	3128713	GS2 Rate II Non-Residential	81 Ashford Ave Gar	12/9/2021	1/10/2022	32	ConEdison	561	576	\$ 561	\$ 38	\$ 599.74	ConEdison	\$ 399.05	\$ 998.79
59-0906-2765-1500-8	3128713	GS2 Rate II Non-Residential	81 Ashford Ave Gar	11/5/2021	12/9/2021	34	ConEdison	255	262	\$ 229	\$ 39	\$ 267.76	ConEdison	\$ 178.27	\$ 446.03
59-0906-2765-1500-8	3128713	GS2 Rate II Non-Residential	81 Ashford Ave Gar	10/7/2021	11/5/2021	29	ConEdison	8	8	\$ 8	\$ 33	\$ 40.66	ConEdison	\$ 5.36	\$ 46.02
59-0906-2765-1500-8	3128713	GS2 Rate II Non-Residential	81 Ashford Ave Gar	9/8/2021	10/7/2021	29	ConEdison	6	6	\$ 4	\$ 33	\$ 37.41	ConEdison	\$ 3.65	\$ 41.06
59-0906-2765-1500-8	3128713	GS2 Rate II Non-Residential	81 Ashford Ave Gar	8/9/2021	9/8/2021	30	ConEdison	6	6	\$ 4	\$ 34	\$ 37.96	ConEdison	\$ 3.62	\$ 41.58
59-0906-2765-1500-8	3128713	GS2 Rate II Non-Residential	81 Ashford Ave Gar	7/9/2021	8/9/2021	31	ConEdison	5	5	\$ 3	\$ 35	\$ 37.90	ConEdison	\$ 2.74	\$ 40.64
59-0906-2765-1500-8	3128713	GS2 Rate II Non-Residential	81 Ashford Ave Gar	6/9/2021	7/9/2021	30	ConEdison	6	6	\$ 4	\$ 34	\$ 37.74	ConEdison	\$ 3.05	\$ 40.79
59-0906-2765-1500-8	3128713	GS2 Rate II Non-Residential	81 Ashford Ave Gar	5/10/2021	6/9/2021	30	ConEdison	8	8	\$ 5	\$ 34	\$ 39.35	ConEdison	\$ 3.62	\$ 42.97
59-0906-2765-1500-8	3128713	GS2 Rate II Non-Residential	81 Ashford Ave Gar	4/12/2021	5/10/2021	28	ConEdison	395	406	\$ 330	\$ 32	\$ 361.67	ConEdison	\$ 186.21	\$ 547.88
59-0906-2765-1500-8	3128713	GS2 Rate II Non-Residential	81 Ashford Ave Gar	3/12/2021	4/12/2021	31	ConEdison	507	521	\$ 511	\$ 35	\$ 546.73	ConEdison	\$ 268	\$ 814.40
59-0906-2765-1500-8	3128713	GS2 Rate II Non-Residential	81 Ashford Ave Gar	2/10/2021	3/12/2021	30	ConEdison	564	579	\$ 434	\$ 34	\$ 467.75	ConEdison	\$ 313	\$ 780.60
59-0906-2765-1500-8	3128713	GS2 Rate II Non-Residential	81 Ashford Ave Gar	1/11/2021	2/10/2021	30	ConEdison	417	428	\$ 321	\$ 34	\$ 354.75	ConEdison	\$ 238.58	\$ 593.33
59-0906-2765-1600-6	4085378	GS2 Rate II Non-Residential	100000 Ashford Ave Pool	12/9/2021	1/10/2022	32	ConEdison	158	162	\$ 172	\$ 38	\$ 210.03	ConEdison	\$ 112.23	\$ 322.26
59-0906-2765-1600-6	4085378	GS2 Rate II Non-Residential	100000 Ashford Ave Pool	11/5/2021	12/9/2021	34	ConEdison	6	6	\$ 3	\$ 39	\$ 41.98	ConEdison	\$ 4.09	\$ 46.07
59-0906-2765-1600-6	4085378	GS2 Rate II Non-Residential	100000 Ashford Ave Pool	10/7/2021	11/5/2021	29	ConEdison	4	4	\$ 3	\$ 33	\$ 35.72	ConEdison	\$ 2.68	\$ 38.40
59-0906-2765-1600-6	4085378	GS2 Rate II Non-Residential	100000 Ashford Ave Pool	9/8/2021	10/7/2021	29	ConEdison	4	4	\$ 2	\$ 33	\$ 35.18	ConEdison	\$ 2.42	\$ 37.60
59-0906-2765-1600-6	4085378	GS2 Rate II Non-Residential	100000 Ashford Ave Pool	8/9/2021	9/8/2021	30	ConEdison	7	7	\$ 5	\$ 34	\$ 38.96	ConEdison	\$ 4.21	\$ 43.17
59-0906-2765-1600-6	4085378	GS2 Rate II Non-Residential	100000 Ashford Ave Pool	7/9/2021	8/9/2021	31	ConEdison	10	10	\$ 8	\$ 35	\$ 43.04	ConEdison	\$ 5.45	\$ 48.49
59-0906-2765-1600-6	4085378	GS2 Rate II Non-Residential	100000 Ashford Ave Pool	6/9/2021	7/9/2021	30	ConEdison	9	9	\$ 7	\$ 34	\$ 40.71	ConEdison	\$ 4.58	\$ 45.29
59-0906-2765-1600-6	4085378	GS2 Rate II Non-Residential	100000 Ashford Ave Pool	5/10/2021	6/9/2021	30	ConEdison	31	32	\$ 28	\$ 34	\$ 62.16	ConEdison	\$ 14.49	\$ 76.65
59-0906-2765-1600-6	4085378	GS2 Rate II Non-Residential	100000 Ashford Ave Pool	4/12/2021	5/10/2021	28	ConEdison	113	116	\$ 106	\$ 32	\$ 137.58	ConEdison	\$ 54.35	\$ 191.93
59-0906-2765-1600-6	4085378	GS2 Rate II Non-Residential	100000 Ashford Ave Pool	3/12/2021	4/12/2021	31	ConEdison	191	196	\$ 205	\$ 35	\$ 239.84	ConEdison	\$ 100.70	\$ 340.54
59-0906-2765-1600-6	4085378	GS2 Rate II Non-Residential	100000 Ashford Ave Pool	2/10/2021	3/12/2021	30	ConEdison	270	277	\$ 217	\$ 34	\$ 251.44	ConEdison	\$ 149.68	\$ 401.12
59-0906-2765-1600-6	4085378	GS2 Rate II Non-Residential	100000 Ashford Ave Pool	1/11/2021	2/10/2021	30	ConEdison	279	287	\$ 253	\$ 3	\$ 255.35	ConEdison	\$ 159.98	\$ 415.33
59-0906-2765-1700-4	4080205	GS2 Rate II Non-Residential	60 Palisade Ave Ent	12/9/2021	1/10/2022	32	ConEdison	197	202	\$ 209	\$ 38	\$ 247.67	ConEdison	\$ 139.95	\$ 387.62
59-0906-2765-1700-4	4080205	GS2 Rate II Non-Residential	60 Palisade Ave Ent	11/5/2021	12/9/2021	34	ConEdison	185	191	\$ 173	\$ 39	\$ 211.46	ConEdison	\$ 129.96	\$ 341.42
59-0906-2765-1700-4	4080205	GS2 Rate II Non-Residential	60 Palisade Ave Ent	10/7/2021	11/5/2021	29	ConEdison	22	23	\$ 26	\$ 33	\$ 59.30	ConEdison	\$ 15.40	\$ 74.70
59-0906-2765-1700-4	4080205	GS2 Rate II Non-Residential	60 Palisade Ave Ent	9/8/2021	10/7/2021	29	ConEdison	14	14	\$ 13	\$ 33	\$ 46.29	ConEdison	\$ 8.49	\$ 54.78
59-0906-2765-1700-4	4080205	GS2 Rate II Non-Residential	60 Palisade Ave Ent	8/9/2021	9/8/2021	30	ConEdison	13	13	\$ 11	\$ 34	\$ 45.19	ConEdison	\$ 7.83	\$ 53.02
59-0906-2765-1700-4	4080205	GS2 Rate II Non-Residential	60 Palisade Ave Ent	7/9/2021	8/9/2021	31	ConEdison	14	14	\$ 12	\$ 35	\$ 47.17	ConEdison	\$ 7.65	\$ 54.82
59-0906-2765-1700-4	4080205	GS2 Rate II Non-Residential	60 Palisade Ave Ent	6/9/2021	7/9/2021	30	ConEdison	14	14	\$ 12	\$ 34	\$ 45.71	ConEdison	\$ 7.10	\$ 52.81
59-0906-2765-1700-4	4080205	GS2 Rate II Non-Residential	60 Palisade Ave Ent	5/10/2021	6/9/2021	30	ConEdison	16	16	\$ 13	\$ 34	\$ 46.96	ConEdison	\$ 7.23	\$ 54.19
59-0906-2765-1700-4	4080205	GS2 Rate II Non-Residential	60 Palisade Ave Ent	4/12/2021	5/10/2021	28	ConEdison	37	38	\$ 36	\$ 32	\$ 67.52	ConEdison	\$ 17.81	\$ 85.33
59-0906-2765-1700-4	4080205	GS2 Rate II Non-Residential	60 Palisade Ave Ent	3/12/2021	4/12/2021	31	ConEdison	87	89	\$ 103	\$ 35	\$ 137.84	ConEdison	\$ 46	\$ 183.57

Village of Dobbs Ferry
Exhibit - Utility Data
Natural Gas Data

Account #	Meter #	Rate Structure	Location	Billing Start Date	Billing End Date	Billing Days	Delivery By	Billed CCF	Billed Therms	Therm Cost	Fixed Cost	Total Delivery Cost	Supply By	Total Supply Cost	Total Cost
59-0906-2765-1700-4	4080205	G52 Rate II Non-Residential	60 Palisade Ave Ent	1/11/2021	3/12/2021	60	ConEdison	238	244	\$ 194	\$ 34	\$ 227.80	ConEdison	\$ 131.85	\$ 359.65
59-0906-2765-1700-4	4080205	G52 Rate II Non-Residential	60 Palisade Ave Ent	1/10/2022	2/10/2021	#NUM!	ConEdison	296	304	\$ 233	\$ 34	\$ 267.33	ConEdison	\$ 169.45	\$ 436.78
59-0906-2765-1900-0	3435865	Trans Rate II Non-Residential	112 Main St TNHL	12/9/2021	1/10/2022	32	ConEdison	1,516	1,557	\$ 1,485	\$ 38	\$ 1,523.14	ConEdison	\$ 1,078.71	\$ 2,601.85
59-0906-2765-1900-0	3435865	Trans Rate II Non-Residential	112 Main St TNHL	11/5/2021	12/9/2021	34	ConEdison	1,359	1,396	\$ 1,129	\$ 39	\$ 1,167.35	ConEdison	\$ 949.87	\$ 2,117.22
59-0906-2765-1900-0	3435865	Trans Rate II Non-Residential	112 Main St TNHL	10/7/2021	11/5/2021	29	ConEdison	475	488	\$ 509	\$ 33	\$ 542.45	ConEdison	\$ 327.02	\$ 869.47
59-0906-2765-1900-0	3435865	Trans Rate II Non-Residential	112 Main St TNHL	9/8/2021	10/7/2021	29	ConEdison	60	62	\$ 67	\$ 33	\$ 99.69	ConEdison	\$ 37.60	\$ 137.29
59-0906-2765-1900-0	3435865	Trans Rate II Non-Residential	112 Main St TNHL	8/9/2021	9/8/2021	30	ConEdison	77	79	\$ 79	\$ 34	\$ 113.49	ConEdison	\$ 47.58	\$ 161.07
59-0906-2765-1900-0	3435865	Trans Rate II Non-Residential	112 Main St TNHL	7/9/2021	8/9/2021	31	ConEdison	76	78	\$ 78	\$ 35	\$ 113.08	ConEdison	\$ 42.61	\$ 155.69
59-0906-2765-1900-0	3435865	Trans Rate II Non-Residential	112 Main St TNHL	6/9/2021	7/9/2021	30	ConEdison	81	83	\$ 80	\$ 34	\$ 114.56	ConEdison	\$ 42.12	\$ 156.68
59-0906-2765-1900-0	3435865	Trans Rate II Non-Residential	112 Main St TNHL	5/10/2021	6/9/2021	30	ConEdison	83	85	\$ 78	\$ 34	\$ 112.57	ConEdison	\$ 38.48	\$ 151.05
59-0906-2765-1900-0	3435865	Trans Rate II Non-Residential	112 Main St TNHL	4/12/2021	5/10/2021	28	ConEdison	479	492	\$ 391	\$ 32	\$ 422.85	ConEdison	\$ 230.58	\$ 653.43
59-0906-2765-1900-0	3435865	Trans Rate II Non-Residential	112 Main St TNHL	3/12/2021	4/12/2021	31	ConEdison	969	995	\$ 959	\$ 35	\$ 994.33	ConEdison	\$ 511.19	\$ 1,505.52
59-0906-2765-1900-0	3435865	Trans Rate II Non-Residential	112 Main St TNHL	1/11/2021	3/12/2021	60	ConEdison	1,785	1,833	\$ 1,332	\$ 34	\$ 1,400.17	ConEdison	\$ 990	\$ 2,390.60
59-0906-2765-1900-0	3435865	Trans Rate II Non-Residential	112 Main St TNHL	1/10/2022	2/10/2021	#NUM!	ConEdison	1,753	1,811	\$ 1,296	\$ 34	\$ 1,329.72	ConEdison	\$ 1,009.48	\$ 2,339.20
59-0906-2765-3600-4	3643584	G52 Rate II Non-Residential	60 Palisade St RECR	12/9/2021	1/10/2022	32	ConEdison	352	372	\$ 369	\$ 38	\$ 407.07	ConEdison	\$ 257.73	\$ 664.80
59-0906-2765-3600-4	3643584	G52 Rate II Non-Residential	60 Palisade St RECR	11/5/2021	12/9/2021	34	ConEdison	298	306	\$ 264	\$ 38	\$ 302.05	ConEdison	\$ 208.20	\$ 510.25
59-0906-2765-3600-4	3643584	G52 Rate II Non-Residential	60 Palisade St RECR	10/7/2021	11/5/2021	29	ConEdison	95	98	\$ 117	\$ 32	\$ 149.29	ConEdison	\$ 65.67	\$ 214.96
59-0906-2765-3600-4	3643584	G52 Rate II Non-Residential	60 Palisade St RECR	9/8/2021	10/7/2021	29	ConEdison	24	25	\$ 25	\$ 32	\$ 57.90	ConEdison	\$ 15.16	\$ 73.06
59-0906-2765-3600-4	3643584	G52 Rate II Non-Residential	60 Palisade St RECR	8/9/2021	9/8/2021	30	ConEdison	3	3	\$ 1	\$ 34	\$ 34.18	ConEdison	\$ 1.81	\$ 35.99
59-0906-2765-3600-4	3643584	G52 Rate II Non-Residential	60 Palisade St RECR	8/9/2021	8/9/2021	-	ConEdison	3	3	\$ 1	\$ 35	\$ 35.28	ConEdison	\$ 1.64	\$ 36.92
59-0906-2765-3600-4	3643584	G52 Rate II Non-Residential	60 Palisade St RECR	5/10/2021	8/9/2021	91	ConEdison	32	33	\$ 27	\$ 66	\$ 93.60	ConEdison	\$ 15.84	\$ 109.44
59-0906-2765-3600-4	3643584	G52 Rate II Non-Residential	60 Palisade St RECR	4/12/2021	5/10/2021	28	ConEdison	132	136	\$ 121	\$ 31	\$ 152.10	ConEdison	\$ 63.75	\$ 215.85
59-0906-2765-3600-4	3643584	G52 Rate II Non-Residential	60 Palisade St RECR	3/12/2021	4/12/2021	31	ConEdison	186	191	\$ 200	\$ 35	\$ 234.47	ConEdison	\$ 98.13	\$ 332.60
59-0906-2765-3600-4	3643584	G52 Rate II Non-Residential	60 Palisade St RECR	2/10/2021	3/12/2021	30	ConEdison	369	379	\$ 290	\$ 34	\$ 323.86	ConEdison	\$ 204.79	\$ 528.65
59-0906-2765-3600-4	3643584	G52 Rate II Non-Residential	60 Palisade St RECR	1/11/2021	2/10/2021	30	ConEdison	459	471	\$ 351	\$ 34	\$ 384.41	ConEdison	\$ 262.55	\$ 646.96
59-0906-2765-3700-2	3971710	G52 Rate II Non-Residential	60 Palisade ST	12/9/2021	1/10/2022	32	ConEdison	549	564	\$ 550	\$ 38	\$ 588.42	ConEdison	\$ 390.75	\$ 979.17
59-0906-2765-3700-2	3971710	G52 Rate II Non-Residential	60 Palisade ST	11/5/2021	12/9/2021	34	ConEdison	538	553	\$ 460	\$ 39	\$ 498.60	ConEdison	\$ 376.27	\$ 874.87
59-0906-2765-3700-2	3971710	G52 Rate II Non-Residential	60 Palisade ST	10/7/2021	11/5/2021	29	ConEdison	234	240	\$ 260	\$ 33	\$ 292.84	ConEdison	\$ 160.83	\$ 453.67
59-0906-2765-3700-2	3971710	G52 Rate II Non-Residential	60 Palisade ST	9/8/2021	10/7/2021	29	ConEdison	43	44	\$ 47	\$ 33	\$ 79.68	ConEdison	\$ 26.67	\$ 106.35
59-0906-2765-3700-2	3971710	G52 Rate II Non-Residential	60 Palisade ST	8/9/2021	9/8/2021	30	ConEdison	15	15	\$ 13	\$ 34	\$ 47.26	ConEdison	\$ 9.03	\$ 56.29
59-0906-2765-3700-2	3971710	G52 Rate II Non-Residential	60 Palisade ST	7/9/2021	8/9/2021	31	ConEdison	13	13	\$ 11	\$ 35	\$ 46.14	ConEdison	\$ 7.11	\$ 53.25
59-0906-2765-3700-2	3971710	G52 Rate II Non-Residential	60 Palisade ST	6/9/2021	7/9/2021	30	ConEdison	23	24	\$ 22	\$ 34	\$ 55.68	ConEdison	\$ 12.17	\$ 67.85
59-0906-2765-3700-2	3971710	G52 Rate II Non-Residential	60 Palisade ST	5/10/2021	6/9/2021	30	ConEdison	124	127	\$ 110	\$ 34	\$ 143.75	ConEdison	\$ 57.49	\$ 201.24
59-0906-2765-3700-2	3971710	G52 Rate II Non-Residential	60 Palisade ST	4/12/2021	5/10/2021	28	ConEdison	327	336	\$ 276	\$ 32	\$ 307.86	ConEdison	\$ 154.11	\$ 461.97
59-0906-2765-3700-2	3971710	G52 Rate II Non-Residential	60 Palisade ST	3/12/2021	4/12/2021	31	ConEdison	516	537	\$ 520	\$ 35	\$ 555.24	ConEdison	\$ 272.30	\$ 827.54
59-0906-2765-3700-2	3971710	G52 Rate II Non-Residential	60 Palisade ST	2/10/2021	3/12/2021	30	ConEdison	850	873	\$ 644	\$ 34	\$ 678.34	ConEdison	\$ 472	\$ 1,150.05
59-0906-2765-3700-2	3971710	G52 Rate II Non-Residential	60 Palisade ST	1/11/2021	2/10/2021	30	ConEdison	874	898	\$ 652	\$ 34	\$ 686.09	ConEdison	\$ 500.57	\$ 1,186.66
59-0906-2765-4000-6	3900842	Trans Rate II Non-Residential	203 Ashford Ave ENT	12/9/2021	1/10/2022	32	ConEdison	653	671	\$ 651	\$ 38	\$ 689.15	ConEdison	\$ 464.87	\$ 1,154.02
59-0906-2765-4000-6	3900842	Trans Rate II Non-Residential	203 Ashford Ave ENT	11/5/2021	12/9/2021	34	ConEdison	600	616	\$ 510	\$ 39	\$ 548.59	ConEdison	\$ 419.14	\$ 967.73
59-0906-2765-4000-6	3900842	Trans Rate II Non-Residential	203 Ashford Ave ENT	10/7/2021	11/5/2021	29	ConEdison	183	188	\$ 207	\$ 33	\$ 240.51	ConEdison	\$ 125.98	\$ 366.49
59-0906-2765-4000-6	3900842	Trans Rate II Non-Residential	203 Ashford Ave ENT	9/8/2021	10/7/2021	29	ConEdison	98	101	\$ 107	\$ 33	\$ 139.77	ConEdison	\$ 61.25	\$ 201.02
59-0906-2765-4000-6	3900842	Trans Rate II Non-Residential	203 Ashford Ave ENT	8/9/2021	9/8/2021	30	ConEdison	92	95	\$ 95	\$ 34	\$ 128.86	ConEdison	\$ 57.22	\$ 186.08
59-0906-2765-4000-6	3900842	Trans Rate II Non-Residential	203 Ashford Ave ENT	7/9/2021	8/9/2021	31	ConEdison	99	102	\$ 100	\$ 35	\$ 135.66	ConEdison	\$ 55.71	\$ 191.37
59-0906-2765-4000-6	3900842	Trans Rate II Non-Residential	203 Ashford Ave ENT	6/9/2021	7/9/2021	30	ConEdison	142	146	\$ 130	\$ 34	\$ 164.20	ConEdison	\$ 74.10	\$ 238.30
59-0906-2765-4000-6	3900842	Trans Rate II Non-Residential	203 Ashford Ave ENT	4/30/2021	6/9/2021	40	ConEdison	149	153	\$ 135	\$ 45	\$ 179.68	ConEdison	\$ 68.46	\$ 248.14
59-0906-2765-4000-6	3900842	Trans Rate II Non-Residential	203 Ashford Ave ENT	4/12/2021	4/30/2021	18	ConEdison	165	169	\$ 154	\$ 20	\$ 173.31	ConEdison	\$ 244.88	\$ 418.19

Village of Dobbs Ferry
Exhibit - Utility Data
Natural Gas Data

Account #	Meter #	Rate Structure	Location	Billing Start Date	Billing End Date	Billing Days	Delivery By	Billed CCF	Billed Therms	Therm Cost	Fixed Cost	Total Delivery Cost	Supply By	Total Supply Cost	Total Cost
59-0906-2765-4000-6	3900842	Trans Rate II Non-Residential	203 Ashford Ave ENT	3/12/2021	4/12/2021	31	ConEdison	363	373	373	34	\$ 407.45	ConEdison	540	\$ 947.93
59-0906-2765-4000-6	3900842	Trans Rate II Non-Residential	203 Ashford Ave ENT	2/10/2021	3/12/2021	30	ConEdison	670	688	\$ 515	\$ 33	\$ 547.82	ConEdison	\$ 996.91	\$ 1,544.73
59-0906-2765-4000-6	3900842	Trans Rate II Non-Residential	203 Ashford Ave ENT	1/11/2021	2/10/2021	30	ConEdison	891	915	\$ 668	\$ 33	\$ 701.15	ConEdison	\$ 1,325.84	\$ 2,026.99

Village of Dobbs Ferry
Exhibit - Utility Data
Propane Data

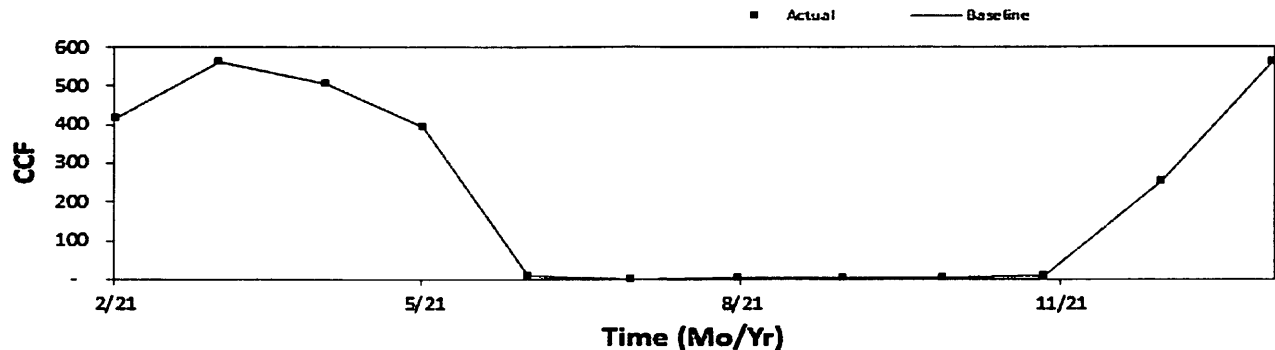
Account #	Location	Delivery Date	Provider	Gallons Delivered	Gallon Cost	Fixed Cost	Total Cost
116842D	1 Stanley Ave	1/13/2022	Paraco	531.00	\$ 1,195.97	\$ 14.99	\$ 1,210.96
116842D	1 Stanley Ave	12/23/2021	Paraco	1,649.00	\$ 3,842.68	\$ 14.99	\$ 3,857.67
116842D	1 Stanley Ave	12/2/2021	Paraco	1,090.00	\$ 2,540.04	\$ 14.99	\$ 2,555.03
116842D	1 Stanley Ave	11/12/2021	Paraco	838.70	\$ 2,110.11	\$ 14.99	\$ 2,125.10
116842D	1 Stanley Ave	7/22/2021	Paraco	405.00	\$ 874.80	\$ 9.99	\$ 884.79
116842D	1 Stanley Ave	5/28/2021	Paraco	1,121.50	\$ 2,366.37	\$ 9.99	\$ 2,376.36
116842D	1 Stanley Ave	3/22/2021	Paraco	1,423.00	\$ 3,073.68	\$ 9.99	\$ 3,083.67
116842D	1 Stanley Ave	2/3/2021	Paraco	500.00	\$ 1,010.00	\$ 9.99	\$ 1,019.99
116842D	1 Stanley Ave	1/15/2021	Paraco	1,573.50	\$ 3,162.74	\$ 9.99	\$ 3,172.73

Exhibit D-4

Meter Tuning Contract

Project: Dobbs Ferry
Area: Ambulance Corps. Build
Account: 59-0906-2765-1500-8

Site: Dobbs Ferry
Meter: 3128713
Unit: CCF(Qty OnPk)



From	To	# Days	Reading	Incl?	HDD	CDD	Offset	Baseline	Deviation
01/12/21	02/10/21	30	417	<input checked="" type="checkbox"/>	0.0	0.0	417	417	0.0%
02/11/21	03/12/21	30	564	<input checked="" type="checkbox"/>	0.0	0.0	564	564	0.0%
03/13/21	04/12/21	31	507	<input checked="" type="checkbox"/>	0.0	0.0	507	507	0.0%
04/13/21	05/10/21	28	395	<input checked="" type="checkbox"/>	0.0	0.0	395	395	0.0%
05/11/21	06/09/21	30	8	<input checked="" type="checkbox"/>	0.0	0.0	8	8	0.0%
06/10/21	07/09/21	30	-	<input checked="" type="checkbox"/>	0.0	0.0	-	-	0.0%
07/10/21	08/09/21	31	5	<input checked="" type="checkbox"/>	0.0	0.0	5	5	0.0%
08/10/21	09/08/21	30	6	<input checked="" type="checkbox"/>	0.0	0.0	6	6	0.0%
09/09/21	10/07/21	29	6	<input checked="" type="checkbox"/>	0.0	0.0	6	6	0.0%
10/08/21	11/05/21	29	8	<input checked="" type="checkbox"/>	0.0	0.0	8	8	0.0%
11/06/21	12/09/21	34	255	<input checked="" type="checkbox"/>	0.0	0.0	255	255	0.0%
12/10/21	01/10/22	32	561	<input checked="" type="checkbox"/>	0.0	0.0	561	561	0.0%
Sum/Average/Max		364	2,732		0.0	0.0	2,732	2,732	0.0%

3128713 (Account # 59-0906-2765-1500-8): Tuning Period is 364 days from 1/12/2021 until 1/10/2022.

Below is the equation used to calculate the Baseline values for the tuning period and all future periods:

$$\text{Baseline (CCF)} = \text{Offset}$$

The Baseline Equation has a Net Mean Bias of 0%. The underlying regression has a $R^2=0$

Baseline Costs are calculated using Average Total Cost/Consumption.

Explanations and Assumptions:

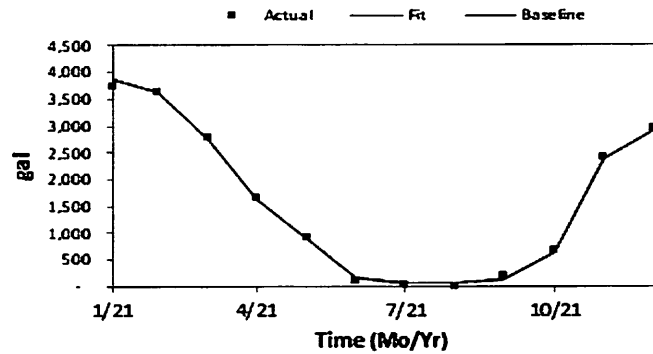
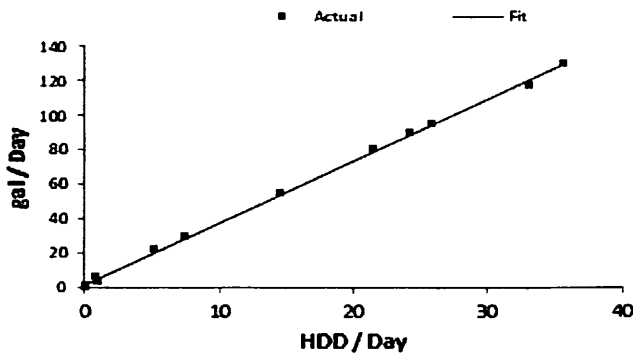
☐ (empty checkbox) under 'Incl?' indicates that the bill is excluded from the regression. However the Baseline Equation is always applied for all billing periods, even those excluded from the regression.

Multiplier and Offset are derived from Modification(s) in effect during the tuning period and are replicated annually for all future periods.

Meter Tuning Contract

Project: Dobbs Ferry
Area: DPW Office
Account: 116842D

Site: Dobbs Ferry
Meter: Propane
Unit: gal(Qty OnPk)



From	To	# Days	Reading	Incl?	HDD	CDD	Offset	Baseline	Deviation
12/31/20	01/31/21	32	3,746	<input checked="" type="checkbox"/>	1061.5	0.0	-	3,856	2.9%
02/01/21	02/28/21	28	3,640	<input checked="" type="checkbox"/>	998.0	0.0	-	3,621	-0.5%
03/01/21	03/31/21	31	2,768	<input checked="" type="checkbox"/>	751.5	0.0	-	2,745	-0.8%
04/01/21	04/30/21	30	1,657	<input checked="" type="checkbox"/>	437.5	0.0	-	1,620	-2.3%
05/01/21	05/31/21	31	925	<input checked="" type="checkbox"/>	230.0	0.0	-	879	-5.0%
06/01/21	06/30/21	30	106	<input checked="" type="checkbox"/>	30.0	0.0	-	161	52.3%
07/01/21	07/31/21	31	13	<input checked="" type="checkbox"/>	4.0	0.0	-	70	440.3%
08/01/21	08/31/21	31	4	<input checked="" type="checkbox"/>	1.5	0.0	-	61	1432.3%
09/01/21	09/30/21	30	193	<input checked="" type="checkbox"/>	23.5	0.0	-	138	-28.4%
10/01/21	10/31/21	31	681	<input checked="" type="checkbox"/>	161.0	0.0	-	632	-7.2%
11/01/21	11/30/21	30	2,395	<input checked="" type="checkbox"/>	646.0	0.0	-	2,366	-1.2%
12/01/21	12/31/21	31	2,945	<input checked="" type="checkbox"/>	801.5	0.0	-	2,924	-0.7%
Sum/Average/Max		366	19,073		5146.0	0.0	-	19,073	0% +/- 3.4%

Propane (Account # 116842D): Tuning Period is 366 days from 12/31/2020 until 12/31/2021.

Below is the equation used to calculate the Baseline values for the tuning period and all future periods:

$$\text{Baseline (gal)} = 1.8 \times \text{\#Days} + 3.58 \times \text{HDD}$$

The Baseline Equation has a Net Mean Bias of 0% and a Monthly Mean Error of +/-3.4%. The underlying regression has a $R^2=0.999$

Baseline Costs are calculated using Average Total Cost/Consumption.

Explanations and Assumptions:

☐ (empty checkbox) under 'Incl?' indicates that the bill is excluded from the regression. However the Baseline Equation is always applied for all billing periods, even those excluded from the regression.

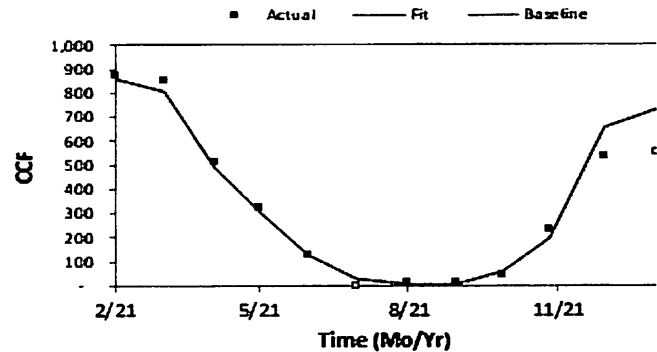
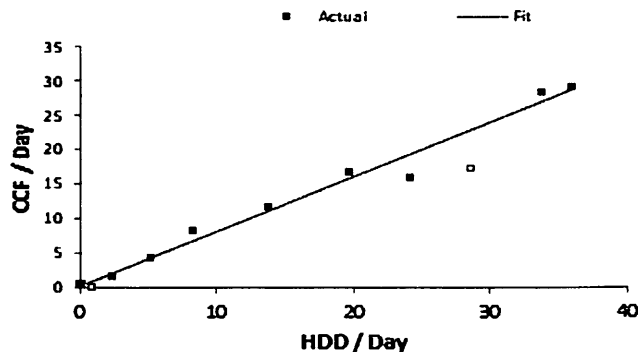
HDD = Heating Degree-Days calculated for WHITE PLAINS, NY for a 65.0 F° balance point.

Multiplier is derived from Modification(s) in effect during the tuning period and is replicated annually for all future periods.

Meter Tuning Contract

Project: Dobbs Ferry
Area: Embassy Club
Account: 59-0906-2765-3700-2

Site: Dobbs Ferry
Meter: 3971710
Unit: CCF(Qty OnPk)



From	To	# Days	Reading	Incl?	HDD	CDD	Offset	Baseline	Deviation
01/12/21	02/10/21	30	874	<input checked="" type="checkbox"/>	1081.0	0.0	-	863	-1.3%
02/11/21	03/12/21	30	850	<input checked="" type="checkbox"/>	1013.0	0.0	-	809	-4.8%
03/13/21	04/12/21	31	516	<input checked="" type="checkbox"/>	613.0	0.0	-	491	-4.8%
04/13/21	05/10/21	28	327	<input checked="" type="checkbox"/>	385.5	0.0	-	310	-5.1%
05/11/21	06/09/21	30	124	<input checked="" type="checkbox"/>	158.0	0.0	-	130	4.7%
06/10/21	07/09/21	30	-	<input type="checkbox"/>	28.0	0.0	-	27	0.0%
07/10/21	08/09/21	31	13	<input checked="" type="checkbox"/>	2.5	0.0	-	6	-50.8%
08/10/21	09/08/21	30	15	<input checked="" type="checkbox"/>	7.0	0.0	-	10	-34.5%
09/09/21	10/07/21	29	43	<input checked="" type="checkbox"/>	72.5	0.0	-	62	43.5%
10/08/21	11/05/21	29	234	<input checked="" type="checkbox"/>	241.0	0.0	-	196	-16.4%
11/06/21	12/09/21	34	538	<input checked="" type="checkbox"/>	821.5	0.0	-	657	22.2%
12/10/21	01/10/22	32	549	<input type="checkbox"/>	916.0	0.0	-	732	33.4%
Sum/Average/Max		364	4,083		5339.0	0.0	-	4,293	0% +/- 13%

3971710 (Account # 59-0906-2765-3700-2): Tuning Period is 364 days from 1/12/2021 until 1/10/2022.

Below is the equation used to calculate the Baseline values for the tuning period and all future periods:

$$\text{Baseline (CCF)} = 0.14 \times \text{\#Days} + 0.79 \times \text{HDD}$$

The Baseline Equation has a Net Mean Bias of 0% and a Monthly Mean Error of +/-13%. The underlying regression has a $R^2=0.983$

Baseline Costs are calculated using Average Total Cost/Consumption.

Explanations and Assumptions:

☐ (empty checkbox) under 'Incl?' indicates that the bill is excluded from the regression. However the Baseline Equation is always applied for all billing periods, even those excluded from the regression.

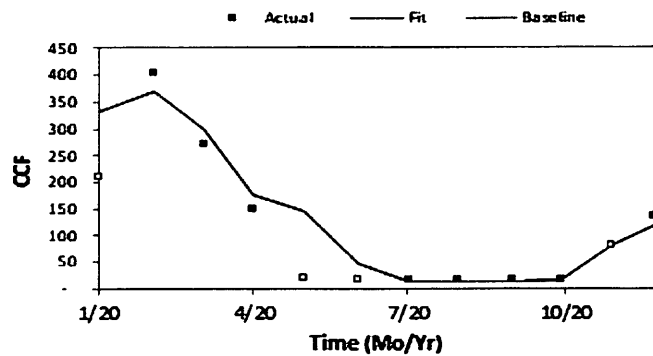
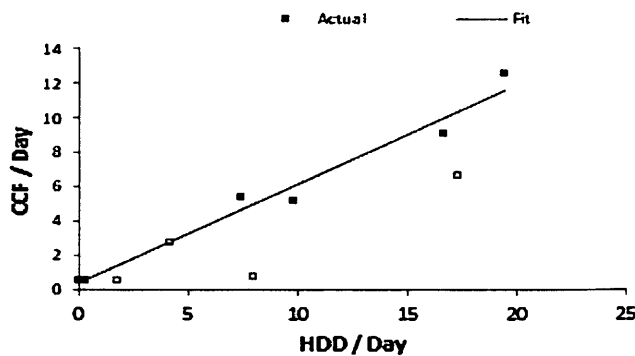
HDD = Heating Degree-Days calculated for WHITE PLAINS NY for a 66.0 F° balance point.

Multiplier is derived from Modification(s) in effect during the tuning period and is replicated annually for all future periods.

Meter Tuning Contract

Project: Dobbs Ferry
Area: Embassy Club
Account: 59-0906-2765-1700-4

Site: Dobbs Ferry
Meter: 4080205
Unit: CCF(Qty OnPk)



From	To	# Days	Reading	Incl?	HDD	CDD	Offset	Baseline	Deviation
12/09/19	01/09/20	32	211	<input type="checkbox"/>	555.5	0.0	-	332	57.3%
01/10/20	02/10/20	32	403	<input checked="" type="checkbox"/>	624.0	0.0	-	371	-7.9%
02/11/20	03/11/20	30	272	<input checked="" type="checkbox"/>	500.5	0.0	-	300	10.2%
03/12/20	04/09/20	29	150	<input checked="" type="checkbox"/>	286.5	0.0	-	177	17.8%
04/10/20	05/08/20	29	20	<input type="checkbox"/>	232.0	0.0	-	145	627.3%
05/09/20	06/09/20	32	16	<input type="checkbox"/>	56.5	0.0	-	46	189.2%
06/10/20	07/09/20	30	15	<input checked="" type="checkbox"/>	0.0	0.0	-	13	-13.0%
07/10/20	08/07/20	29	16	<input checked="" type="checkbox"/>	0.0	0.0	-	13	-21.1%
08/08/20	09/08/20	32	15	<input checked="" type="checkbox"/>	0.0	0.0	-	14	-7.2%
09/09/20	10/07/20	29	16	<input checked="" type="checkbox"/>	8.5	0.0	-	17	9.3%
10/08/20	11/05/20	29	80	<input type="checkbox"/>	121.0	0.0	-	82	2.4%
11/06/20	11/30/20	25	135	<input checked="" type="checkbox"/>	186.0	0.0	-	117	-13.1%
Sum/Average/Max		358	1,349		2570.5	0.0	-	1,628	0% +/- 15.7%

4080205 (Account # 59-0906-2765-1700-4): Tuning Period is 358 days from 12/9/2019 until 11/30/2020.

Below is the equation used to calculate the Baseline values for the tuning period and all future periods:

$$\text{Baseline (CCF)} = 0.44 \times \# \text{Days} + 0.57 \times \text{HDD}$$

The Baseline Equation has a Net Mean Bias of 0% and a Monthly Mean Error of +/-15.7%. The underlying regression has a $R^2=0.979$

Baseline Costs are calculated using Average Total Cost/Consumption.

Explanations and Assumptions:

☐ (empty checkbox) under 'Incl?' indicates that the bill is excluded from the regression. However the Baseline Equation is always applied for all billing periods, even those excluded from the regression.

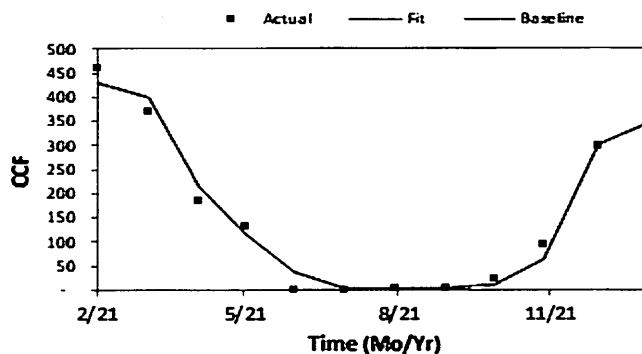
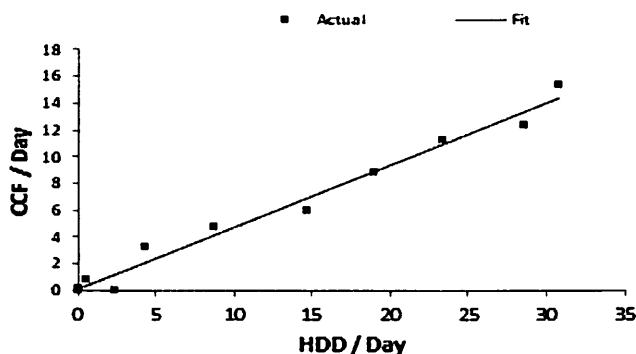
HDD = Heating Degree-Days calculated for WHITE PLAINS NY for a 55.0 F° balance point.

Multiplier is derived from Modification(s) in effect during the tuning period and is replicated annually for all future periods.

Meter Tuning Contract

Project: Dobbs Ferry
Area: Memorial Park Building
Account: 59-0906-2765-3600-4

Site: Dobbs Ferry
Meter: 3643584
Unit: CCF(Qty OnPk)



From	To	# Days	Reading	Incl?	HDD	CDD	Offset	Baseline	Deviation
01/12/21	02/10/21	30	459	<input checked="" type="checkbox"/>	925.0	0.0	-	431	-6.2%
02/11/21	03/12/21	30	369	<input checked="" type="checkbox"/>	857.0	0.0	-	399	8.2%
03/13/21	04/12/21	31	186	<input checked="" type="checkbox"/>	456.5	0.0	-	214	15.2%
04/13/21	05/10/21	28	132	<input checked="" type="checkbox"/>	246.5	0.0	-	117	-11.4%
05/11/21	06/09/21	30	-	<input checked="" type="checkbox"/>	71.3	0.0	-	36	0.0%
06/10/21	07/09/21	30	-	<input checked="" type="checkbox"/>	0.0	0.0	-	3	0.0%
07/10/21	08/09/21	31	3	<input checked="" type="checkbox"/>	0.0	0.0	-	3	14.3%
08/10/21	09/08/21	30	3	<input checked="" type="checkbox"/>	0.0	0.0	-	3	10.6%
09/09/21	10/07/21	29	24	<input checked="" type="checkbox"/>	16.0	0.0	-	11	-55.8%
10/08/21	11/05/21	29	95	<input checked="" type="checkbox"/>	127.0	0.0	-	62	-34.9%
11/06/21	12/09/21	34	298	<input checked="" type="checkbox"/>	644.7	0.0	-	302	1.2%
12/10/21	01/10/22	32	362	<input checked="" type="checkbox"/>	749.6	0.0	-	350	-3.4%
Sum/Average/Max		364	1,931		4093.6	0.0	-	1,931	0% +/- 13.9%

3643584 (Account # 59-0906-2765-3600-4): Tuning Period is 364 days from 1/12/2021 until 1/10/2022.

Below is the equation used to calculate the Baseline values for the tuning period and all future periods:

$$\text{Baseline (CCF)} = 0.11 \times \text{\#Days} + 0.46 \times \text{HDD}$$

The Baseline Equation has a Net Mean Bias of 0% and a Monthly Mean Error of +/-13.9%. The underlying regression has a $R^2=0.981$

Baseline Costs are calculated using Average Total Cost/Consumption.

Explanations and Assumptions:

☐ (empty checkbox) under 'Incl?' indicates that the bill is excluded from the regression. However the Baseline Equation is always applied for all billing periods, even those excluded from the regression.

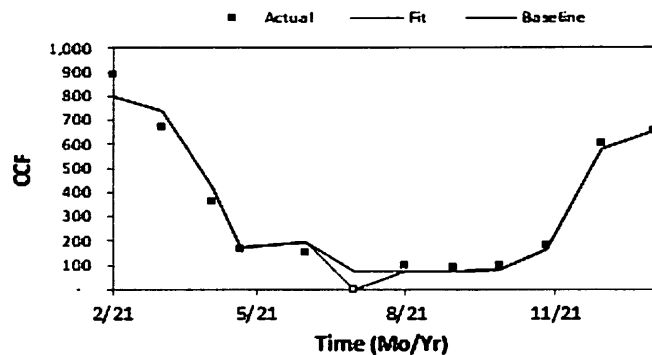
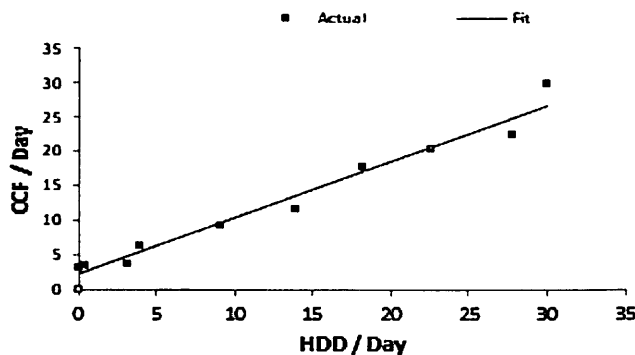
HDD = Heating Degree-Days calculated for WHITE PLAINS NY for a 61.0 F° balance point.

Multiplier is derived from Modification(s) in effect during the tuning period and is replicated annually for all future periods.

Meter Tuning Contract

Project: Dobbs Ferry
Area: Ogden Engine Company
Account: 59-0906-2765-4000-6

Site: Dobbs Ferry
Meter: 3900842
Unit: CCF(Qty OnPk)



From	To	# Days	Reading	Incl?	HDD	CDD	Offset	Baseline	Deviation
01/12/21	02/10/21	30	891	<input checked="" type="checkbox"/>	901.0	0.0	-	797	-10.6%
02/11/21	03/12/21	30	670	<input checked="" type="checkbox"/>	833.0	0.0	-	742	10.7%
03/13/21	04/12/21	31	363	<input checked="" type="checkbox"/>	432.5	0.0	-	423	16.4%
04/13/21	04/30/21	18	165	<input checked="" type="checkbox"/>	164.5	0.0	-	176	6.6%
05/01/21	06/09/21	40	149	<input checked="" type="checkbox"/>	124.5	0.0	-	197	32.3%
06/10/21	07/09/21	30	-	<input type="checkbox"/>	0.0	0.0	(73)	-	0.0%
07/10/21	08/09/21	31	99	<input checked="" type="checkbox"/>	0.0	0.0	-	75	-24.0%
08/10/21	09/08/21	30	92	<input checked="" type="checkbox"/>	0.0	0.0	-	73	-20.8%
09/09/21	10/07/21	29	98	<input checked="" type="checkbox"/>	12.0	0.0	-	80	-18.3%
10/08/21	11/05/21	29	183	<input checked="" type="checkbox"/>	115.5	0.0	-	163	-10.8%
11/06/21	12/09/21	34	600	<input checked="" type="checkbox"/>	617.5	0.0	-	579	-3.6%
12/10/21	01/10/22	32	653	<input checked="" type="checkbox"/>	724.0	0.0	-	659	1.0%
Sum/Average/Max		364	3,963		3924.5	0.0	(73)	3,963	0% +/- 13.1%

3900842 (Account # 59-0906-2765-4000-6): Tuning Period is 364 days from 1/12/2021 until 1/10/2022.

Below is the equation used to calculate the Baseline values for the tuning period and all future periods:

$$\text{Baseline (CCF)} = 2.43 \times \text{\#Days} + 0.8 \times \text{HDD} + \text{Offset}$$

The Baseline Equation has a Net Mean Bias of 0% and a Monthly Mean Error of +/-13.1%. The underlying regression has a $R^2=0.973$

Baseline Costs are calculated using Average Total Cost/Consumption.

Explanations and Assumptions:

☐ (empty checkbox) under 'Incl?' indicates that the bill is excluded from the regression. However the Baseline Equation is always applied for all billing periods, even those excluded from the regression.

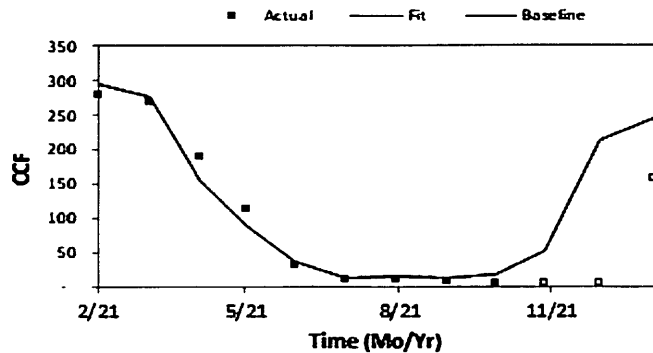
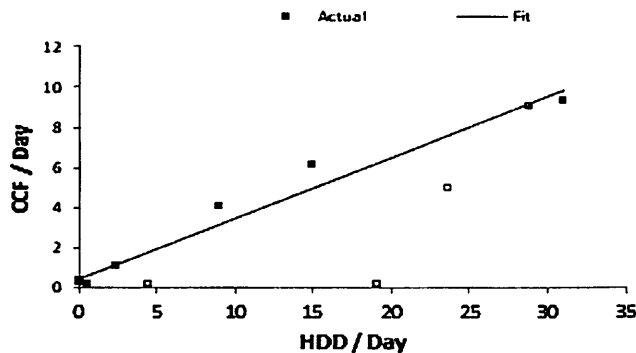
HDD = Heating Degree-Days calculated for WHITE PLAINS, NY for a 60.0 F° balance point.

Multiplier and Offset are derived from Modification(s) in effect during the tuning period and are replicated annually for all future periods.

Meter Tuning Contract

Project: Dobbs Ferry
Area: Pool House and Offices
Account: 59-0906-2765-1600-6

Site: Dobbs Ferry
Meter: 4085378
Unit: CCF(Qty OnPk)



From	To	# Days	Reading	Incl?	HDD	CDD	Offset	Baseline	Deviation
01/12/21	02/10/21	30	279	<input checked="" type="checkbox"/>	931.0	0.0	-	297	6.4%
02/11/21	03/12/21	30	270	<input checked="" type="checkbox"/>	863.0	0.0	-	276	2.3%
03/13/21	04/12/21	31	191	<input checked="" type="checkbox"/>	462.5	0.0	-	155	-18.9%
04/13/21	05/10/21	28	113	<input checked="" type="checkbox"/>	251.5	0.0	-	89	-20.9%
05/11/21	06/09/21	30	31	<input checked="" type="checkbox"/>	73.5	0.0	-	36	16.8%
06/10/21	07/09/21	30	9	<input checked="" type="checkbox"/>	0.0	0.0	-	14	54.3%
07/10/21	08/09/21	31	10	<input checked="" type="checkbox"/>	0.0	0.0	-	14	43.5%
08/10/21	09/08/21	30	7	<input checked="" type="checkbox"/>	0.0	0.0	-	14	98.4%
09/09/21	10/07/21	29	4	<input checked="" type="checkbox"/>	17.0	0.0	-	19	364.7%
10/08/21	11/05/21	29	4	<input type="checkbox"/>	130.0	0.0	-	53	1223.0%
11/06/21	12/09/21	34	6	<input type="checkbox"/>	651.5	0.0	-	214	3461.3%
12/10/21	01/10/22	32	158	<input type="checkbox"/>	756.0	0.0	-	245	54.7%
Sum/Average/Max		364	1,082		4136.0	0.0	-	1,425	0% +/- 17.6%

4085378 (Account # 59-0906-2765-1600-6): Tuning Period is 364 days from 1/12/2021 until 1/10/2022.

Below is the equation used to calculate the Baseline values for the tuning period and all future periods:

$$\text{Baseline (CCF)} = 0.46 \times \text{\#Days} + 0.3 \times \text{HDD}$$

The Baseline Equation has a Net Mean Bias of 0% and a Monthly Mean Error of +/-17.6%. The underlying regression has a $R^2=0.976$

Baseline Costs are calculated using Average Total Cost/Consumption.

Explanations and Assumptions:

☐ (empty checkbox) under 'Incl?' indicates that the bill is excluded from the regression. However the Baseline Equation is always applied for all billing periods, even those excluded from the regression.

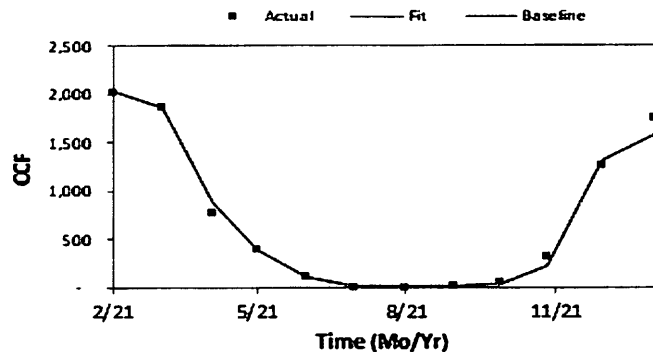
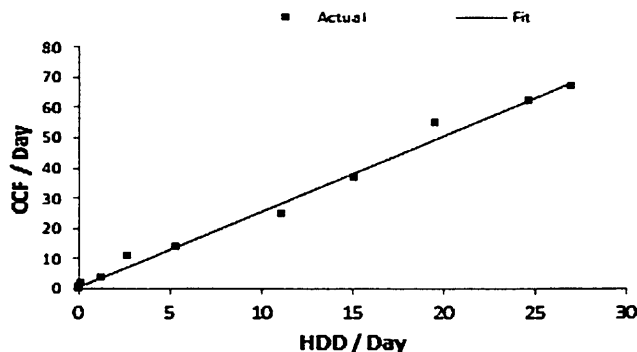
HDD = Heating Degree-Days calculated for WHITE PLAINS NY for a 61.0 F° balance point.

Multiplier is derived from Modification(s) in effect during the tuning period and is replicated annually for all future periods.

Meter Tuning Contract

Project: Dobbs Ferry
Area: Public Library
Account: 59-0906-0665-2100-0

Site: Dobbs Ferry
Meter: 3491993
Unit: CCF(Qty OnPk)



From	To	# Days	Reading	Incl?	HDD	CDD	Offset	Baseline	Deviation
01/12/21	02/10/21	30	2,013	<input checked="" type="checkbox"/>	811.0	0.0	-	2,044	1.5%
02/11/21	03/12/21	30	1,860	<input checked="" type="checkbox"/>	743.0	0.0	-	1,874	0.8%
03/13/21	04/12/21	31	770	<input checked="" type="checkbox"/>	344.5	0.0	-	882	14.5%
04/13/21	05/10/21	28	385	<input checked="" type="checkbox"/>	152.0	0.0	-	400	3.9%
05/11/21	06/09/21	30	109	<input checked="" type="checkbox"/>	37.0	0.0	-	115	5.4%
06/10/21	07/09/21	30	-	<input checked="" type="checkbox"/>	0.0	0.0	-	23	0.0%
07/10/21	08/09/21	31	-	<input checked="" type="checkbox"/>	0.0	0.0	-	23	0.0%
08/10/21	09/08/21	30	9	<input checked="" type="checkbox"/>	0.0	0.0	-	23	151.8%
09/09/21	10/07/21	29	58	<input checked="" type="checkbox"/>	3.5	0.0	-	31	-47.2%
10/08/21	11/05/21	29	318	<input checked="" type="checkbox"/>	77.5	0.0	-	215	-32.4%
11/06/21	12/09/21	34	1,259	<input checked="" type="checkbox"/>	515.5	0.0	-	1,310	4.1%
12/10/21	01/10/22	32	1,748	<input checked="" type="checkbox"/>	628.0	0.0	-	1,589	-9.1%
Sum/Average/Max		364	8,529		3312.0	0.0	-	8,529	0% +/- 9.9%

3491993 (Account # 59-0906-0665-2100-0): Tuning Period is 364 days from 1/12/2021 until 1/10/2022.

Below is the equation used to calculate the Baseline values for the tuning period and all future periods:

$$\text{Baseline (CCF)} = 0.76 \times \text{\#Days} + 2.49 \times \text{HDD}$$

The Baseline Equation has a Net Mean Bias of 0% and a Monthly Mean Error of +/-9.9%. The underlying regression has a $R^2=0.992$

Baseline Costs are calculated using Average Total Cost/Consumption.

Explanations and Assumptions:

☐ (empty checkbox) under 'Incl?' indicates that the bill is excluded from the regression. However the Baseline Equation is always applied for all billing periods, even those excluded from the regression.

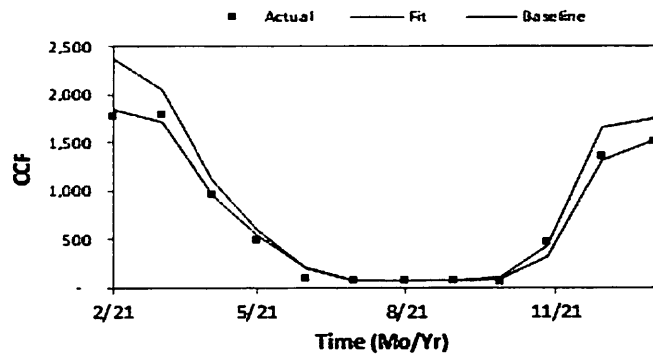
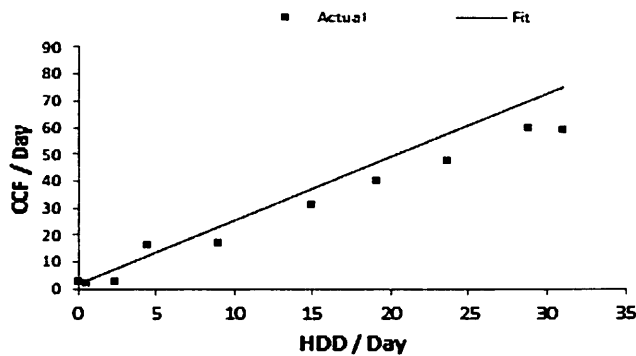
HDD = Heating Degree-Days calculated for WHITE PLAINS NY for a 57.0 F° balance point.

Multiplier is derived from Modification(s) in effect during the tuning period and is replicated annually for all future periods.

Meter Tuning Contract

Project: Dobbs Ferry
Area: Village Hall
Account: 59-0906-2765-1900-0

Site: Dobbs Ferry
Meter: 3435865
Unit: CCF(Qty OnPk)



From	To	# Days	Reading	Incl?	HDD	CDD	Offset	Baseline	Deviation
01/12/21	02/10/21	30	1,763	<input checked="" type="checkbox"/>	931.0	0.0	533	2,380	35.0%
02/11/21	03/12/21	30	1,785	<input checked="" type="checkbox"/>	863.0	0.0	335	2,052	15.0%
03/13/21	04/12/21	31	969	<input checked="" type="checkbox"/>	462.5	0.0	164	1,118	15.4%
04/13/21	05/10/21	28	479	<input checked="" type="checkbox"/>	251.5	0.0	56	600	25.2%
05/11/21	06/09/21	30	83	<input checked="" type="checkbox"/>	73.5	0.0	-	208	150.1%
06/10/21	07/09/21	30	81	<input checked="" type="checkbox"/>	0.0	0.0	-	67	-17.3%
07/10/21	08/09/21	31	76	<input checked="" type="checkbox"/>	0.0	0.0	-	69	-8.9%
08/10/21	09/08/21	30	77	<input checked="" type="checkbox"/>	0.0	0.0	-	67	-13.0%
09/09/21	10/07/21	29	60	<input checked="" type="checkbox"/>	17.0	0.0	21	118	97.0%
10/08/21	11/05/21	29	475	<input checked="" type="checkbox"/>	130.0	0.0	121	435	-8.5%
11/06/21	12/09/21	34	1,359	<input checked="" type="checkbox"/>	651.5	0.0	345	1,667	22.6%
12/10/21	01/10/22	32	1,516	<input checked="" type="checkbox"/>	756.0	0.0	237	1,754	15.7%
Sum/Average/Max		364	8,723		4136.0	0.0	1,812	10,535	0% +/- 10.2%

3435865 (Account # 59-0906-2765-1900-0): Tuning Period is 364 days from 1/12/2021 until 1/10/2022.

Below is the equation used to calculate the Baseline values for the tuning period and all future periods:

$$\text{Baseline (CCF)} = 2.23 \times \text{\#Days} + 1.91 \times \text{HDD} + \text{Offset}$$

The Baseline Equation has a Net Mean Bias of 0% and a Monthly Mean Error of +/-10.2%. The underlying regression has a $R^2=0.988$

Baseline Costs are calculated using Average Total Cost/Consumption.

Explanations and Assumptions:

☐ (empty checkbox) under 'Incl?' indicates that the bill is excluded from the regression. However the Baseline Equation is always applied for all billing periods, even those excluded from the regression.

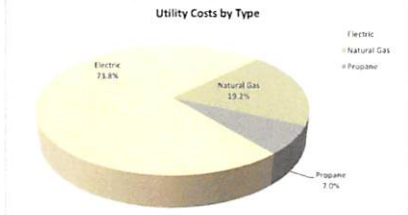
HDD = Heating Degree-Days calculated for WHITE PLAINS, NY for a 61.0 F° balance point.

Multiplier and Offset are derived from Modification(s) in effect during the tuning period and are replicated annually for all future periods.

Building	Square Footage	Electric										Fuel Designation Main Heating Utility	Natural Gas					Propane				Total Thermal				Total Energy				
		Total Cost	Total kWh	Demand Cost	Fixed Costs	Total kW Demand	Demand Months	S/W	Blended Rate	Unblended Rate	\$ per Square Ft.		Total Cost	Fixed Costs	Total Therms	Blended Rate	Unblended Rate	\$ per Square Ft.	Total Cost	Fixed Costs	Gal.	Price per Gallons	\$ per Square Ft.	Total Cost	MMBtu/ Yr Total	\$/MMBtu	\$ per Square Ft.	kBTU per Square Ft.	Total Cost	
Public Library	16,000	\$ 35,442	231,040	\$ 22,083	\$ -	850	12	\$ 25.99	\$ 0.153	\$ 0.058	\$ 2.22	Natural Gas	\$ 12,882	\$ 417	8,758	\$ 1.47	\$ 1.42	\$ 0.81	\$ -	\$ -	\$ -	\$ -	\$ 12,882	876	\$ 14.71	\$ 0.81	\$ 9.02	104.0	\$ 48,325	
Village Hall	9,000	\$ 28,100	196,340	\$ 16,827	\$ -	599	12	\$ 28.11	\$ 0.149	\$ 0.057	\$ 1.12	Natural Gas	\$ 15,997	\$ 417	10,825	\$ 1.48	\$ 1.44	\$ 1.78	\$ -	\$ -	\$ -	\$ -	\$ 15,997	1,041	\$ 14.78	\$ 1.78	\$ 4.90	184.7	\$ 44,096	
Memorial Park Building	1,400	\$ 2,393	9,564	\$ -	\$ -	-	12	\$ -	\$ 0.307	\$ 0.307	\$ 1.83	Natural Gas	\$ 3,869	\$ 408	2,017	\$ 1.67	\$ 1.47	\$ 2.11	\$ -	\$ -	\$ -	\$ -	\$ 3,869	202	\$ 16.71	\$ 2.11	\$ 3.94	146.5	\$ 6,303	
OPW Office	23,800	\$ 14,509	92,446	\$ 9,078	\$ -	277	12	\$ 12.75	\$ 0.157	\$ 0.059	\$ 0.61	Propane	\$ -	\$ -	-	\$ -	\$ -	\$ -	\$ 20,286	110	8,532	\$ 2.21	\$ 0.85	\$ 20,286	836	\$ 24.28	\$ 0.85	\$ 1.46	48.4	\$ 34,795
Ambulance Corps, Building	2,000	\$ 5,282	17,280	\$ -	\$ -	-	12	\$ -	\$ 0.306	\$ 0.306	\$ 1.64	Natural Gas	\$ 4,434	\$ 417	2,811	\$ 1.58	\$ 1.43	\$ 2.22	\$ -	\$ -	\$ -	\$ -	\$ 4,434	281	\$ 15.77	\$ 2.22	\$ 4.86	170.0	\$ 9,716	
Ogden Engine Company	4,000	\$ 5,558	35,618	\$ 3,781	\$ -	109	12	\$ 14.55	\$ 0.182	\$ 0.058	\$ 1.19	Natural Gas	\$ 8,491	\$ 411	4,217	\$ 2.01	\$ 1.92	\$ 2.12	\$ -	\$ -	\$ -	\$ -	\$ 8,491	422	\$ 20.14	\$ 2.12	\$ 3.51	131.5	\$ 14,549	
Pool House and Offices at Gould Park II	2,000	\$ 12,811	102,420	\$ 6,833	\$ -	256	12	\$ 26.64	\$ 0.125	\$ 0.058	\$ 6.41	Natural Gas	\$ 2,007	\$ 385	1,110	\$ 1.81	\$ 1.46	\$ 1.00	\$ -	\$ -	\$ -	\$ -	\$ 2,007	111	\$ 18.08	\$ 1.00	\$ 7.41	293.2	\$ 14,817	
Embassy Club	4,000	\$ 9,567	42,490	\$ 6,001	\$ -	210	12	\$ 28.42	\$ 0.153	\$ 0.057	\$ 2.19	Natural Gas	\$ 8,558	\$ 833	5,386	\$ 1.59	\$ 1.43	\$ 2.14	\$ -	\$ -	\$ -	\$ -	\$ 8,558	519	\$ 15.89	\$ 2.14	\$ 4.52	187.8	\$ 18,125	
Street Lighting		\$ 100,120	834,058	\$ -	\$ -	-	12	\$ -	\$ 0.299	\$ 0.299	\$ -		\$ -	\$ -	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-	\$ -	-	\$ -	-	\$ 100,120	
TOTALS	62,400	\$ 214,373	1,076,666	\$ 64,603	\$ -	2,301		\$ 28.07	\$ 0.199	\$ 0.139	\$ 4.44		\$ 55,738	\$ 3,288	35,125	\$ 1.59	\$ 1.49	\$ 0.89	\$ 20,286		9,532	\$ 2.22	\$ 0.33	\$ 76,024	4,348	\$ 17.48	\$ 1.22	\$ 4.65	128.6	\$ 290,397

Electric	\$ 214,373
Natural Gas	\$ 55,738
Propane	\$ 20,286
Total	\$ 290,397

Heating Content of Fuels	
Natural Gas	100,000 BTU/Therm
Propane	91,500 BTU/Gallon



Village Hall includes adjustment for 1 AirU that is not functioning

Village of Dobbs Ferry
Exhibit D-5-Summary
Energy Savings Summary

Utilities	Electric kWh	Electric kW	Natural Gas Therms	Fuel Oil Gallons	Propane Gallons	Water & Sewer kGallons	\$/yr
Electric	1,076,666	2,301	-	-	-	-	\$ 214,373
Natural Gas	-	-	35,125	-	-	-	\$ 55,738
Propane	-	-	-	-	9,132	-	\$ 20,286
Total:	1,076,666	2,301	35,125	-	9,132	-	\$ 290,397

GLOBAL SAFETY FACTORS*

Global Electric Safety Factor (%) =	0.0%
Global Thermal Safety Factor (%) =	3.0%

*Applied over the entire project

GUARANTEED Savings		Baseline	
Electric	\$ 63,192	\$ 214,373	29.5%
Natural Gas	\$ 14,315	\$ 55,738	25.7%
Propane	\$ 1,584	\$ 20,286	7.8%
Total	\$ 79,091	\$ 290,397	27.2%

GUARANTEED SAVINGS

ECM No.		Description	Total Guaranteed Energy & Water Savings	% of Baseline Total Utility Cost	Guaranteed Energy & Water Savings												
					ELECTRIC				NATURAL GAS				PROPANE				
					kWh Savings	kWh % Baseline	kW Savings	kW % of Baseline	Total \$ Savings	Electric \$ % Baseline	Therm Savings	Therm % Baseline	Therm \$ Savings	Therm \$ % Baseline	Gallon Savings	Gallon % of Baseline	Gallon \$ Savings
1	LED Lighting and Lighting Controls Upgrade	\$ 15,597	5.4%	89,683	8.3%	348.4	15.1%	\$ 16,108	7.5%	(191)	-0.5%	\$ (288)	-0.5%	(101)	-1.1%	\$ (223)	-1.1%
2	Street Lighting Upgrades	\$ 44,139	15.2%	147,464	13.7%	-	0.0%	\$ 44,139	20.6%	-	0.0%	\$ -	0.0%	-	0.0%	\$ -	0.0%
3	Boiler Plant Upgrades	\$ 1,639	0.6%	-	0.0%	-	0.0%	\$ -	0.0%	1,139	3.2%	\$ 1,639	2.9%	-	0.0%	\$ -	0.0%
4	Install Boiler Burner Controllers	\$ -	0.0%	-	0.0%	-	0.0%	\$ -	0.0%	-	0.0%	\$ -	0.0%	-	0.0%	\$ -	0.0%
5	Furnace Upgrades	\$ -	0.0%	-	0.0%	-	0.0%	\$ -	0.0%	-	0.0%	\$ -	0.0%	-	0.0%	\$ -	0.0%
4	Air Handling Unit Replacement	\$ 953	0.3%	-	0.0%	-	0.0%	\$ -	0.0%	662	1.9%	\$ 953	1.7%	-	0.0%	\$ -	0.0%
5	Roof Top Unit Replacement	\$ 715	0.2%	717	0.1%	24.0	1.0%	\$ 715	0.3%	-	0.0%	\$ -	0.0%	-	0.0%	\$ -	0.0%
6	Condensing Unit Replacement	\$ 91	0.0%	1,578	0.1%	-	0.0%	\$ 91	0.0%	-	0.0%	\$ -	0.0%	-	0.0%	\$ -	0.0%
7	Pump & Motor Replacement	\$ 33	0.0%	149	0.0%	0.9	0.0%	\$ 33	0.0%	-	0.0%	\$ -	0.0%	-	0.0%	\$ -	0.0%
10	Install De-Stratification Fans	\$ -	0.0%	-	0.0%	-	0.0%	\$ -	0.0%	-	0.0%	\$ -	0.0%	-	0.0%	\$ -	0.0%
11	Install Kitchen Hood Controllers	\$ -	0.0%	-	0.0%	-	0.0%	\$ -	0.0%	-	0.0%	\$ -	0.0%	-	0.0%	\$ -	0.0%
12	Install Walk-in Freezer/Coolers Controllers	\$ -	0.0%	-	0.0%	-	0.0%	\$ -	0.0%	-	0.0%	\$ -	0.0%	-	0.0%	\$ -	0.0%
8	Building Management System Upgrades	\$ 10,221	3.5%	15,149	1.4%	-	0.0%	\$ 939	0.4%	5,145	14.6%	\$ 7,475	13.4%	818	9.0%	\$ 1,807	8.9%
9	Building Envelope Improvements	\$ 2,109	0.7%	2,635	0.2%	-	0.0%	\$ 392	0.2%	1,148	3.3%	\$ 1,716	3.1%	-	0.0%	\$ -	0.0%
10	Pipe Insulation	\$ 2,583	0.9%	-	0.0%	-	0.0%	\$ -	0.0%	1,802	5.1%	\$ 2,583	4.6%	-	0.0%	\$ -	0.0%
11	Desktop Computer Power Management	\$ 772	0.3%	8,850	0.8%	-	0.0%	\$ 772	0.4%	-	0.0%	\$ -	0.0%	-	0.0%	\$ -	0.0%
12	Roof Replacement	\$ 240	0.1%	55	0.0%	-	0.0%	\$ 3	0.0%	164	0.5%	\$ 237	0.4%	-	0.0%	\$ -	0.0%
18	Water Conservation	\$ -	0.0%	-	0.0%	-	0.0%	\$ -	0.0%	-	0.0%	\$ -	0.0%	-	0.0%	\$ -	0.0%
Total:		\$ 79,091	27.2%	266,280	24.7%	373.2	16.2%	\$ 63,192	29.5%	9,870	28.1%	\$ 14,315	25.7%	717	7.9%	\$ 1,584	7.8%

BOILER FUEL ADJUSTMENTS DUE TO INTERACTIVE ECMS

Fuel Adjustment (Therms) - Boiler load only

Include (Y/N)	ECM #	Unadjusted Baseline	Public Library	Village Hall	Memorial Park Building	DPW Office	Ambulance Corps. Building	Ogden Engine Company	Pool House and Offices at Gould Park (Seasonal)	Embassy Club
			8,759	10,825	2,017	8,356	2,811	4,217	1,110	5,186
	-	DHW Usage (% of Building Thermal Usage)	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
		DHW Baseline	438	541	101	418	141	211	56	269
		Adjusted Baseline	8,321	10,284	1,916	7,938	2,670	4,006	1,055	5,117
Y	1	ECM 1 - LED Lighting and Lighting Controls Upgrade	-39	-95	-1	-92	-6	-31	0	-17
		Adjusted Baseline	8,360	10,379	1,918	8,030	2,676	4,037	1,055	5,134
Y	2	ECM 2 - Street Lighting Upgrades	0	0	0	0	0	0	0	0
		Adjusted Baseline	8,360	10,379	1,918	8,030	2,676	4,037	1,055	5,134
Y	4	ECM 4 - Air Handling Unit Replacement	0	662	0	0	0	0	0	0
		Adjusted Baseline	8,360	9,717	1,918	8,030	2,676	4,037	1,055	5,134
Y	5	ECM 5 - Roof Top Unit Replacement	0	0	0	0	0	0	0	0
		Adjusted Baseline	8,360	9,717	1,918	8,030	2,676	4,037	1,055	5,134
Y	6	ECM 6 - Condensing Unit Replacement	0	0	0	0	0	0	0	0
		Adjusted Baseline	8,360	9,717	1,918	8,030	2,676	4,037	1,055	5,134
Y	7	ECM 7 - Pump & Motor Replacement	0	0	0	0	0	0	0	0
		Adjusted Baseline	8,360	9,717	1,918	8,030	2,676	4,037	1,055	5,134
Y	9	ECM 9 - Building Envelope Improvements	142	566	183	0	79	129	0	50
		Adjusted Baseline	8,218	9,151	1,735	8,030	2,598	3,908	1,055	5,084
Y	10	ECM 10 - Pipe Insulation	444	824	0	0	263	0	0	271
		Adjusted Baseline	7,774	8,328	1,735	8,030	2,334	3,908	1,055	4,813
Y	11	ECM 11 - Desktop Computer Power Management	0	0	0	0	0	0	0	0
		Adjusted Baseline	7,774	8,328	1,735	8,030	2,334	3,908	1,055	4,813
Y	12	ECM 12 - Roof Replacement	0	164	0	0	0	0	0	0
		Adjusted Baseline	7,774	8,163	1,735	8,030	2,334	3,908	1,055	4,813
N	3	ECM 3 - Boiler Plant Upgrades	0	0	0	0	0	0	0	0
		Adjusted Baseline	7,774	8,163	1,735	8,030	2,334	3,908	1,055	4,813
Y	8	ECM 8 - Building Management System Upgrades	2,147	876	508	748	351	191	301	768
		Adjusted Baseline	5,627	7,287	1,227	7,282	1,983	3,715	753	4,045

COOLING

WHITE PLAINS WESTCHESTER CO A NY USFA #: 725037TY

All Months							
Amb. Temp Bin [°F]	Ave Temp [°F]	01-08 Hours	09-16 Hours	17-24 Hours	WB [°F]	Enthalpy [BTU/lb]	Total Bin Hours
100 to 105	102.5	-	-	-	-	-	-
95 to 100	97.5	-	13	1	75	39	14
90 to 95	92.5	-	19	4	74	38	23
85 to 90	87.5	-	59	17	72.8	36.6	76
80 to 85	82.5	9	146	55	69.1	33.4	210
75 to 80	77.5	38	215	93	68.1	32.6	346
70 to 75	72.5	108	282	194	65.8	30.8	564
65 to 70	67.5	254	305	315	62.6	28.4	875
60 to 65	62.5	383	292	362	58.2	25.3	1,037
Total		792	1,311	1,042			3,145

WHITE PLAINS WESTCHESTER CO A NY USFA #: 725037TY

Cooling Months Only (April - September)							
Amb. Temp Bin [°F]	Ave Temp [°F]	01-08 Hours	09-16 Hours	17-24 Hours	WB [°F]	Enthalpy [BTU/lb]	Total Bin Hours
100 to 105	102.5	-	-	-	-	-	-
95 to 100	97.5	-	13	1	75	39	14
90 to 95	92.5	-	19	4	74	38	23
85 to 90	87.5	-	59	17	72.8	36.6	76
80 to 85	82.5	9	146	55	69.1	33.4	210
75 to 80	77.5	38	215	93	68.1	32.6	346
70 to 75	72.5	108	254	194	65.8	30.8	556
65 to 70	67.5	251	244	303	63.0	28.7	798
60 to 65	62.5	356	228	306	58.3	25.4	890
Total		762	1,178	973			2,913

HEATING

WHITE PLAINS WESTCHESTER CO A NY USFA #: 725037TY

All Months							
Amb. Temp Bin [°F]	Ave Temp [°F]	01-08 Hours	09-16 Hours	17-24 Hours	WB [°F]	Enthalpy [BTU/lb]	Total Bin Hours
55 to 60	57.5	289	258	267	52.7	21.9	814
50 to 55	52.5	276	295	283	47.0	18.7	854
45 to 50	47.5	168	160	238	43.0	16.7	596
40 to 45	42.5	310	174	260	38.2	14.4	744
35 to 40	37.5	293	200	215	33.6	12.5	708
30 to 35	32.5	220	211	193	28.6	10.4	624
25 to 30	27.5	125	135	178	24.0	8.6	438
20 to 25	22.5	235	92	147	19.4	6.9	474
15 to 20	17.5	99	61	53	14.6	5.3	213
10 to 15	12.5	45	17	28	10.0	3.8	90
5 to 10	7.5	29	5	15	5.5	2.4	49
0 to 5	2.5	9	1	1	1.3	1.2	11
-5 to 0	-2.5	-	-	-	-	-	-
-10 to -5	-7.5	-	-	-	-	-	-
-15 to -10	-12.5	-	-	-	-	-	-
Total		2,128	1,609	1,878			5,615

WHITE PLAINS WESTCHESTER CO A NY USFA #: 725037TY

Heating Months Only (October - March)							
Amb. Temp Bin [°F]	Ave Temp [°F]	01-08 Hours	09-16 Hours	17-24 Hours	WB [°F]	Enthalpy [BTU/lb]	Total Bin Hours
55 to 60	57.5	50	141	68	50.8	20.8	259
50 to 55	52.5	94	203	147	46.2	18.3	444
45 to 50	47.5	95	125	151	42.7	16.6	371
40 to 45	42.5	201	140	218	38.0	14.3	559
35 to 40	37.5	240	192	188	33.5	12.4	620
30 to 35	32.5	205	211	193	28.5	10.3	609
25 to 30	27.5	124	135	178	24.0	8.6	437
20 to 25	22.5	235	92	147	19.4	6.9	474
15 to 20	17.5	99	61	53	14.6	5.3	213
10 to 15	12.5	45	17	28	10.0	3.8	90
5 to 10	7.5	29	5	15	5.5	2.4	49
0 to 5	2.5	9	1	1	1.3	1.2	11
-5 to 0	-2.5	-	-	-	-	-	-
-10 to -5	-7.5	-	-	-	-	-	-
-15 to -10	-12.5	-	-	-	-	-	-
Total		1,426	1,323	1,387			4,136

BMS / Occupancy Schedules

Building	EXISTING				
	Weekday Schedule		Weekend Schedule		Summer Schedule
	Start Time	End Time	Start Time	End Time	
Public Library	9:00 AM	7:30 PM	9:00 AM	5:30 PM	
Village Hall	12:00 AM	12:00 AM	12:00 AM	12:00 AM	
Memorial Park Building	8:00 AM	5:00 PM	8:00 AM	5:00 PM	
DPW Office	12:00 AM	12:00 AM	12:00 AM	12:00 AM	
Ambulance Corps Building	12:00 AM	12:00 AM	12:00 AM	12:00 AM	
Ogden Engine Company	12:00 AM	12:00 AM	12:00 AM	12:00 AM	
Pool House and Offices at Gould Park (Seasonal)	8:00 AM	4:00 PM	8:00 AM	4:00 PM	
Embassy Club	10:00 AM	5:00 PM	10:00 AM	5:00 PM	

PROPOSED			
Weekday Schedule		Weekend Schedule	
Start Time	End Time	Start Time	End Time
9:00 AM	7:30 PM	9:00 AM	5:30 PM
12:00 AM	12:00 AM	12:00 AM	12:00 AM
8:00 AM	5:00 PM	8:00 AM	5:00 PM
12:00 AM	12:00 AM	12:00 AM	12:00 AM
12:00 AM	12:00 AM	12:00 AM	12:00 AM
12:00 AM	12:00 AM	12:00 AM	12:00 AM
8:00 AM	4:00 PM	8:00 AM	4:00 PM
10:00 AM	5:00 PM	10:00 AM	5:00 PM

EXISTING							
Weekday Schedule				Weekend Schedule		Weighted	
01-08	09-16	17-24	01-08	09-16	17-24	01-08	09-16
Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
-	8.0	3.5	-	8.0	1.5	-	1.00
8.0	8.0	8.0	8.0	8.0	1.00	1.00	1.00
-	8.0	1.0	-	8.0	1.0	-	1.00
8.0	8.0	8.0	8.0	8.0	1.00	1.00	1.00
8.0	8.0	8.0	8.0	8.0	1.00	1.00	1.00
8.0	8.0	8.0	8.0	8.0	1.00	1.00	1.00
-	8.0	-	-	8.0	-	-	1.00
-	8.0	1.0	-	8.0	1.0	-	1.00

PROPOSED							
Weekday Schedule				Weekend Schedule		Weighted	
01-08	09-16	17-24	01-08	09-16	17-24	01-08	09-16
Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
-	8.0	3.5	-	8.0	1.5	-	1.00
8.0	8.0	8.0	8.0	8.0	1.00	1.00	1.00
-	8.0	1.0	-	8.0	1.0	-	1.00
8.0	8.0	8.0	8.0	8.0	1.00	1.00	1.00
8.0	8.0	8.0	8.0	8.0	1.00	1.00	1.00
8.0	8.0	8.0	8.0	8.0	1.00	1.00	1.00
-	8.0	-	-	8.0	-	-	1.00
-	8.0	1.0	-	8.0	1.0	-	1.00

NOTES:
1) All proposed HVAC run times all for a minimum of one (1) hour warm up period prior to occupant arrival
2) Existing schedules and setpoints are based on detailed review of thermostats, interviews with staff, and a review of temperature data logging results
3) Proposed schedules based on information provided by the Facilities Department
4) Guaranteed contractual savings are based on the proposed schedules and setpoints listed in this document

SITE/BUILDING	INT/EXT	Floor/EXT	Annual Hours	Location Description	Existing QTY	EXISTING TECH	Existing Watts	Proposal QTY	Sensor	QTY	%	PROPOSED TECH	Proposed Watts	Wattage Reduction percentage	Total kW Saved	Total kWh Saved	Sensor kWh Savings	Total kWh saved Lighting and Sensors
Goulds Park	INT	1	500	MECHANICAL ROOM/BOILER	2	T8-32	60	2				LED	21	65%	0.08	39.00	0.00	39.00
Goulds Park	INT	1	3750	RR CORRIDOR	2	T8-32	60	2				LED	21	65%	0.08	292.50	0.00	292.50
Goulds Park	INT	1	3750	RR CORRIDOR	1	CFL	20	1				LED	6	70%	0.01	52.50	0.00	52.50
Goulds Park	INT	1	2200	WOMENS RESTROOM	2	CFL	20	2				LED	6	70%	0.03	61.60	0.00	61.60
Goulds Park	INT	1	2200	WOMENS RESTROOM	4	T8-32	60	4				LED	21	65%	0.16	343.20	0.00	343.20
Goulds Park	INT	1	2200	MENS RESTROOM	2	CFL	20	2				LED	6	70%	0.03	61.60	0.00	61.60
Goulds Park	INT	1	2200	MENS RESTROOM	4	T8-32	60	4				LED	21	65%	0.16	343.20	0.00	343.20
Goulds Park	INT	1	500	CUSTODIAN CLOSET	1	CFL	40	1	FM5	1	30%	LED	12	70%	0.03	14.00	1.80	15.80
Goulds Park	INT	1	2200	OLD LOCKERS/SPORTS STORAGE	1	T12	138	1	OSW-1G	1	30%	LED	42	70%	0.10	211.20	27.72	238.92
Goulds Park	INT	1	2200	OLD LOCKERS/SPORTS STORAGE	3	T12	80	3	OSW-1G	1	30%	LED	21	74%	0.18	389.40	41.58	430.98
Goulds Park	INT	1	8760	OLD LOCKERS/SPORTS STORAGE	1	CFL	18	1				LED-EXIT	2	89%	0.02	140.16	0.00	140.16
Goulds Park	INT	1	2200	OLD LOCKERS/SPORTS STORAGE	2	INC	150	2				LED	9	94%	0.28	620.40	0.00	620.40
Goulds Park	INT	2	500	2ND FLOOR VACANT	10	INC	100	10				LED	9	91%	0.91	455.00	0.00	455.00
Goulds Park	EXT	EXT	4380	EXT LOWER	2	HPS	130	2				LED	30	77%	0.20	876.00	0.00	876.00
Goulds Park	EXT	EXT	4380	BALL FIELD POLES	1	MH	455	1				LED	150	67%	0.31	1335.90	0.00	1335.90
Goulds Park	EXT	EXT	4380	BALL FIELD POLES	1	MH	95	1				LED	50	47%	0.05	197.10	0.00	197.10
Goulds Park	EXT	EXT	4380	SCOREBOARD	1	MH	455	1				LED	150	67%	0.31	1335.90	0.00	1335.90
Goulds Park	EXT	EXT	4380	SCOREBOARD	1	MH	455	1				LED	150	67%	0.31	1335.90	0.00	1335.90
Goulds Park	EXT	EXT	4380	BASKETBALL COURT	4	MV	455	4				LED	150	67%	1.22	5343.60	0.00	5343.60
Goulds Park	EXT	EXT	4380	BASKETBALL COURT	4	MH	455	4				LED	150	67%	1.22	5343.60	0.00	5343.60
Goulds Park	EXT	EXT	4380	POOL	1	MV	795	1				LED	200	75%	0.60	2606.10	0.00	2606.10
OGDEN FD ENGINE 1	INT	1	3750	ENTRY (SIDE)	2	CFL	20	2				LED	9	55%	0.02	82.50	0.00	82.50
OGDEN FD ENGINE 1	INT	1	500	CLOSET	1	CFL	28	1				LED	9	68%	0.02	9.50	0.00	9.50
OGDEN FD ENGINE 1	INT	1	2200	MENS RESTROOM	2	CFL	40	2	OSW-2G	1	30%	LED	18	55%	0.04	96.80	23.76	120.56

SITE/BUILDING	INT/EXT	Floor/EXT	Annual Hours	Location Description	Existing QTY	EXISTING TECH	Existing Watts	Proposal QTY	Sensor	QTY	%	PROPOSED TECH	Proposed Watts	Wattage Reduction percentage	Total kW Saved	Total kWh Saved	Sensor kWh Savings	Total kWh saved Lighting and Sensors
OGDEN FD ENGINE 1	INT	1	2200	WOMENS RESTROOM	2	CFL	40	2	OSW-2G	1	30%	LED	18	55%	0.04	96.80	23.76	120.56
OGDEN FD ENGINE 1	INT	1	3750	VEST (2)	2	CFL	20	2				LED	9	55%	0.02	82.50	0.00	82.50
OGDEN FD ENGINE 1	INT	1	2500	RECREATION ROOM	1	T12	42	1				LED	12	71%	0.03	75.00	0.00	75.00
OGDEN FD ENGINE 1	INT	1	8760	RECREATION ROOM	2	INC	18	2				LED-EXIT	2	89%	0.03	280.32	0.00	280.32
OGDEN FD ENGINE 1	INT	1	500	CHAIR STORAGE	1	INC	75	1				LED	9	88%	0.07	33.00	0.00	33.00
OGDEN FD ENGINE 1	INT	1	500	STORAGE IN TRUCK BAY	1	T12	80	1				LED	21	74%	0.06	29.50	0.00	29.50
OGDEN FD ENGINE 1	INT	sw	8760	BASEMENT STAIRS	1	T8-32	60	1				LED	21	65%	0.04	341.64	0.00	341.64
OGDEN FD ENGINE 1	INT	B	8760	BASEMENT STORAGE 1	6	T8-32	60	6	OSW-1G	1	30%	LED	21	65%	0.23	2049.84	331.13	2380.97
OGDEN FD ENGINE 1	INT	B	500	CLOSETS	4	INC	75	4				LED	9	88%	0.26	132.00	0.00	132.00
OGDEN FD ENGINE 1	INT	2	500	CLOSET TOP OF STAIRWELL	1	INC	75	1				LED	9	88%	0.07	33.00	0.00	33.00
OGDEN FD ENGINE 1	INT	2	4000	MEETING/MUSEUM	3	MV	215	3				LED	5	98%	0.63	2520.00	0.00	2520.00
OGDEN FD ENGINE 1	INT	2	4000	MEETING/MUSEUM	18	MV	90	18				LED	12	87%	1.40	5616.00	0.00	5616.00
OGDEN FD ENGINE 1	INT	2	4000	BACK OFFICE	3	INC	75	3				LED	9	88%	0.20	792.00	0.00	792.00
OGDEN FD ENGINE 1	INT	2	2200	RESTROOM	1	INC	75	1				LED	9	88%	0.07	145.20	0.00	145.20
OGDEN FD ENGINE 1	EXT	EXT	4380	OVER HANG	1	INC	100	1				LED	12	88%	0.09	385.44	0.00	385.44
MEMORIAL BUILDING	INT	1	3750	CORRIDOR	2	INC	120	2				LED	12	90%	0.22	810.00	0.00	810.00
MEMORIAL BUILDING	INT	1	500	STORAGE	4	INC	150	4	OSW-1G	1	30%	LED	9	94%	0.56	282.00	5.40	287.40
MEMORIAL BUILDING	INT	1	2200	WOMENS RESTROOM	1	INC	150	1	OSW-1G	1	30%	LED	12	92%	0.14	303.60	7.92	311.52
MEMORIAL BUILDING	INT	1	2200	MENS RESTROOM	1	INC	150	1				LED	12	92%	0.14	303.60	0.00	303.60
MEMORIAL BUILDING	INT	1	500	FURNACE ROOM	1	INC	100	1				LED	9	91%	0.09	45.50	0.00	45.50
MEMORIAL BUILDING	INT	SW	8760	STAIRS	1	CFL	40	1				LED	12	70%	0.03	245.28	0.00	245.28
MEMORIAL BUILDING	EXT	EXT	4380	RIGHT SIDE EXIT	2	HPS	130	2				LED	30	77%	0.20	876.00	0.00	876.00
MEMORIAL BUILDING	EXT	EXT	4380	LEFT SIDE WALL	2	HPS	190	2				LED	30	84%	0.32	1401.60	0.00	1401.60
MEMORIAL BUILDING	EXT	EXT	4380	FRONT WALL	1	T12	80	1				LED	78	3%	0.00	8.76	0.00	8.76

SITE/BUILDING	INT/EXT	Floor/EXT	Annual Hours	Location Description	Existing QTY	EXISTING TECH	Existing Watts	Proposal QTY	Sensor	QTY	%	PROPOSED TECH	Proposed Watts	Wattage Reduction percentage	Total kW Saved	Total kWh Saved	Sensor kWh Savings	Total kWh saved Lighting and Sensors
MEMORIAL BUILDING	EXT	EXT	4380	BACK WALL	2	HPS	460	2			30%	LED	150	67%	0.62	2715.60	394.20	3109.80
MEMORIAL BUILDING	EXT	EXT	4380	PARK STAIR POLES	4	MH	455	4				LED	150	67%	1.22	5343.60	0.00	5343.60
DOBBS FERRY EMBASSY CLUB	INT	1	3750	CORRIDOR	6	CFL	17	6				LED	9	50%	0.05	191.25	0.00	191.25
DOBBS FERRY EMBASSY CLUB	INT	1	3750	SITTING ROOM	4	CFL	17	4	OSW-1G	1	30%	LED	9	50%	0.03	127.50	38.25	165.75
DOBBS FERRY EMBASSY CLUB	INT	1	2200	BACK OFFICE	1	CFL	17	1				LED	9	50%	0.01	18.70	0.00	18.70
DOBBS FERRY EMBASSY CLUB	INT	1	2200	I.T. CLOSET	1	T8-32	60	1				LED	21	65%	0.04	85.80	0.00	85.80
DOBBS FERRY EMBASSY CLUB	INT	1	3750	FAN/LIGHT	1	INC	225	1				LED	9	96%	0.22	810.00	0.00	810.00
DOBBS FERRY EMBASSY CLUB	INT	1	3750	POOL TABLE	3	MV	80	3				LED	9	89%	0.21	804.38	0.00	804.38
DOBBS FERRY EMBASSY CLUB	INT	1	2200	MENS RESTROOM	1	T8-32	60	1	OSW-2G	1	30%	LED	21	65%	0.04	85.80	13.86	99.66
DOBBS FERRY EMBASSY CLUB	INT	1	2200	MENS RESTROOM	1	T12	73	1	OSW-2G	1	30%	LED	24	67%	0.05	107.80	15.84	123.64
DOBBS FERRY EMBASSY CLUB	INT	1	2200	WOMENS RESTROOM	1	T8-32	60	1	OSW-2G	1	30%	LED	21	65%	0.04	85.80	13.86	99.66
DOBBS FERRY EMBASSY CLUB	INT	1	2200	WOMENS RESTROOM	1	T12	73	1	OSW-2G	1	30%	LED	24	67%	0.05	107.80	15.84	123.64
DOBBS FERRY EMBASSY CLUB	INT	1	3750	KITCHEN	2	T8-32	112	2	OSW-1G	1	30%	LED	42	63%	0.14	525.00	94.50	619.50
DOBBS FERRY EMBASSY CLUB	INT	1	500	FURNACE ROOM	1	T8-32	60	1	OSW-1G	1	30%	LED	21	65%	0.04	19.50	3.15	22.65
DOBBS FERRY EMBASSY CLUB	INT	1	500	FURNACE ROOM	1	INC	75	1	OSW-1G	1	30%	LED	9	88%	0.07	33.00	1.35	34.35
DOBBS FERRY EMBASSY CLUB	INT	1	500	KITCHEN STORAGE	2	CFL	17	2	OSW-1G	1	30%	LED	9	50%	0.02	8.50	2.55	11.05
AMBULANCE	INT	1	4000	OFFICE 2	2	T8-32	112	2	OSW-1G	1	30%	LED	42	63%	0.14	560.00	100.80	660.80
AMBULANCE	INT	1	500	BOILER STORAGE	4	INC	100	4				LED	9	91%	0.36	182.00	0.00	182.00
LIBRARY	INT	G	500	SLOP SINK	1	T8-32	60	1				LED	21	65%	0.04	19.50	0.00	19.50
LIBRARY	INT	G	8760	ELEVATOR	1	T8-32	60	1				LED	21	65%	0.04	341.64	0.00	341.64
LIBRARY	INT	G	500	BOILER ROOM	14	T8-32	60	14				LED	21	65%	0.55	273.00	0.00	273.00
LIBRARY	INT	G	500	I.T.	1	T8-32	60	1				LED	21	65%	0.04	19.50	0.00	19.50
LIBRARY	INT	G	500	ELECTRIC ROOM	2	T8-32	60	2				LED	21	65%	0.08	39.00	0.00	39.00
LIBRARY	INT	G	500	ELEVATOR ROOM	1	T8-32	60	1				LED	21	65%	0.04	19.50	0.00	19.50

SITE/BUILDING	INT/EXT	Floor/EXT	Annual Hours	Location Description	Existing QTY	EXISTING TECH	Existing Watts	Proposal QTY	Sensor	QTY	%	PROPOSED TECH	Proposed Watts	Wattage Reduction percentage	Total kW Saved	Total kWh Saved	Sensor kWh Savings	Total kWh saved Lighting and Sensors
LIBRARY	INT	G	500	STORAGE	4	T8-32	60	4				LED	21	65%	0.16	78.00	0.00	78.00
LIBRARY	INT	G	500	STORAGE	15	UT8	58	4				LED	17	71%	0.80	401.00	0.00	401.00
LIBRARY	INT	1	2500	ENT/VESTIBULE	3	CFL	30	3				LED	8	73%	0.07	165.00	0.00	165.00
LIBRARY	INT	1	2500	ENT/VESTIBULE	3	CFL	30	3				LED	8	73%	0.07	165.00	0.00	165.00
LIBRARY	INT	1	8760	ENT/VESTIBULE	1	CFL	30	1				LED	8	73%	0.02	192.72	0.00	192.72
LIBRARY	INT	1	2500	LIBRARY OPEN AREA	30	CFL	30	30				LED	8	73%	0.66	1650.00	0.00	1650.00
LIBRARY	INT	1	8760	LIBRARY OPEN AREA	14	CFL	30	14				LED	8	73%	0.31	2698.08	0.00	2698.08
LIBRARY	INT	1	8760	MAIN STAIRWELL	2	CFL	30	2				LED	8	73%	0.04	385.44	0.00	385.44
DPW	INT	1	4000	FOREMAN OFFICE	7	T8-32	88	7	OSC-1D	1	30%	LED	32	64%	0.40	1582.00	264.60	1846.60
DPW	INT	1	2200	RESTROOM	1	UT8	58	1	OSW-1G	1	30%	LED	17	71%	0.04	90.20	11.22	101.42
DPW	INT	1	500	STORAGE	1	UT8	58	1	OSW-1G	1	30%	LED	17	71%	0.04	20.50	2.55	23.05
DPW	INT	1	4000	MECHANICAL OFFICE	6	T8-32	112	6	OSC-1D	1	30%	LED	42	63%	0.42	1680.00	302.40	1982.40
DPW	INT	1	2200	BREAK ROOM	1	T8-59	109	1	FMS	1	30%	LED	57	48%	0.05	114.40	37.62	152.02
DPW	INT	1	500	SPRINKLER	1	T8-59	109	1	FMS	1	30%	LED	57	48%	0.05	26.00	8.55	34.55
DPW	INT	1	500	IT CLOSET	1	T8-25	47	1	OSW-1G	1	30%	LED	24	49%	0.02	11.50	3.60	15.10
DPW	INT	1	500	TOOL ROOM	2	T8-32	112	2	OSW-1G	1	30%	LED	42	63%	0.14	70.00	12.60	82.60
DPW	INT	1	500	ELECTRICAL SUPPLY	3	T8-32	112	3	OSW-1G	1	30%	LED	42	63%	0.21	105.00	18.90	123.90
DPW	INT	1	2200	RESTROOM 1	1	T8-32	60	1	OSW-1G	1	30%	LED	21	65%	0.04	85.80	13.86	99.66
DPW	INT	1	2200	RESTROOM 1	1	T8-17	37	1	OSW-1G	1	30%	LED	16	57%	0.02	46.20	10.56	56.76
DPW	INT	1	2200	RESTROOM 2	1	T8-32	88	1	OSW-1G	1	30%	LED	32	64%	0.06	124.30	20.79	145.09
DPW	INT	1	2200	RESTROOM 2	1	UT8	58	1	OSW-1G	1	30%	LED	17	71%	0.04	90.20	11.22	101.42
DPW	INT	1	3750	BACK HALL / WASH BAY	4	CIRC	34	4	FMS	4	30%	LED	12	65%	0.09	330.00	54.00	384.00
DPW	INT	1	2500	WASH BAY	4	CFL	376	4	FMS	4	30%	LED	100	73%	1.10	2760.00	300.00	3060.00
DPW	INT	1	2500	MECHANICS BAYS	10	CFL	376	10	FMS	9	30%	LED	100	73%	2.76	6900.00	750.00	7650.00

SITE/BUILDING	INT/EXT	Floor/EXT	Annual Hours	Location Description	Existing QTY	EXISTING TECH	Existing Watts	Proposal QTY	Sensor	QTY	%	PROPOSED TECH	Proposed Watts	Wattage Reduction percentage	Total kW Saved	Total kWh Saved	Sensor kWh Savings	Total kWh saved Lighting and Sensors
DPW	INT	1	2500	MECHANICS MEZZ	5	CFL	376	5	FMS	5	50%	LED	57	85%	1.60	3987.50	356.25	4343.75
DPW	INT	1	2500	MECHANICS OVER BENCH	1	T8-59	109	1				LED	57	48%	0.05	130.00	0.00	130.00
DPW	INT	1	2500	MECHANICS WORK LIGHT	1	T12	276	1				LED	57	79%	0.22	547.50	0.00	547.50
DPW	INT	1	2500	MECHANICS ENTRY	1	T8-32	112	1				LED	42	63%	0.07	175.00	0.00	175.00
DPW	INT	1	3750	HALL TO EQUIPMENT BAY	1	T8-32	60	1				LED	21	65%	0.04	146.25	0.00	146.25
DPW	INT	1	2200	LOCKER ROOM	3	T8-32	60	3	OSW-1G	1	30%	LED	21	65%	0.12	257.40	41.58	298.98
DPW	INT	1	2200	LOCKER ROOM	2	CFL	40	2			30%	LED	8	80%	0.06	140.80	10.56	151.36
DPW	INT	1	500	CUSTODIAL CLOSET	1	T8-25	47	1				LED	24	49%	0.02	11.50	0.00	11.50
DPW	INT	1	2200	BREAK ROOM	6	T8-32	60	6	OSW-1G	1	30%	LED	21	65%	0.23	514.80	83.16	597.96
DPW	INT	1	2500	EQUIPMENT BAY	26	CFL	376	26	FMS	26	30%	LED	100	73%	7.18	17940.00	1950.00	19890.00
DPW	INT	1	2500	EQUIPMENT BAY	4	CFL	376	4				LED	100	73%	1.10	2760.00	0.00	2760.00
DPW	INT	1	500	GENERATOR ROOM	1	T12	138	1	OSW-1G	1	30%	LED	42	70%	0.10	48.00	6.30	54.30
DPW	INT	2	500	LOFT/SIGN STORAGE	1	T8-32	112	1				LED	42	63%	0.07	35.00	0.00	35.00
DPW	INT	2	500	LOFT/ FILE STORAGE	3	T8-32	112	3	OSW-1G	1	30%	LED	42	63%	0.21	105.00	18.90	123.90
DPW	EXT	EXT	4380	OVER BAY DOORS	5	MH	455	5				LED	150	67%	1.53	6679.50	0.00	6679.50
DPW	EXT	EXT	4380	OVER MAN DOORS	5	MH	95	5				LED	12	87%	0.42	1817.70	0.00	1817.70
DPW	EXT	EXT	4380	OVER MAN DOORS	1	INC	100	1				LED	28	72%	0.07	315.36	0.00	315.36
DPW	EXT	EXT	4380	BACK WALLS	4	MH	295	4				LED	30	90%	1.06	4642.80	0.00	4642.80
DPW	EXT	EXT	4380	BY OFFICE DOOR	1	MH	95	1				LED	15	84%	0.08	350.40	0.00	350.40
VILLAGE HALL	INT	2	2500	BACK ENTERANCE	12	CFL	48	12				LED	22	54%	0.31	780.00	0.00	780.00
VILLAGE HALL	INT	2	500	SUPPLY	1	CIRC	58	1				LED	12	79%	0.05	23.00	0.00	23.00
VILLAGE HALL	INT	2	2200	COURT ROOM	8	T8-17	62	8				LED	17	73%	0.36	792.00	0.00	792.00
VILLAGE HALL	INT	2	3750	CORRIDOR	4	CFL	28	4				LED	8	71%	0.08	300.00	0.00	300.00
VILLAGE HALL	INT	2	3750	CORRIDOR	6	T8-32	112	6				LED	42	63%	0.42	1575.00	0.00	1575.00

SITE/BUILDING	INT/EXT	Floor/EXT	Annual Hours	Location Description	Existing QTY	EXISTING TECH	Existing Watts	Proposal QTY	Sensor	QTY	%	PROPOSED TECH	Proposed Watts	Wattage Reduction percentage	Total kW Saved	Total kWh Saved	Sensor kWh Savings	Total kWh saved Lighting and Sensors
VILLAGE HALL	INT	2	3750	RESTROOM HALL	1	UT8	58	1				LED	17	71%	0.04	153.75	0.00	153.75
VILLAGE HALL	INT	1	3750	CORRIDOR	12	CFL	28	12				LED	8	71%	0.24	900.00	0.00	900.00
VILLAGE HALL	INT	1	500	POLICE CUSTODIAL CLOSET	2	CIRC	58	2	OSW-1G	1	30%	LED	12	79%	0.09	46.00	3.60	49.60
VILLAGE HALL	INT	SW	8760	BACK STAIRWAY	1	T12	138	1	OSW-1G	1	30%	LED	42	70%	0.10	840.96	110.38	951.34
VILLAGE HALL	INT	SW	8760	BACK STAIRWAY	1	T8-32	60	1	OSW-1G	1	30%	LED	21	65%	0.04	341.64	55.19	396.83
VILLAGE HALL	INT	B	500	HOLDING CELL AREA	3	T8-32	60	3				LED	21	65%	0.12	58.50	0.00	58.50
VILLAGE HALL	INT	B	4000	DETECTIVES OFFICE	1	INC	18	1				LED-EXIT	2	89%	0.02	64.00	0.00	64.00
VILLAGE HALL	INT	B	500	BOILER ROOM	5	T8-32	60	5				LED	21	65%	0.20	97.50	0.00	97.50
VILLAGE HALL	INT	B	500	BOILER ROOM	1	INC	18	1				LED-EXIT	2	89%	0.02	8.00	0.00	8.00
VILLAGE HALL	INT	B	2200	S. LOCKERS	2	T8-32	60	2	OSC-1D	1	30%	LED	21	65%	0.08	171.60	27.72	199.32
VILLAGE HALL	INT	B	3750	CORRIDOR	1	UT8	58	1				LED	17	71%	0.04	153.75	0.00	153.75
VILLAGE HALL	INT	B	500	IT CLOSET	1	CIRC	58	1	OSW-1G	1	30%	LED	12	79%	0.05	23.00	1.80	24.80
VILLAGE HALL	INT	B	500	STORAGE 1	1	CIRC	58	1	OSW-1G	1	30%	LED	12	79%	0.05	23.00	1.80	24.80
VILLAGE HALL	INT	B	500	STORAGE 2	1	CIRC	58	1	OSW-1G	1	30%	LED	12	79%	0.05	23.00	1.80	24.80
VILLAGE HALL	INT	B	2500	TROPHY LANE	2	T12	42	2				LED	12	71%	0.06	150.00	0.00	150.00
VILLAGE HALL	INT	B	2200	KITCHEN	4	T8-17	37	4	OSW-1G	1	30%	LED	16	57%	0.08	184.80	42.24	227.04
VILLAGE HALL	INT	B	2200	KITCHEN HOOD	1	INC	60	1				LED	9	85%	0.05	112.20	0.00	112.20
VILLAGE HALL	INT	B	2200	DINING	16	T8-17	37	16				LED	16	57%	0.34	739.20	0.00	739.20
VILLAGE HALL	INT	B	500	AIR HANDLER	1	CFL	28	1				LED	9	68%	0.02	9.50	0.00	9.50
VILLAGE HALL	INT	B	500	ELECTRIC ROOM	1	CIRC	58	1				LED	12	79%	0.05	23.00	0.00	23.00
VILLAGE HALL	INT	B	500	GENERATOR ROOM	6	T8-32	60	6				LED	21	65%	0.23	117.00	0.00	117.00
VILLAGE HALL	INT	B	500	ELEVATOR	1	T12	80	1				LED	21	74%	0.06	29.50	0.00	29.50
VILLAGE HALL	INT	B	8760	STAIRS	1	T8-32	60	1				LED	21	65%	0.04	341.64	0.00	341.64
VILLAGE HALL	INT	B	2500	FIRE TRUCK BAYS	3	T8-32	60	3				LED	21	65%	0.12	292.50	0.00	292.50

SITE/BUILDING	INT/EXT	Floor/EXT	Annual Hours	Location Description	Existing QTY	EXISTING TECH	Existing Watts	Proposal QTY	Sensor	QTY	%	PROPOSED TECH	Proposed Watts	Wattage Reduction percentage	Total kW Saved	Total kWh Saved	Sensor kWh Savings	Total kWh saved Lighting and Sensors
VILLAGE HALL	INT	B	2500	FIRE TRUCK BAYS	25	T8-59	109	25				LED	42	61%	1.68	4187.50	0.00	4187.50
VILLAGE HALL	INT	B	500	STORAGE 1	1	T8-59	109	1	OSW-1G	1	30%	LED	42	61%	0.07	33.50	6.30	39.80
VILLAGE HALL	INT	B	500	STORAGE 2	1	T8-59	109	1	OSW-1G	1	30%	LED	42	61%	0.07	33.50	6.30	39.80
VILLAGE HALL	INT	B	2200	REST ROOM	1	T8-32	60	1	OSW-1G	1	30%	LED	21	65%	0.04	85.80	13.86	99.66
VILLAGE HALL	INT	B	4000	OFFICE	3	T8-32	60	3	OSW-1G	1	30%	LED	21	65%	0.12	468.00	75.60	543.60
VILLAGE HALL	INT	B	3750	HALLWAY	3	T8-32	60	3				LED	21	65%	0.12	438.75	0.00	438.75
VILLAGE HALL	EXT	EXT	4380	FRONT ENTRY	2	INC	100	2				LED	9	91%	0.18	797.16	0.00	797.16
VILLAGE HALL	EXT	EXT	4380	BACK ENTERANCE	1	T12	83	1				LED	57	31%	0.03	113.88	0.00	113.88

Village of Dobbs Ferry
Exhibit D-5-1
ECM 1 - LED Lighting and Lighting Controls Upgrade

ECM DESCRIPTION

Upgrades existing lighting with state of the art, high efficiency LED lighting. Where applicable, install occupancy sensors for lighting control.

DATA / ASSUMPTIONS

Heating Season Length [Weeks]	20
* Percent of Heating Season [%]	38%
** Fraction of Heat to be Made-Up [%]	40%
Heating Season Length [Hours]	4,136
* Fraction of the year representing the heating season, as there are times during the year when the building is neither heated nor cooled.	
** Fraction of the lighting reduction that has to be made up by the heating system; a portion of the lighting heat is released at night plus interior zones will have limited heating loads	
Cooling Season Length [Weeks]	16
Percent of Cooling Season [%]	31%
Fraction of Cooling Avoided [%]	35%
Average Cooling Equipment COP	3.0

COMMISSIONING

Confirm lighting operation and occupancy sensor functionality

RECOVERY/SAFETY FACTOR

Electric Safety Factor [%] =	0%
Thermal Safety Factor [%] =	0%

FORMULAE

$$C_{SAVINGS} = kW_{PROPOSED} \cdot (T \cdot C_h)$$

$$L_{SAVINGS} = kW_{SAVINGS} \cdot T$$

$$kW_{SAVINGS} = kW_{EXISTING} - kW_{PROPOSED}$$

$$H_{PENALTY} = (T_{EQUIVALENT} \cdot \%_{HEAT-SEASON} \cdot \%_{MAKE-UP}) / \eta_{HEATING}$$

$$T_{EQUIVALENT} = (L_{SAVINGS} + C_{SAVINGS}) \cdot 3,412 / 100,000$$

Village of Dobbs Ferry
Exhibit D-5-1
ECM 1 - LED Lighting and Lighting Controls Upgrade

Variable	Units	Description
C _{SAVINGS}	kWh	Lighting consumption savings from lighting controls
L _{SAVINGS}	kWh	Lighting consumption savings
C _L	%	Percent reduction in lighting hours of operation with lighting controls
T	Hours	Annual lighting hours of operation
kW _{SAVINGS}	kW	Total lighting power savings
kW _{PROPOSED}	kW	Total proposed lighting power draw
kW _{EXISTING}	kW	Total existing lighting power draw
H _{PENALTY}	Therms	Total heating penalty
T _{EQUIVALENT}	Therms	Therm equivalent of lighting consumption savings
% _{MAKE-UP}	%	Fraction of heat to be made up
% _{HEAT-SEASON}	%	Percentage heating season of entire year
η _{HEATING}	%	Heating system efficiency

CALCULATIONS

Detailed energy savings calculations are in the line-by-line calculation sheet

*Inputs are blue

Building	Lighting Consumption Savings [kWh]	Controls Consumption Savings [kWh]	Lighting Demand Savings [kW]	Proposed Boiler Efficiency [%]
Public Library	6,447	-	2.90	84.0%
Village Hall	14,532	3,463	5.66	91.1%
Memorial Park Building	12,336	586	3.54	79.0%
DPW Office	54,641	4,289	19.71	84.0%
Ambulance Corps. Building	742	173	0.50	78.0%
Ogden Engine Company	12,801	635	3.33	81.5%
Pool House and Offices at Gould Park (Seasonal)	21,398	71	6.24	78.0%
Embassy Club	3,011	199	1.00	94.0%
Totals	125,907	9,416	42.88	

CALCULATIONS

	Public Library	Village Hall	Memorial Park Building	DPW Office	Ambulance Corps. Building	Ogden Engine Company	Pool House and Offices at Gould Park (Seasonal)	Embassy Club
	0%	0%	90%	25%	0%	60%	60%	0%
Lighting Derate [%]								
Lighting Savings [kWh]	6,447	17,996	1,292	44,197	915	5,374	8,588	3,210
kW Savings [kW]	2.9	5.7	0.4	14.8	0.5	1.3	2.5	1.0
Heating Season [Weeks/Year]	20	20	20	20	20	20	20	20
* % of Heating Season [%]	38%	38%	38%	38%	38%	38%	38%	38%
**Fraction of Heat to be Made-Up [%]	40%	40%	40%	40%	40%	40%	40%	40%
Equivalent of Lighting kWh Saved in Therms [Therms/Yr]	220	583	7	1,038	31	170	293	110
Proposed Boiler Efficiency [%]	84.0%	91.1%	79.0%	84.0%	78.0%	81.5%	78.0%	94.0%
Heating Penalty [Therms]	(40)	(98.44)	(1)	(95)	(6)	(32)	-	(18)
Cooling Season [Weeks/Year]	16	16	16	16	16	16	16	16
% of Cooling Season [%]	31%	31%	31%	31%	31%	31%	31%	31%
Fraction of Cooling Avoided [%]	35%	35%	35%	2%	35%	35%	35%	35%
Cooling Equipment COP	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Cooling Savings [kWh]	231	646	46	91	33	193	308	115

SAVINGS SUMMARY

Building ID	kWh Savings kWh	kW Savings kW	Thermal Savings Therms	Safety Factor %
Public Library	6,679	2.9	(40)	0.0%
Village Hall	18,642	5.7	(98)	0.0%
Memorial Park Building	1,339	0.4	(1)	90.0%
DPW Office	44,288	14.8	(95)	25.0%
Ambulance Corps. Building	948	0.5	(6)	0.0%
Ogden Engine Company	5,567	1.3	(32)	60.0%
Pool House and Offices at Gould Park (Seasonal)	8,896	2.5	-	60.0%
Embassy Club	3,325	1.0	(18)	0.0%
Subtotal	89,683	29.0	(291)	

Status	ID	Lamp	Street	Location	Rated Watts	ABH	New LED Wattage, W	Annual Savings, kWh
	57890	INCANDESCENT			189	4270		0
	57891	INCANDESCENT			189	4270		0
	58042	INCANDESCENT			189	4270		0
	58043	INCANDESCENT			189	4270		0
	57737	MERCURY VAPOR			200	4270		0
	57779	MERCURY VAPOR			200	4270		0
	57656	LED	ALLEN ST	HOUSE 80	50	4270		0
	57657	LED	ALLEN ST	HOUSE 18	50	4270		0
	57658	LED	ALLEN ST	HOUSE 27	50	4270		0
	57659	LED	ALLEN ST	HOUSE 60	50	4270		0
	72890	LED	APPLETON PL		50	4270		0
	72905	LED	APPLETON PL	at OLIPHANT AVE	50	4270		0
	57662	SODIUM VAPOR	APPLETON PL	FO 30 1WSNO BIRCH LA	105	4270	24	346
	57660	SODIUM VAPOR	APPLETON PL	WO BIRCH LA	146	4270	24	521
	57661	SODIUM VAPOR	APPLETON PL	SS WO CLINTON AV	146	4270	24	521
Converted	57663	SODIUM VAPOR	ASHFORD AVE	W15118-AT BELLWOOD AVE	150	4270	73	329
Converted	57664	SODIUM VAPOR	ASHFORD AVE	OP HOUSE 163	150	4270	73	329
Converted	57665	SODIUM VAPOR	ASHFORD AVE	12399-HOUSE 174	150	4270	73	329
Converted	57666	SODIUM VAPOR	ASHFORD AVE	HOUSE 323	146	4270	73	312
Converted	57667	MERCURY VAPOR	ASHFORD AVE	HOUSE 207	200	4270	73	542
Converted	57668	SODIUM VAPOR	ASHFORD AVE	HOUSE 273	150	4270	73	329
Converted	57669	SODIUM VAPOR	ASHFORD AVE	AT BRIARY RD	150	4270	73	329
Converted	57670	SODIUM VAPOR	ASHFORD AVE	4E BRIARY RD	150	4270	73	329
Converted	57671	SODIUM VAPOR	ASHFORD AVE	HOUSE 377	150	4270	73	329
Converted	57672	SODIUM VAPOR	ASHFORD AVE	AT KING ST-HOUSE 357	150	4270	73	329
Converted	57673	SODIUM VAPOR	ASHFORD AVE	HOUSE 289	150	4270	73	329
Converted	57674	MERCURY VAPOR	ASHFORD AVE	HOUSE 212	200	4270	73	542
Converted	57675	SODIUM VAPOR	ASHFORD AVE	1WSS OF GRANDVIEW AVE	199	4270	73	538
Converted	57676	SODIUM VAPOR	ASHFORD AVE	HOUSE 88	150	4270	73	329
Converted	57677	SODIUM VAPOR	ASHFORD AVE	OP HOUSE 153-155	250	4270	106	615
Converted	57678	SODIUM VAPOR	ASHFORD AVE	HOUSE 140	150	4270	73	329
Converted	57679	SODIUM VAPOR	ASHFORD AVE	AT SHADY LANE	150	4270	73	329
Converted	57681	SODIUM VAPOR	ASHFORD AVE	HOUSE 79	250	4270	106	615
Converted	57682	SODIUM VAPOR	ASHFORD AVE	HOUSE 58	199	4270	73	538
Converted	57683	MERCURY VAPOR	ASHFORD AVE	AT BRG APPRCH	290	4270	73	927
Converted	57684	SODIUM VAPOR	ASHFORD AVE	HOUSE 184	150	4270	106	188
Converted	57685	SODIUM VAPOR	ASHFORD AVE	HOUSE 104	199	4270	73	538
Converted	57686	SODIUM VAPOR	ASHFORD AVE	AT GRANDVIEW AVE	250	4270	106	615
Converted	57688	SODIUM VAPOR	ASHFORD AVE	HOUSE 48	150	4270	73	329
Converted	57689	SODIUM VAPOR	ASHFORD AVE	AT MOCHIEAN PK. AVE.	105	4270	73	137
Converted	57690	SODIUM VAPOR	ASHFORD AVE	OP HOUSE 334	150	4270	73	329
Converted	57691	SODIUM VAPOR	ASHFORD AVE	HOUSE 26	150	4270	106	188
Converted	57692	SODIUM VAPOR	ASHFORD AVE	HOUSE 192	150	4270	73	329
Converted	57694	SODIUM VAPOR	ASHFORD AVE	NEAR HOUSE 164	199	4270	73	538
Converted	57695	SODIUM VAPOR	ASHFORD AVE	HOUSE 18	150	4270	73	329
Converted	57699	SODIUM VAPOR	ASHFORD AVE		150	4270	54	410
Converted	57700	SODIUM VAPOR	ASHFORD AVE		150	4270	73	329
	57701	SODIUM VAPOR	ASHFORD AVE		100	4270	45	235
Converted	57702	SODIUM VAPOR	ASHFORD AVE		100	4270	73	115
	57703	SODIUM VAPOR	ASHFORD AVE		100	4270		0
	57704	SODIUM VAPOR	ASHFORD AVE		100	4270	100	0
	57705	SODIUM VAPOR	ASHFORD AVE		100	4270	45	235
	57706	SODIUM VAPOR	ASHFORD AVE		100	4270	45	235

2016 corrections
2022 Project

	57707	SODIUM VAPOR	ASHFORD AVE		100	4270	45	235
	57708	SODIUM VAPOR	ASHFORD AVE		100	4270	45	235
Converted	73111	SODIUM VAPOR	ASHFORD AVE	OP LEFURGY AVE	150	4270	73	329
Converted	57709	SODIUM VAPOR	ATILDA AVE		141	4270	54	371
	57710	SODIUM VAPOR	ATILDA AVE		141	4270	100	175
Converted	57711	SODIUM VAPOR	ATILDA AVE		141	4270	54	371
Converted	57712	SODIUM VAPOR	BEACON HILL DR	BEACON HILL DRIVE	100	4270	54	196
Converted	57713	SODIUM VAPOR	BEACON HILL DR	BEACON HILL DRIVE	100	4270	54	196
Converted	57714	SODIUM VAPOR	BEACON HILL DR	BEACON HILL ROAD	100	4270	54	196
Converted	57715	SODIUM VAPOR	BEACON HILL DR	BEACON HILL ROAD	100	4270	54	196
Converted	57716	SODIUM VAPOR	BEACON HILL DR	BEACON HILL DRIVE	100	4270	54	196
Converted	57717	SODIUM VAPOR	BEACON HILL DR	BEACON HILL DRIVE	100	4270	54	196
Converted	57718	SODIUM VAPOR	BEACON HILL DR	BEACON HILL DRIVE	100	4270	54	196
Converted	57719	SODIUM VAPOR	BEACON HILL DR	BEACON HILL ROAD	100	4270	54	196
Converted	57720	SODIUM VAPOR	BEACON HILL DR	BEACON HILL DRIVE	100	4270	54	196
Converted	57721	SODIUM VAPOR	BEACON HILL DR	BEACON HILL DRIVE	100	4270	54	196
Converted	57722	SODIUM VAPOR	BEACON HILL DR	BEACON HILL DRIVE	100	4270	54	196
Converted	57723	SODIUM VAPOR	BEACON HILL DR	BEACON HILL DRIVE	100	4270	54	196
Converted	57724	SODIUM VAPOR	BEACON HILL DR	BEACON HILL ROAD	100	4270	54	196
Converted	57725	SODIUM VAPOR	BEACON HILL DR	BEACON HILL ROAD	100	4270	54	196
Converted	57726	SODIUM VAPOR	BEACON HILL DR	BEACON HILL DRIVE	100	4270	54	196
Converted	57727	SODIUM VAPOR	BEACON HILL DR	BEACON HILL DRIVE	100	4270	54	196
Converted	57728	SODIUM VAPOR	BEACON HILL DR	BEACON HILL ROAD	150	4270	73	329
Converted	57729	SODIUM VAPOR	BEACON HILL DR	BEACON HILL DRIVE	150	4270	73	329
Converted	72935	SODIUM VAPOR	BEACON HILL DR	at Springhurst xing	250	4270	54	837
	57730	LED	BEECHDALE RD	HOUSE 28	50	4270		0
	57731	LED	BEECHDALE RD	HOUSE 60	50	4270		0
	57732	LED	BEECHDALE RD	HOUSE 36	50	4270		0
	57733	LED	BEECHDALE RD	HOUSE 54	50	4270		0
	57734	LED	BEECHDALE RD	AT SCENIC DRIVE	50	4270		0
	57735	LED	BEECHDALE RD		1241	50	4270	0
	57736	LED	BEECHDALE RD	HOUSE 70	50	4270		0
	73242	LED	BEECHWOOD COURT	HOUSE 15 - CUL-DE-SAC	50	4270		0
	57738	LED	BELDEN AVE	HOUSE 24	50	4270		0
	57739	LED	BELDEN AVE	HOUSE 42	50	4270		0
	57740	LED	BELDEN AVE	HOUSE 50	50	4270		0
	57741	LED	BELDEN AVE	HOUSE 12	50	4270		0
	57742	LED	BELDEN AVE	1 W OF PETRO PL L 208	50	4270		0
	57743	LED	BELDEN AVE	HOUSE 76	50	4270		0
	57744	LED	BELDEN AVE	HOUSE 100	50	4270		0
	57745	LED	BELDEN AVE	HOUSE 82	50	4270		0
	57746	LED	BELDEN AVE	HOUSE 120	50	4270		0
	57749	LED	BELDEN AVE	HOUSE 64	50	4270		0
Converted	57750	LED	BELLAIR DRIVEWA	HOUSE 96	50	4270	54	-17
	57751	LED	BELLAIR DRIVEWA	HOUSE 64	50	4270		0
	72995	LED	BELLAIR DRIVEWA	HOUSE 54	50	4270		0
	72996	LED	BELLAIR DRIVEWA	HOUSE 41	50	4270		0
	72997	LED	BELLAIR DRIVEWA	HOUSE 21	50	4270		0
	57754	LED	BELLAIR DRIVEWA	HOUSE 114	50	4270		0
Converted	57756	LED	BELLAIR DRIVEWA	HOUSE 146	50	4270	54	-17
Converted	57753	SODIUM VAPOR	BELLAIR DRIVEWA	HASTINGS LINE	70	4270	50	85
Converted	57752	SODIUM VAPOR	BELLAIR DRIVEWA	HOUSE 80	105	4270	50	235
Converted	57755	SODIUM VAPOR	BELLAIR DRIVEWA	HOUSE 133	146	4270	50	410
	57757	LED	BELLVUE AVE	HOUSE 22	50	4270		0
	57758	LED	BELLVUE AVE	HOUSE 5	50	4270		0

Converted	57759	SODIUM VAPOR	BELLVUE AVE	AT FLORENCE AVE	100	4270	73	115
	57760	LED	BELLWOOD AVE	HOUSE 84	50	4270		0
	57761	LED	BELLWOOD AVE	HOUSE 50	50	4270		0
	57762	LED	BELLWOOD AVE	HOUSE 64	50	4270		0
	57763	LED	BELLWOOD AVE	HOUSE 18	50	4270		0
	57764	LED	BELLWOOD AVE	HOUSE 98	50	4270		0
	57765	LED	BELLWOOD AVE	House 30	50	4270		0
	57767	LED	BLANCHARD AVE	HOUSE 45	50	4270		0
	57768	LED	BLANCHARD AVE	HOUSE 65	50	4270		0
	57769	LED	BLANCHARD AVE	HOUSE 81	50	4270		0
	57770	LED	BLANCHARD AVE	3697 EAST DEAD END	50	4270		0
Converted	57766	SODIUM VAPOR	BLANCHARD AVE	HOUSE 31	105	4270	54	218
	57771	LED	BRACE TERR	SS WO CLINTON AV	50	4270		0
	57772	LED	BRACE TERR	SS WO CLINTON AV by HOUSE 39	50	4270		0
	57773	LED	BRADLEY ST	OP HOUSE 23	50	4270		0
	57774	LED	BRADLEY ST	HOUSE 34	50	4270		0
	57775	LED	BRADLEY ST	HOUSE 25	50	4270		0
	57777	LED	BRADLEY ST	HOUSE 26	50	4270		0
Converted	57778	SODIUM VAPOR	BRADLEY ST	OP HOUSE 51	100	4270	54	196
Converted	57776	SODIUM VAPOR	BRADLEY ST	AT FORKLIN LA.	100	4270	54	196
	57780	LED	BRIARY RD	AT BROOKSIDE LA	50	4270		0
	57781	LED	BRIARY RD	NO BROOKSIDE LA	50	4270		0
	57782	LED	BRIARY RD	AT HILLDALE RD,OP HOUSE 45	50	4270		0
	57783	LED	BRIARY RD	AT MEADOWWAY	50	4270		0
	57784	LED	BRIARY RD	AT SECOR RD	50	4270		0
	57785	LED	BRIARY RD	AT HILLDALE AV OP HOUSE 25	50	4270		0
	57786	LED	BRIARY RD	OP HOUSE 86	50	4270		0
	57787	LED	BRIARY RD	AT HEATHERWAY (HILLTOP PK.)	50	4270		0
Converted	57788	SODIUM VAPOR	BRIARY RD		105	4270	54	218
Converted	57789	SODIUM VAPOR	BROADWAY	25WS OF IRVINGTON LINE	313	4270	106	884
Converted	57790	SODIUM VAPOR	BROADWAY	HOUSE 554	313	4270	106	884
Converted	57791	SODIUM VAPOR	BROADWAY	HOUSE 535	313	4270	106	884
Converted	57792	SODIUM VAPOR	BROADWAY	HOUSE 522	250	4270	106	615
Converted	57793	SODIUM VAPOR	BROADWAY	OP SHERMEN AVE	313	4270	106	884
Converted	57794	SODIUM VAPOR	BROADWAY	OP BELDEN AVE	250	4270	106	615
Converted	57795	SODIUM VAPOR	BROADWAY	AT ROCHAMBEAU AVE	250	4270	106	615
Converted	57796	SODIUM VAPOR	BROADWAY	HOUSE 313	250	4270	106	615
Converted	57797	SODIUM VAPOR	BROADWAY		250	4270	106	615
Converted	57798	SODIUM VAPOR	BROADWAY	HOUSE 363	313	4270	106	884
Converted	57799	SODIUM VAPOR	BROADWAY	HOUSE 333	313	4270	73	1,025
Converted	57800	SODIUM VAPOR	BROADWAY	AT ELM STREET	313	4270	73	1,025
Converted	57801	SODIUM VAPOR	BROADWAY	HOUSE 311	250	4270	106	615
Converted	57802	SODIUM VAPOR	BROADWAY	HOUSE 295	313	4270	106	884
Converted	57803	SODIUM VAPOR	BROADWAY	25 WS OF CHESTNUT STREET	250	4270	106	615
Converted	57804	SODIUM VAPOR	BROADWAY	HOUSE 255	250	4270	106	615
Converted	57805	SODIUM VAPOR	BROADWAY	HOUSE 233	250	4270	106	615
Converted	57806	SODIUM VAPOR	BROADWAY	AT HATCH TERR.	250	4270	106	615
Converted	57807	SODIUM VAPOR	BROADWAY	HOUSE 191	313	4270	106	884
Converted	57808	SODIUM VAPOR	BROADWAY	IFO CABRINIA NUR.HOME	250	4270	106	615
Converted	57809	SODIUM VAPOR	BROADWAY	OP COLONIAL AVE WEST SIDE	250	4270	174	325
Converted	57810	SODIUM VAPOR	BROADWAY	HOUSE 96	250	4270	174	325
Converted	57811	SODIUM VAPOR	BROADWAY	OP HOUSE 84	250	4270	174	325
Converted	57812	SODIUM VAPOR	BROADWAY	HOUSE 70	486	4270	174	1,332
Converted	57813	SODIUM VAPOR	BROADWAY	OP HOUSE 40	250	4270	174	325

Converted	57814	SODIUM VAPOR	BROADWAY	OP HOUSE 30	250	4270	106	615	
Converted	57815	SODIUM VAPOR	BROADWAY	HOUSE 241	250	4270	106	615	
	57816	HALIDE	BROADWAY	IFO CABRINIA NUR. HOME WEST SIDE	175	4270	45	555	
Converted	57817	SODIUM VAPOR	BROADWAY	AT CEDAR STREET	250	4270	106	615	
	57818	SODIUM VAPOR	BROADWAY	AT OAK STREET	250	4270	45	875	
Converted	57819	SODIUM VAPOR	BROADWAY	HOUSE 443	250	4270	106	615	
Converted	57820	SODIUM VAPOR	BROADWAY	at ESTERWOOD AVE	250	4270	106	615	
	57821	HALIDE	BROADWAY	IFO CABRINIA NUR. HOME	175	4270	45	555	
Converted	57822	SODIUM VAPOR	BROADWAY	OP SOUTH LANE	250	4270	106	615	
Converted	57823	SODIUM VAPOR	BROADWAY	BWAY & CEDAR ST HOUSE 381	313	4270	106	884	
Converted	57824	SODIUM VAPOR	BROADWAY	15 IRVINGTON LINE	250	4270	106	615	
Converted	57825	SODIUM VAPOR	BROADWAY	HOUSE 490	250	4270	106	615	
Converted	57827	SODIUM VAPOR	BROADWAY	T27207 HOUSE 177	250	4270	106	615	
Converted	57828	SODIUM VAPOR	BROADWAY	HOUSE 11	250	4270	106	615	
	73112	SODIUM VAPOR	BROADWAY	AT LIVINGSTON AV	250	4270	45	875	
	73113	SODIUM VAPOR	BROADWAY		250	4270	45	875	
	57830	LED	BROOKSIDE LA	IFO HOUSE15	50	4270		0	
	57831	LED	BROOKSIDE LA	IFO HOUSE 28	50	4270		0	
	57832	LED	BUENA VISTA DR	house 100	50	4270		0	
Converted	57833	LED	BUENA VISTA DR	HOUSE 93	50	4270	54	-17	
Converted	57834	SODIUM VAPOR	BUENA VISTA DR	HOUSE 72	105	4270	50	235	
Converted	57836	SODIUM VAPOR	BUENA VISTA DR	HOUSE 102	105	4270	50	235	
Converted	57837	SODIUM VAPOR	BYRON PL		105	4270	54	218	
	73157	SODIUM VAPOR	CASTLE HILL CLOSE	HOUSE 3	150	4270	45	448	
	73158	SODIUM VAPOR	CASTLE HILL CLOSE	HOUSE 1	150	4270	45	448	
Converted	57838	SODIUM VAPOR	CEDAR ST		313	4270	106	884	
Converted	57839	SODIUM VAPOR	CEDAR ST		199	4270	106	397	
Converted	57840	SODIUM VAPOR	CEDAR ST		146	4270	54	393	
Converted	57841	SODIUM VAPOR	CEDAR ST		199	4270	106	397	
Converted	57842	SODIUM VAPOR	CEDAR ST		199	4270	73	538	
Converted	57843	SODIUM VAPOR	CEDAR ST		199	4270	73	538	
Converted	57844	SODIUM VAPOR	CEDAR ST		199	4270	73	538	
Converted	57845	SODIUM VAPOR	CEDAR ST		199	4270	73	538	
Converted	57846	SODIUM VAPOR	CEDAR ST		199	4270	73	538	
Converted	57847	SODIUM VAPOR	CEDAR ST		199	4270	73	538	
	57848	SODIUM VAPOR	CEDAR ST		199	4270		0	
Converted	57849	SODIUM VAPOR	CEDAR ST		146	4270	73	312	
	57850	SODIUM VAPOR	CEDAR ST		146	4270		0	
Converted	57856	SODIUM VAPOR	CHESTNUT RDGE WAY	IFO HOUSE 20	100	4270	54	196	
Converted	57857	SODIUM VAPOR	CHESTNUT RDGE WAY	IFO HOUSE 4	100	4270	54	196	
Converted	57859	SODIUM VAPOR	CHESTNUT RDGE WAY	IFO HOUSE 28	100	4270	54	196	
Converted	57858	SODIUM VAPOR	CHESTNUT RDGE WAY	IFO HOUSE 42	150	4270	54	410	
Converted	57851	SODIUM VAPOR	CHESTNUT ST	OP CHESTNUT COURT	146	4270	54	393	
Converted	57852	SODIUM VAPOR	CHESTNUT ST		45	146	4270	54	393
Converted	57853	SODIUM VAPOR	CHESTNUT ST		44	146	4270	73	312
Converted	57854	SODIUM VAPOR	CHESTNUT ST		43	146	4270	54	393
Converted	57855	SODIUM VAPOR	CHESTNUT ST	AT AQUEDUCT	146	4270	54	393	
Converted	57863	HIGH PRESSURE SODIUM	CLINTON AVE	ES 6N JUDSON AV	150	4270	73	329	
	57864	LED	CLINTON AVE	AT KITCHING PL	50	4270		0	
	57866	LED	CLINTON AVE	HOUSE 296	50	4270		0	
	57860	LED	CLINTON AVE	HOUSE 23	50	4270		0	
	73161	LED	CLINTON AVE	NORTH OF APPLETON PL	50	4270		0	
	57874	LED	CLINTON AVE	AT ESTERWOOD HOUSE DW, 4 SO BWAY	50	4270		0	
	57876	LED	CLINTON AVE	HOUSE 286	50	4270		0	

	57862	LED	CLINTON AVE	AT COCHRANE AV	50	4270		0
	57861	LED	CLINTON AVE	OP HOUSE 54	105	4270		0
Converted	57865	SODIUM VAPOR	CLINTON AVE	HOUSE 330	100	4270	54	196
	57868	SODIUM VAPOR	CLINTON AVE	AT JUDSON AV	100	4270	24	325
	57869	SODIUM VAPOR	CLINTON AVE	HOUSE 193	100	4270	24	325
Converted	57871	SODIUM VAPOR	CLINTON AVE	HOUSE 256	100	4270	73	115
	57872	SODIUM VAPOR	CLINTON AVE	OP HOUSE 169	100	4270	24	325
Converted	57873	SODIUM VAPOR	CLINTON AVE	WS SO APPLETON PL	100	4270	54	196
	57870	SODIUM VAPOR	CLINTON AVE	AT JUDSON AV ES SO OF JUDSON AVE	146	4270	24	521
Converted	57867	SODIUM VAPOR	CLINTON AVE	BWAY	250	4270	73	756
	57881	LED	COCHRANE AVE	SS1E BWAY	50	4270		0
	57877	LED	COCHRANE AVE	WO CLINTON AV IFO HOUSE 80	50	4270		0
	57878	LED	COCHRANE AVE	NS2W BRACE TERR IFO House 52	50	4270		0
	57879	LED	COCHRANE AVE	NS3E BWAY 27643	50	4270		0
	57880	LED	COCHRANE AVE	AT BRACE TERR 27645	55	4270		0
	57882	LED	COLONIAL AVE	HOUSE 72	50	4270		0
	57883	LED	COLONIAL AVE	OP HOUSE 61	50	4270		0
	57884	LED	COLONIAL AVE	HOUSE 68	50	4270		0
	72946	LED	COLONIAL AVE	HOUSE 49 AT SOUTHLAWN AVE	50	4270		0
Converted	57885	SODIUM VAPOR	COLONIAL AVE	HOUSE 40	105	4270	54	218
Converted	57886	SODIUM VAPOR	COLONIAL AVE	AT TRAILWAY	105	4270	54	218
Converted	57887	SODIUM VAPOR	COLONIAL AVE	1 EO BROADWAY	105	4270	54	218
Converted	57889	SODIUM VAPOR	CONSTANCE AVE		141	4270	54	371
	73243	LED	CRESENT LANE	HOUSE 11 - CUL-DE-SAC	50	4270		0
	73241	LED	CRESENT LANE	HOUSE 12	50	4270		0
	57892	LED	CRICKET LANE	NS EO LEFURGY AV	50	4270		0
	57895	SODIUM VAPOR	DANFORTH AVE		105	4270	50	235
	57896	SODIUM VAPOR	DANFORTH AVE	2SSEO OGDEN AVE	105	4270	50	235
Converted	57901	SODIUM VAPOR	DEVOE ST	NS 7E STORM ST	100	4270	54	196
Converted	57897	SODIUM VAPOR	DEVOE ST	EO STORM ST	146	4270	54	393
Converted	57898	SODIUM VAPOR	DEVOE ST	EO STORM ST	146	4270	54	393
Converted	57899	SODIUM VAPOR	DEVOE ST	EO STORM ST	146	4270	54	393
Converted	57900	SODIUM VAPOR	DEVOE ST	EO STORM ST	146	4270	54	393
Converted	57904	SODIUM VAPOR	DRAPER LA		100	4270	73	115
Converted	57903	SODIUM VAPOR	DRAPER LA		150	4270	54	410
Converted	57902	SODIUM VAPOR	DRAPER LA		250	4270	106	615
	57905	LED	ELDRIDGE PL	HOUSE 18	50	4270		0
	57906	LED	ELDRIDGE PL	HOUSE 10	50	4270		0
Converted	57907	SODIUM VAPOR	ELM ST		146	4270	73	312
Converted	57908	SODIUM VAPOR	ELM ST		146	4270	54	393
Converted	57909	SODIUM VAPOR	ELM ST		146	4270	54	393
Converted	57910	SODIUM VAPOR	ELM ST		146	4270	54	393
Converted	57911	SODIUM VAPOR	ENGLISH LA		141	4270	54	371
	57912	LED	ESTERWOOD AVE	1 OFF BROADWAY	50	4270		0
	57913	LED	ESTERWOOD AVE	SO BROADWAY	50	4270		0
	57914	LED	ESTERWOOD AVE	HOUSE 45	50	4270		0
	57915	LED	ESTERWOOD AVE	AT TRANSVALL ST	50	4270		0
	57916	LED	ESTERWOOD AVE	HOUSE 87	50	4270		0
	57917	LED	ESTERWOOD AVE	HOUSE 105	50	4270		0
	57918	LED	ESTERWOOD AVE	HOUSE 111	50	4270		0
	57919	LED	ESTERWOOD AVE	HOUSE 83	50	4270		0
Converted	57920	SODIUM VAPOR	FAIRLAWN AVE		141	4270	54	371
Converted	57921	SODIUM VAPOR	FAIRLAWN AVE		141	4270	54	371
	57922	SODIUM VAPOR	FAIRLAWN AVE		141	4270	45	410
	57923	LED	FLORENCE AVE	AT SCOTT ST, HOUSE 40	50	4270		0

	57924	LED	FLORENCE AVE	HOUSE 26	50	4270		0
	57925	LED	FLORENCE AVE	HOUSE 4	50	4270		0
	72976	LED	FLORENCE AVE	HOUSE 60	50	4270		0
Converted	57926	SODIUM VAPOR	FLORENCE AVE	HOUSE 72	141	4270	54	371
	57927	LED	GOULD AVE	HOUSE 42	50	4270		0
	57929	LED	GOULD AVE	HOUSE 61	50	4270		0
	73127	LED	GOULD AVE	HOUSE 5 ON DEAD END	50	4270		0
	73128	LED	GOULD AVE	HOUSE 53	50	4270		0
	73129	LED	GOULD AVE	HOUSE 33	50	4270		0
Converted	57930	SODIUM VAPOR	GRANDVIEW AVE	NO ORCHARD ST	100	4270	54	196
Converted	57931	SODIUM VAPOR	GRANDVIEW AVE	AT GROVE ST	100	4270	54	196
Converted	57932	SODIUM VAPOR	GRANDVIEW AVE	IFO HOUSE 51	100	4270	54	196
Converted	57933	SODIUM VAPOR	GRANDVIEW AVE	AT HOWARD ST	100	4270	54	196
Converted	57934	SODIUM VAPOR	GRANDVIEW AVE	NO GROVE ST	100	4270	54	196
Converted	57935	SODIUM VAPOR	GRANDVIEW AVE	IFO HOUSE 93	100	4270	54	196
Converted	57936	SODIUM VAPOR	GRANDVIEW AVE	IFO HOUSE 39	100	4270	54	196
Converted	57938	SODIUM VAPOR	GROVE ST		105	4270	38	286
Converted	57939	SODIUM VAPOR	HATCH TERR	AT WALNUT ST	100	4270	54	196
Converted	57940	SODIUM VAPOR	HATCH TERR	HOUSE 19	100	4270	54	196
	57941	SODIUM VAPOR	HAYNES AVE		105	4270		0
Converted	57942	SODIUM VAPOR	HAYNES AVE		105	4270	38	286
Converted	57943	SODIUM VAPOR	HAYNES AVE		105	4270	38	286
	57944	LED	HEATHER WAY	1E OF BRIARY RD	50	4270		0
Converted	72903	LED	HEATHER WAY	IFO HOUSE 14	50	4270	54	-17
	72906	LED	HEATHER WAY	at SUMMITT TERR	50	4270		0
	72907	LED	HEATHER WAY	ON BEND OF ROAD	50	4270		0
	57946	LED	HENRY CT	1E OF PRICE ST	50	4270		0
	57947	LED	HENRY CT	IN DE CIR	50	4270		0
	57948	LED	HICKORY HILL RD	HOUSE 3	50	4270		0
	57951	LED	HICKORY HILL RD	HOUSE 34	50	4270		0
	57954	LED	HICKORY HILL RD	HOUSE 48 - AT CRESENT LA.	50	4270		0
Converted	57952	SODIUM VAPOR	HICKORY HILL RD	HICKORY HILL DR	100	4270	54	196
Converted	57956	SODIUM VAPOR	HICKORY HILL RD	HOUSE 72	100	4270	54	196
Converted	57957	SODIUM VAPOR	HICKORY HILL RD	HOUSE 76	105	4270	54	218
Converted	57958	SODIUM VAPOR	HICKORY HILL RD	HOUSE 80	105	4270	54	218
Converted	57949	SODIUM VAPOR	HICKORY HILL RD	HOUSE 7	105	4270	54	218
Converted	57950	SODIUM VAPOR	HICKORY HILL RD	HOUSE 18	105	4270	54	218
Converted	57953	SODIUM VAPOR	HICKORY HILL RD	AT BRAMLEY LA.	155	4270	73	350
Converted	57955	SODIUM VAPOR	HICKORY HILL RD	HOUSE 65	155	4270	73	350
Converted	57959	SODIUM VAPOR	HIGH ST		146	4270	50	410
	57964	SODIUM VAPOR	HIGH ST		146	4270		0
	57965	SODIUM VAPOR	HIGH ST		199	4270		0
Converted	57960	SODIUM VAPOR	HIGH ST		199	4270	73	538
Converted	57961	SODIUM VAPOR	HIGH ST		199	4270	73	538
Converted	57962	SODIUM VAPOR	HIGH ST		199	4270	106	397
Converted	57963	SODIUM VAPOR	HIGH ST		199	4270	73	538
	57966	LED	HIGHLAND AVE	AT LUZERN RD	50	4270		0
	57967	LED	HIGHLAND AVE	CR HAYNES AVE OP HOUSE 15	50	4270		0
	57968	LED	HILLDALE AVE	IFO HOUSE 18	50	4270		0
Converted	57969	SODIUM VAPOR	HILLDALE AVE	EO BRIARY ROAD - DE	141	4270	54	371
	72904	LED	HILLDALE RD	UPPER HILLDALE IFO HOUSE 136 DE	50	4270		0
	57973	LED	HILLSIDE RD	HOUSE 35	50	4270		0
	57974	LED	HILLSIDE RD	AT AQUADUCK TRAIL	50	4270		0
	57976	LED	HOLLYWOOD DRIVE	AT MAPLEWOOD AVE	50	4270		0
	57978	LED	HOWARD ST		50	4270		0

	57979	LED	IRVINGTON ST	HOUSE 13	50	4270		0
	72977	LED	IRVINGTON ST	AT HOUSE 18 FLORENCE ST CORNER	50	4270		0
	72940	LED	JUDSON AVE		50	4270		0
	57981	LED	JUDSON AVE	HOUSE 247	50	4270		0
	57982	LED	JUDSON AVE	HOUSE 169	50	4270		0
	57984	LED	JUDSON AVE	HOUSE 187	50	4270		0
	57987	LED	JUDSON AVE	OP HOUSE 167	50	4270		0
	57988	LED	JUDSON AVE	HOUSE 205	50	4270		0
	57990	LED	JUDSON AVE	NO BEECHDALE RD	50	4270		0
	57991	SODIUM VAPOR	JUDSON AVE	FRT HOUSE 126	100	4270	24	325
	57985	SODIUM VAPOR	JUDSON AVE	HOUSE 67	100	4270	24	325
	57986	SODIUM VAPOR	JUDSON AVE	HOUSE 20	100	4270	24	325
	57980	SODIUM VAPOR	JUDSON AVE		100	4270	24	325
	72937	SODIUM VAPOR	JUDSON AVE		100	4270	24	325
	72938	SODIUM VAPOR	JUDSON AVE	HOUSE 100	100	4270	24	325
	72939	SODIUM VAPOR	JUDSON AVE	HOUES 130	100	4270	24	325
Converted	57989	SODIUM VAPOR	JUDSON AVE	HOUSE 257	150	4270	73	329
Converted	57993	SODIUM VAPOR	KELLER LA	KELLER LANE	100	4270	54	196
Converted	57994	SODIUM VAPOR	KELLER LA	KELLER LANE	100	4270	54	196
Converted	57992	SODIUM VAPOR	KELLER LA	KELLER LANE	150	4270	73	329
	57995	LED	KING ST	AKA 8543 HOUSE 15	50	4270		0
	57996	LED	KING ST	HOUSE 50	50	4270		0
	57997	LED	KING ST	HOUSE 60	50	4270		0
	57998	LED	KING ST	HOUSE 30	50	4270		0
	57999	LED	KING ST	HOUSE 74	50	4270		0
	58000	LED	LAUREL HILL RD	HOUSE 15	50	4270		0
	58001	LED	LAUREL HILL RD	AT CRICKET LA	50	4270		0
	73153	HALIDE	LAWRENCE ST		275	4270	100	747
	73154	HALIDE	LAWRENCE ST		275	4270		0
	72994	LED	LEFURGY AVE	HOUSE 31	50	4270		0
	72998	LED	LEFURGY AVE	AT HIGHLAND AVE	50	4270		0
	58005	LED	LEFURGY AVE	WS NO ASHFORD AV	50	4270		0
	58007	LED	LEFURGY AVE	HOUSE 72	50	4270		0
	58008	LED	LEFURGY AVE	HOUSE 80	50	4270		0
	58009	LED	LEFURGY AVE	HOUSE 88	50	4270		0
	58010	LED	LEFURGY AVE	HOUSE 111	50	4270		0
	58011	LED	LEFURGY AVE	AT CRICKET LA	50	4270		0
	72990	SODIUM VAPOR	LEFURGY AVE	15 OF VIRGINIA AVE	100	4270		0
	58012	SODIUM VAPOR	LEWIS ROAD	AT RUSSELL PLACE	130	4270	45	363
	58014	SODIUM VAPOR	LEWIS ROAD	IFO HOUSE 14	130	4270	45	363
	58013	SODIUM VAPOR	LEWIS ROAD	IFO HOUSE 6	133	4270	45	376
Converted	58015	SODIUM VAPOR	LIVINGSTON AVE		199	4270	73	538
Converted	58016	SODIUM VAPOR	LIVINGSTON AVE	2WSNO BROADWAY	199	4270	73	538
Converted	58017	SODIUM VAPOR	LIVINGSTON AVE	3WSNO BROADWAY	199	4270	73	538
Converted	58018	SODIUM VAPOR	LIVINGSTON AVE		199	4270	73	538
Converted	58019	SODIUM VAPOR	LIVINGSTON AVE		250	4270	73	756
Converted	58020	SODIUM VAPOR	LIVINGSTON AVE		486	4270	106	1,623
	58023	HALIDE	LIVINGSTON MANOR		288	4270	100	803
	58024	HALIDE	LIVINGSTON MANOR		288	4270	100	803
	58025	HALIDE	LIVINGSTON MANOR		288	4270	100	803
	58026	HALIDE	LIVINGSTON MANOR		288	4270	100	803
	58027	HALIDE	LIVINGSTON MANOR		288	4270	100	803
	58028	HALIDE	LIVINGSTON MANOR		288	4270	100	803
	58029	HALIDE	LIVINGSTON MANOR		288	4270	100	803
	73149	HALIDE	LIVINGSTONE AVE		275	4270		0

	73150	HALIDE	LIVINGSTONE AVE		275	4270		0	
	73151	HALIDE	LIVINGSTONE AVE		275	4270		0	
	73152	HALIDE	LIVINGSTONE AVE		275	4270		0	
	58030	SODIUM VAPOR	LIVINGSTONE AVE	AT LAWREANCE AVE	199	4270	100	423	
Converted	58034	LED	LUZERN& RD	HOUSE 38	50	4270	54	-17	
	58035	LED	LUZERN& RD	HOUSE 60	50	4270		0	
	58037	LED	LUZERN& RD	HOUSE 30	50	4270		0	
	58038	LED	LUZERN& RD	HOUSE 42	50	4270		0	
	58039	LED	LUZERN& RD	HOUSE 66	50	4270		0	
Converted	58036	SODIUM VAPOR	LUZERN& RD	HOUSE 20	100	4270	54	196	
	58040	LED	LYMAN PL	HOUSE 19	50	4270		0	
	58041	LED	LYMAN PL	HOUSE 3	50	4270		0	
	58044	LED	MAGNOLIA DR	HOUSE 11	50	4270		0	
	58045	LED	MAGNOLIA DR	HOUSE 26	50	4270		0	
	58047	LED	MAGNOLIA DR		50	4270		0	
	58048	LED	MAGNOLIA DR	HOUSE 60	50	4270		0	
	58049	LED	MAGNOLIA DR	HOUSE 72	50	4270		0	
	58050	LED	MAGNOLIA DR	HOUSE 84	50	4270		0	
	73206	LED	MAGNOLIA DR	AT POTOR PLACE	50	4270		0	
	73207	LED	MAGNOLIA DR		50	4270		0	
	72943	LED	MAGNOLIA DR		50	4270		0	
	58051	SODIUM VAPOR	MAIN ST		199	4270	100	423	
Converted	58052	SODIUM VAPOR	MAIN ST		199	4270	106	397	
Converted	58053	SODIUM VAPOR	MAIN ST		199	4270	106	397	
Converted	58054	SODIUM VAPOR	MAIN ST		199	4270	106	397	
Converted	58055	SODIUM VAPOR	MAIN ST		199	4270	106	397	
Converted	58056	SODIUM VAPOR	MAIN ST		199	4270	73	538	
Converted	58057	SODIUM VAPOR	MAIN ST		199	4270	106	397	
Converted	58058	SODIUM VAPOR	MAIN ST		199	4270	106	397	
Converted	58059	SODIUM VAPOR	MAIN ST		199	4270	73	538	
Converted	58060	SODIUM VAPOR	MAIN ST		31	199	4270	73	538
Converted	58061	SODIUM VAPOR	MAIN ST		30	199	4270	73	538
Converted	58062	SODIUM VAPOR	MAIN ST		29	199	4270	73	538
Converted	58063	SODIUM VAPOR	MAIN ST		199	4270	106	397	
Converted	58064	SODIUM VAPOR	MAIN ST		199	4270	73	538	
Converted	58065	SODIUM VAPOR	MAIN ST		199	4270	73	538	
Converted	58066	SODIUM VAPOR	MAIN ST		199	4270	73	538	
Converted	58067	SODIUM VAPOR	MAIN ST		199	4270	73	538	
Converted	58068	SODIUM VAPOR	MAIN ST		199	4270	73	538	
Converted	58071	SODIUM VAPOR	MANOR HOUSE DR	MANOR HOUSE RD	100	4270	54	196	
Converted	58072	SODIUM VAPOR	MANOR HOUSE DR	MANOR HOUSE DR	100	4270	54	196	
Converted	58073	SODIUM VAPOR	MANOR HOUSE DR	MANOR HOUSE DR	100	4270	54	196	
	58069	LED	MANOR PL	HOUSE 10	50	4270		0	
	58070	LED	MANOR PL	HOUSE 23	50	4270		0	
Converted	58075	SODIUM VAPOR	MAPLE AVE	HOUSE 72 (25111)	105	4270	54	218	
Converted	58076	SODIUM VAPOR	MAPLE AVE	HOUSE 63	105	4270	54	218	
Converted	58078	SODIUM VAPOR	MAPLE AVE	HOUSE 20	105	4270	54	218	
Converted	58079	SODIUM VAPOR	MAPLE AVE	HOUSE 52	105	4270	54	218	
Converted	58080	SODIUM VAPOR	MAPLE AVE	HOUSE 12	105	4270	54	218	
Converted	58081	SODIUM VAPOR	MAPLE AVE	NS 2W WASHINGTON AV	105	4270	54	218	
Converted	58082	SODIUM VAPOR	MAPLE AVE	2NSWO WASHINGTON AVE AT DEVOE ST	105	4270	54	218	
Converted	58083	SODIUM VAPOR	MAPLE AVE	AT PARK RD	105	4270	54	218	
Converted	58077	SODIUM VAPOR	MAPLE AVE	AT STORM ST	143	4270	54	380	
	58084	LED	MAPLEWOOD AVE	HOUSE 18	50	4270		0	
	58085	LED	MAPLEWOOD AVE		50	4270		0	

Converted	58086	SODIUM VAPOR	MCCLELLAND AVE	2EO BROADWAY 18397	141	4270	54	371
Converted	58087	SODIUM VAPOR	MCCLELLAND AVE		141	4270	54	371
	58088	LED	MOHICAN PARK AV	SO GROVE ST	50	4270		0
	58090	LED	MOHICAN PARK AV	AT ORCHARD ST	50	4270		0
	58091	LED	MOHICAN PARK AV	NO HOWARD ST	50	4270		0
	58092	LED	MOHICAN PARK AV	NO ORCHARD ST	50	4270		0
	58093	LED	MOHICAN PARK AV	AT HOWARD ST	50	4270		0
	58097	LED	MOHICAN PARK AV	1NO ORCHARD ST	50	4270		0
	58098	LED	MOHICAN PARK AV		50	4270		0
	58095	LED	MOHICAN PARK AV	SO HOWARD ST	50	4270		0
Converted	58096	SODIUM VAPOR	MOHICAN PARK AV	WS NO GROVE ST	146	4270	54	393
	58094	SODIUM VAPOR	MOHICAN PARK AV	AT GROVE ST	146	4270	50	410
Converted	58089	SODIUM VAPOR	MOHICAN PARK AV	WS SO ASHFORD AV	146	4270	54	393
	58099	LED	MOULTON AVE	HOUSE 38 (5936)	50	4270		0
	58100	LED	MOULTON AVE	HOUSE 5 (DEAD END)	50	4270		0
	58101	LED	MOULTON AVE	HOUSE 27	50	4270		0
	58102	LED	MOULTON AVE	HOUSE 42	50	4270		0
	58103	LED	MYRTLE AVE	2 EAST OF WASHINGTON	50	4270		0
	58104	LED	MYRTLE AVE	HOUSE 22	50	4270		0
	58105	LED	MYRTLE AVE	HOUSE 40	50	4270		0
	58106	LED	MYRTLE AVE	HOUSE 50	50	4270		0
	58107	LED	MYRTLE AVE	1 EO WASHINGTON AV	50	4270		0
	58108	LED	MYRTLE AVE	HOUSE 36	50	4270		0
Converted	72991	SODIUM VAPOR	MYRTLE AVE		100	4270	54	196
	73140	LED	NO FIELD AVE	1N of Ashford Ave	50	4270		0
	73202	LED	NO FIELD AVE	AT SANDROCK AVE	50	4270		0
	58112	LED	NO FIELD AVE	HOUSE 61	50	4270		0
	58113	LED	NO FIELD AVE	HOUSE 45	50	4270		0
	58114	LED	NO FIELD AVE	HOUSE 13	50	4270		0
Converted	58115	LED	NO FIELD AVE	HOUSE 32	50	4270	54	-17
	58116	LED	NO FIELD AVE	HOUSE 100	50	4270		0
	58117	LED	NO FIELD AVE	HOUSE 108	50	4270		0
Converted	58118	LED	NO FIELD AVE	HOUSE 120	50	4270	73	-98
	58119	LED	NO FIELD AVE	HOUSE 134	50	4270		0
	58120	LED	NO FIELD AVE	house 144	50	4270		0
	58121	LED	NO FIELD AVE	HOUSE 169	50	4270		0
	58122	LED	NO FIELD AVE	HOUSE 176	50	4270		0
	58123	LED	NO FIELD AVE	HOUSE 192	50	4270		0
	58124	LED	NO FIELD AVE	HOUSE 188	50	4270		0
	58125	LED	NO FIELD AVE	HOUSE 136	50	4270		0
	58127	LED	NO FIELD AVE	AT CYRUS FIELD RD	50	4270		0
Converted	58109	SODIUM VAPOR	NORTH DRIVEWAY	5758	105	4270	54	218
Converted	58110	SODIUM VAPOR	NORTH DRIVEWAY		105	4270	54	218
Converted	58111	SODIUM VAPOR	NORTH DRIVEWAY		105	4270	54	218
Converted	58129	SODIUM VAPOR	OAK ST		146	4270	50	410
Converted	58130	SODIUM VAPOR	OAK ST		146	4270	54	393
Converted	58131	SODIUM VAPOR	OAK ST		146	4270	54	393
	58132	SODIUM VAPOR	OAK ST	38	146	4270	50	410
	58134	LED	OGDEN AVE	WS SO IRVING PL	50	4270		0
	58139	LED	OGDEN AVE	WS NO BEACON HILL DR	50	4270		0
	58137	LED	OGDEN AVE	WS SO IRVING PL	50	4270		0
	58135	LED	OGDEN AVE	WS SO IRVING PL	146	4270		0
	58140	SODIUM VAPOR	OGDEN AVE	AT CHESTNUT WAY	105	4270	50	235
Converted	58146	SODIUM VAPOR	OGDEN AVE	1N OF DANFORTH AVE	105	4270	54	218
Converted	58138	SODIUM VAPOR	OGDEN AVE	WS SO ASHFORD AV	146	4270	54	393

	58141	SODIUM VAPOR	OGDEN AVE	AT DANFORTH AV	146	4270	50	410
Converted	58136	SODIUM VAPOR	OGDEN AVE	WS SO ASHFORD AV	146	4270	54	393
Converted	58133	SODIUM VAPOR	OGDEN AVE	AT IRVING PL	146	4270	54	393
Converted	58145	SODIUM VAPOR	OGDEN AVE	HOUSE 130	150	4270	54	410
	58149	LED	OGDEN PLACE	HOUSE 48	50	4270		0
	58150	LED	OGDEN PLACE	HOUSE 76	50	4270		0
	58151	LED	OGDEN PLACE	AT IRVING PLACE	50	4270		0
	58152	LED	OGDEN PLACE	HOUSE 10	50	4270		0
	58148	LED	OGDEN PLACE	AT BRADLEY ST	74	4270		0
	58153	LED	OLIPHANT AVE	HOUSE 8	50	4270		0
	58156	LED	OLIPHANT AVE	HOUSE 67	50	4270		0
	58157	LED	OLIPHANT AVE	AT BROADWAY	50	4270		0
	58158	LED	OLIPHANT AVE		50	4270		0
	58159	LED	OLIPHANT AVE		50	4270		0
Converted	58154	SODIUM VAPOR	OLIPHANT AVE		105	4270	54	218
Converted	58155	SODIUM VAPOR	OLIPHANT AVE		105	4270	54	218
Converted	58160	SODIUM VAPOR	ORCHARD ST	AT GRANDVIEW AV	105	4270	54	218
Converted	58161	SODIUM VAPOR	OSCEOLA AVE	OSCEOLA AVE	70	4270	38	137
Converted	58162	SODIUM VAPOR	OSCEOLA AVE	OSCEOLA AVE	70	4270	38	137
Converted	58163	SODIUM VAPOR	OSCEOLA AVE	OSCEOLA AVE	70	4270	54	68
Converted	58164	SODIUM VAPOR	OSCEOLA AVE	OSCEOLA AVE	70	4270	38	137
Converted	58165	LED	OVERLOOK RD	HOUSE 11	50	4270	54	-17
	58166	LED	OVERLOOK RD	HOUSE 27	50	4270		0
	58167	LED	OVERLOOK RD	HOUSE 35	50	4270		0
	58168	LED	PALISADE AVE		50	4270		0
	58170	LED	PALISADE AVE		50	4270		0
	58171	LED	PALISADE AVE		50	4270		0
	58172	LED	PALISADE AVE		50	4270		0
	58173	LED	PALISADE AVE		50	4270		0
	58175	LED	PALISADE AVE		50	4270		0
	58176	LED	PALISADE AVE		50	4270		0
	58177	LED	PALISADE AVE		50	4270		0
	58174	LED	PALISADE AVE		105	4270		0
Converted	58169	SODIUM VAPOR	PALISADE AVE	PALISADE AVE	100	4270	54	196
Converted	58182	SODIUM VAPOR	PALISADE PL		146	4270	54	393
Converted	58183	SODIUM VAPOR	PALISADE ST		105	4270	54	218
	58187	SODIUM VAPOR	PALISADE ST		105	4270	50	235
Converted	58194	SODIUM VAPOR	PALISADE ST		105	4270	54	218
Converted	58192	SODIUM VAPOR	PALISADE ST	59	105	4270	54	218
Converted	58193	SODIUM VAPOR	PALISADE ST		146	4270	54	393
	58195	SODIUM VAPOR	PALISADE ST		146	4270	50	410
Converted	58188	SODIUM VAPOR	PALISADE ST		146	4270	54	393
Converted	58189	SODIUM VAPOR	PALISADE ST		146	4270	54	393
Converted	58190	SODIUM VAPOR	PALISADE ST		146	4270	54	393
Converted	58191	SODIUM VAPOR	PALISADE ST		146	4270	54	393
Converted	58184	SODIUM VAPOR	PALISADE ST		146	4270	54	393
Converted	58185	SODIUM VAPOR	PALISADE ST		146	4270	54	393
Converted	58186	SODIUM VAPOR	PALISADE ST		146	4270	54	393
Converted	58179	SODIUM VAPOR	PALISADE ST	49	146	4270	54	393
Converted	58180	SODIUM VAPOR	PALISADE ST	51	146	4270	54	393
Converted	58181	SODIUM VAPOR	PALISADE ST	47	146	4270	54	393
	72944	LED	PARKHILL TERR		50	4270		0
Converted	58196	SODIUM VAPOR	PARKHILL TERR		146	4270	54	393
Converted	58197	SODIUM VAPOR	PARKHILL TERR	OFF SUMMITT TERR	146	4270	54	393
	58198	LED	PARKWAY DR	HOUSE 12	50	4270		0

	58199	LED	PARKWAY DR	HOUSE 38	50	4270		0
	58200	LED	PEARL ST	AT ASHFORD AV	50	4270		0
	58201	LED	PEARL ST	HOUSE 11	50	4270		0
	73148	LED	PEARL ST	AT ALLEN ST	50	4270		0
Converted	58202	SODIUM VAPOR	PIETRO PL		100	4270	54	196
Converted	58203	SODIUM VAPOR	PIETRO PL		100	4270	54	196
	73208	LED	POTER PLACE	BETWEEN BELAIR DR & MAGNOLIA DR	50	4270		0
	58207	LED	PRICE ST		50	4270		0
	58209	LED	PRICE ST	HOUSE 59	50	4270		0
Converted	58205	SODIUM VAPOR	PRICE ST	PRICE STREET	100	4270	54	196
Converted	58206	SODIUM VAPOR	PRICE ST	HOUSE 72 - W20629	100	4270	54	196
Converted	58208	SODIUM VAPOR	PRICE ST	HOUSE 43	105	4270	54	218
Converted	58204	SODIUM VAPOR	PRICE ST	HOUSE 14	105	4270	54	218
	58212	LED	RAYSON LA		50	4270		0
Converted	58210	SODIUM VAPOR	RIDGE ROAD		146	4270	54	393
Converted	58211	SODIUM VAPOR	RIDGE ROAD		146	4270	54	393
Converted	58213	SODIUM VAPOR	RIVERSIDE PLACE	1 W OF PALISADE STREET	105	4270	54	218
Converted	58214	SODIUM VAPOR	RIVERSIDE PLACE	HOUSE 16	105	4270	54	218
Converted	58215	SODIUM VAPOR	RIVERSIDE PLACE	HOUSE 30	105	4270	54	218
Converted	73201	SODIUM VAPOR	RIVERSIDE PLACE	HOUSE 35	105	4270	54	218
	58216	LED	ROCHAMBEAU AVE	HOUSE 17	105	4270		0
Converted	58217	SODIUM VAPOR	ROCHAMBEAU AVE		141	4270	54	371
Converted	58218	SODIUM VAPOR	ROCHAMBEAU AVE		141	4270	38	440
Converted	58219	SODIUM VAPOR	ROCHAMBEAU AVE		141	4270	54	371
Converted	58220	SODIUM VAPOR	ROCHAMBEAU AVE		141	4270	54	371
Converted	58221	SODIUM VAPOR	RUSSELL PLACE	3 S OF NORTHFIELD AVE	105	4270	54	218
Converted	73205	SODIUM VAPOR	RUSSELL PLACE		105	4270	54	218
	73139	LED	SANDROCK AVE	HOUSE 28	50	4270		0
	58222	LED	SANDROCK AVE	HOUSE 40	50	4270		0
	58223	LED	SANDROCK AVE	HOUSE 56	50	4270		0
	58225	LED	SANDROCK AVE	HOUSE 64	50	4270		0
	58226	LED	SANDROCK AVE	HOUSE 6	50	4270		0
Converted	58227	SODIUM VAPOR	SARANAC ST		141	4270	54	371
Converted	58228	SODIUM VAPOR	SARANAC ST	AT 1 SOUTH OF 4	141	4270	54	371
Converted	58229	SODIUM VAPOR	SARANAC ST		141	4270	54	371
	58230	LED	SCENIC DRIVEWAY	AT KITCHING PL	50	4270		0
	58231	LED	SCENIC DRIVEWAY	AT MAPLEWOOD AV	50	4270		0
	58233	LED	SCOTT ST	HOUSE 7	50	4270		0
Converted	58234	SODIUM VAPOR	SECOR ROAD	WO BRIARY RD	146	4270	54	393
Converted	58235	SODIUM VAPOR	SECOR ROAD	NS 4W BRIARY RD	146	4270	54	393
	58237	LED	SENECA ST	IFO HOUSE 19	55	4270		0
	58238	LED	SENECA ST	AT MCCLELLAND 27646	105	4270		0
Converted	58239	SODIUM VAPOR	SENECA ST		141	4270	54	371
Converted	58240	SODIUM VAPOR	SENECA ST		141	4270	50	389
Converted	58241	SODIUM VAPOR	SENECA ST		141	4270	54	371
Converted	58236	SODIUM VAPOR	SENECA ST		141	4270	54	371
	58242	LED	SHADY LA	AT MEADOWAY	50	4270		0
	58243	LED	SHADY LA	IFO HOUSE 33	50	4270		0
	58244	LED	SHADY LA	IFO HOUSE 59	50	4270		0
	72909	LED	SHADY LA	IFO HOUSE 21	50	4270		0
	72910	LED	SHADY LA	1N OF ASHFORD AVE IFO HOUSE 4	50	4270		0
Converted	58247	LED	SHERMAN AVE	EO WASHINGTON AV	50	4270	54	-17
	58248	LED	SHERMAN AVE	3 EO WASHINGTON AV	50	4270		0
	58249	LED	SHERMAN AVE	AT OSCEOLA AV HOUSE 155	50	4270		0
	58250	LED	SHERMAN AVE	HOUSE 120	50	4270		0

	58251	SODIUM VAPOR	SHERMAN AVE	5	141	4270	100	175
Converted	58245	SODIUM VAPOR	SHERMAN AVE		141	4270	54	371
Converted	58246	SODIUM VAPOR	SHERMAN AVE		141	4270	54	371
	58257	HIGH PRESSURE SODIUM	SO FIELD AVE	AT ASHFRD	150	4270		0
	58253	LED	SO FIELD AVE	HOUSE 61	50	4270		0
	58254	LED	SO FIELD AVE	HOUSE 45	50	4270		0
	58255	LED	SO FIELD AVE	AT ALLEN ST	50	4270		0
	58256	LED	SO FIELD AVE	HOUSE 29	50	4270		0
	58252	LED	SOUTH LANE	AT 468 BWAY PARKING LOT ENT.	50	4270		0
	58258	LED	SOUTH LAWN AVE	HOUSE 98	50	4270		0
	58259	LED	SOUTH LAWN AVE	HOUSE 81	50	4270		0
	58260	LED	SOUTH LAWN AVE	HOUSE 65	50	4270		0
	58261	LED	SOUTH LAWN AVE	65 HILLSIDE RD	50	4270		0
	58263	LED	SOUTH LAWN AVE	HOUSE 12	50	4270		0
	58264	LED	SOUTH LAWN AVE	HOUSE 112	50	4270		0
	58265	LED	SOUTH LAWN AVE	HOUSE 55	50	4270		0
	72945	LED	SOUTH LAWN AVE	HOUSE 50	50	4270		0
Converted	58266	SODIUM VAPOR	SOUTH RUSSELL PL		141	4270	54	371
	73155	HALIDE	STANLEY AVE		275	295	45	982
	73156	HALIDE	STANLEY AVE		275	295	45	982
	71204	LED	STANLEY AVE		105			0
	58267	SODIUM VAPOR	STANLEY AVE	AT LAWRENCE ST 150	105	295	45	256
Converted	58268	SODIUM VAPOR	STANLEY AVE		146	4270	51	406
Converted	58274	SODIUM VAPOR	STATION PLAZA		105	4270	106	-4
Converted	58271	SODIUM VAPOR	STATION PLAZA	3ESNO HIGH ST	146	4270	54	393
Converted	58273	SODIUM VAPOR	STATION PLAZA		146	4270	106	171
Converted	58272	SODIUM VAPOR	STATION PLAZA		199	4270	54	619
Converted	58275	SODIUM VAPOR	STORM ST	AT DEVOE ST	146	4270	54	393
	58276	LED	SUMMIT TERR		50	4270		0
	58277	LED	SUMMIT TERR		50	4270		0
	72896	LED	SUMMIT TERR	AT PARK HILL TERR	50	4270		0
	58278	LED	TEMPLE RD	AT MANOR PL	50	4270		0
	58279	LED	TEMPLE RD	1 NO HIGHLAND AV	50	4270		0
	58280	LED	TEMPLE RD	AT LYMAN PL	50	4270		0
	58281	LED	TIERNANS LA	25 OF MAIN ST	50	4270		0
	58282	LED	TIERNANS LA	1EO MAIN ST	50	4270		0
Converted	58283	SODIUM VAPOR	TRANSVALL ST	SE SIDE AT BELLWOOD AVE	105	4270	54	218
	58285	LED	VIRGINIA AVE	HOUSE 57	50	4270		0
	58286	LED	VIRGINIA AVE	HOUSE 21	50	4270		0
	58287	LED	VIRGINIA AVE	HOUSE 15	50	4270		0
	58288	LED	VIRGINIA AVE	HOUSE 47	50	4270		0
Converted	58289	SODIUM VAPOR	VIRGINIA AVE		105	4270	38	286
Converted	58290	SODIUM VAPOR	VIRGINIA AVE		105	4270	54	218
Converted	58291	SODIUM VAPOR	VIRGINIA AVE		105	4270	38	286
Converted	58284	SODIUM VAPOR	VIRGINIA AVE		105	4270	54	218
	58299	LED	WALGROVE AVE	24008 - HOUSE 120	50	4270		0
	58293	LED	WALGROVE AVE	AT TRANSVL ST HOUSE 65	50	4270		0
Converted	58326	MERCURY VAPOR	WALGROVE AVE		200	4270	73	542
Converted	58304	SODIUM VAPOR	WALGROVE AVE		105	4270	73	137
Converted	58306	SODIUM VAPOR	WALGROVE AVE		105	4270	73	137
Converted	58307	SODIUM VAPOR	WALGROVE AVE		105	4270	73	137
Converted	58308	SODIUM VAPOR	WALGROVE AVE		105	4270	73	137
Converted	58300	SODIUM VAPOR	WALGROVE AVE	NO BELLWOOD AV	105	4270	54	218
	58301	SODIUM VAPOR	WALGROVE AVE		105	4270		0
Converted	58295	SODIUM VAPOR	WALGROVE AVE		105	4270	73	137

Converted	58296	SODIUM VAPOR	WALGROVE AVE	HOUSE 18	105	4270	54	218
	58297	SODIUM VAPOR	WALGROVE AVE		105	4270		0
	58298	SODIUM VAPOR	WALGROVE AVE		105	4270		0
Converted	73195	SODIUM VAPOR	WALGROVE AVE	HOUSE 59	105	4270	73	137
Converted	73196	SODIUM VAPOR	WALGROVE AVE	1 SO TRANSVALL ST	105	4270	54	218
Converted	73197	SODIUM VAPOR	WALGROVE AVE		105	4270	73	137
Converted	73198	SODIUM VAPOR	WALGROVE AVE	HOUSE 127	105	4270	54	218
Converted	73199	SODIUM VAPOR	WALGROVE AVE	HOUSE 144	105	4270	54	218
Converted	73200	SODIUM VAPOR	WALGROVE AVE		105	4270	73	137
Converted	73194	SODIUM VAPOR	WALGROVE AVE	HOUSE 25	150	4270	73	329
Converted	58302	SODIUM VAPOR	WALGROVE AVE		150	4270	73	329
Converted	58303	SODIUM VAPOR	WALGROVE AVE		150	4270	73	329
	58305	SODIUM VAPOR	WALGROVE AVE	SPRINGHURST SCH. DW NORTH	150	4270		0
Converted	58294	SODIUM VAPOR	WALGROVE AVE	ON ISLAND NORTH	150	4270	73	329
Converted	58309	SODIUM VAPOR	WALGROVE AVE	AT CV & SPRINGHURST SCH. DW	250	4270	73	756
Converted	58310	SODIUM VAPOR	WALGROVE AVE	LAST LIGHT AT CV & SH SCH. DRIVEWAYS	250	4270	73	756
Converted	58292	SODIUM VAPOR	WALGROVE AVE	NO TRANSVALL ST ON ISLAND NE	400	4270	106	1,255
Converted	58327	SODIUM VAPOR	WALNUT ST		146	4270	54	393
Converted	58328	SODIUM VAPOR	WALNUT ST		146	4270	54	393
Converted	58329	SODIUM VAPOR	WALNUT ST		146	4270	54	393
	58331	LED	WASHINGTON AVE	AT BRADLEY ST	50	4270		0
	58332	LED	WASHINGTON AVE	HOUSE 164	50	4270		0
	58333	LED	WASHINGTON AVE	WS 4N SHERMAN AV	50	4270		0
	58339	LED	WASHINGTON AVE	WS 2N BELDEN AV	50	4270		0
	58340	LED	WASHINGTON AVE	OP HOUSE 130	50	4270		0
	58341	LED	WASHINGTON AVE	HOUSE 199	50	4270		0
Converted	58343	SODIUM VAPOR	WASHINGTON AVE	AT EAST SHERMEN AVE	105	4270	50	235
Converted	58344	SODIUM VAPOR	WASHINGTON AVE	HOUSE 26	105	4270	73	137
Converted	58334	SODIUM VAPOR	WASHINGTON AVE	SW SHERMAN AV	105	4270	54	218
Converted	58335	SODIUM VAPOR	WASHINGTON AVE	AT BELDN ST	105	4270	54	218
Converted	58336	SODIUM VAPOR	WASHINGTON AVE	HOUSE 26	105	4270	54	218
Converted	58337	SODIUM VAPOR	WASHINGTON AVE	ES 1N MAPLE AV	105	4270	54	218
Converted	58330	SODIUM VAPOR	WASHINGTON AVE	HOUSE 22 (SO. WASH. AVE)	150	4270	73	329
Converted	58342	SODIUM VAPOR	WASHINGTON AVE	HOUSE 14	150	4270	73	329
Converted	58348	SODIUM VAPOR	WASHINGTON AVE	AT VIRGINIA AVE	150	4270	54	410
Converted	58345	SODIUM VAPOR	WOODBINE TERR	HOUSE 11 - CUL DE SAC	105	4270	54	218
Converted	58346	SODIUM VAPOR	YOUNG ST	1SE ASHFORD	100	4270	54	196
	72634	LED	LEFURGY AVE	HOUSE 31	50	4270		0

ECM DESCRIPTION

Upgrades existing street lighting with state of the art, high efficiency LED lighting.

DATA / ASSUMPTIONS

Annual street lighting burn hours (per Con Edison) 4,270

COMMISSIONING

Confirm street lighting operation

RECOVERY/SAFETY FACTOR

Electric Safety Factor (%) = 0%

FORMULAE

$$SL_{SAVINGS} = (W_{EXISTING} - W_{PROPOSED}) \cdot T / 1,000$$

Variable	Units	Description
SL _{SAVINGS}	kWh	Street lighting consumption savings
T	Hours	Annual street lighting burn hours (per Con Edison)
W _{PROPOSED}	W	Total proposed street lighting power draw
W _{EXISTING}	W	Total existing street lighting power draw

CALCULATIONS

Existing Street Lighting			Proposed Street Lighting		
Lighting Description	Rated Wattage	Qty	Lighting Description	Rated Wattage	Qty
All existing street lights not LED		1	Replacement LED		1

Con Edison Burn Hours Table	
January	443
February	372
March	371
April	319
May	294
June	266
July	283
August	314
September	342
October	396
November	418
December	452

Existing Street Light Consumption (kWh)	
Proposed Street Light Consumption (kWh)	
Electric Safety Factor (%)	0%
Street lighting Savings (kWh)	147,464

Include inventory corrections

SAVINGS SUMMARY

Building ID	kWh Savings	kW Savings	Thermal Savings	Safety Factor
	kWh	kW	Therms	%
Street Lighting	147,464	-	-	0.0%
Subtotal	147,464	-	-	

EXISTING												
Building	Equipment Label	Qty	Location	Boiler(s) Replaced (Y/N)	Add Burner Controls / Replace (Y/N)	Existing Fuel	Manufacturer	Model No.	Total Input Capacity (MMBtu)	Heating Medium	Combustion Efficiency	Percentage of Building Served
Public Library	PC-B-1	1	Boiler Room	N	Y	Natural Gas	Hib Smith	28A - 7	2,163	Hot Water	85%	100%
Village Hall	VH-B-1	1	Boiler Room	N	N	Natural Gas	HYDROTHERM	MA-1200B	1,200	Hot Water	79%	100%
Ambulance Corps. Building	AC-B-1	1	Basement	N	N	Natural Gas	Well - McLean		300	Hot Water	79%	100%
Ogden Engine Company	OE-B-1	1	Basement	N	N	Natural Gas	Buderus	G234X - 55	228	Hot Water	82%	100%
Pool House and Offices at Gould Park (Seasonal)	PH-B-1	1	Boiler Room	N	N	Natural Gas	Well - McLean		250	Hot Water	79%	100%
Embassy Club	EC-B-1.2	2	Mechanical Room	N	N	Natural Gas	Lochmvar	WHB285N	285	Hot Water	95%	100%
Memorial Park Building	Furnace	1	First Floor	N	N	Natural Gas	Trane			Direct Fire	80%	100%
DPW Office	UH	6	Bay/Offices	N	N	Natural Gas	Reznor			Direct Fired	85%	100%
Totals		14							4,426			

PROPOSED										
Building	Equipment Label	Boiler(s) Replaced Y/N	Qty	Proposed Fuel	Manufacturer	Model No.	Total Input Capacity (MBH)	Heating Medium	Combustion Efficiency	Percentage of Building Served
Village Hall	VH-B-1	Y	1	Natural Gas	Buderus	GB162-100	333	Hot Water	92.1%	77.3%
Village Hall	VH-B-2	Y	3	Natural Gas	Buderus	GB162-80	370	Hot Water	92.1%	77.3%
Ambulance Corps, Building	AC-B-1	N	1	Natural Gas	Well - McLain	-	300	Hot Water	91.0%	100.0%
Ogden Engine Company	OE-B-1	N	1	Natural Gas	Buderus	G234X - 55	228	Hot Water	79.0%	100.0%
Pool House and Offices at Gould Park (Seasonal)	PH-B-1	N	1	Natural Gas	Well - McLain	-	250	Hot Water	91.0%	100.0%
Embassy Club	EC-B-1,2	N	2	Natural Gas	Lochinvar	WHB285N	285	Hot Water	80.0%	100.0%
Memorial Park Building	Furnace	N	1	Natural Gas	Trane	-	-	Hot Water	80.0%	100.0%
DPW Office	LH	N	6	Natural Gas	Reznor	-	-	Direct Fired	85.1%	100.0%
Totals			16				2,266			

EXISTING OVERALL BOILER EFFICIENCY

[illegible]

Village of Dobbs Ferry
Exhibit D-5 Chart
Boiler Efficiency Spreadsheet

Makeup Water Temperature [°F]	60	60	60	60	60	60	60	60	60	60
Hours of Operation (hrs/yr)	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136
Blowdown Temperature [°F]	220	220	220	220	220	220	220	220	220	220
Heat Required to Raise a lb of Steam (BTU/lb)	980	980	980	980	980	980	980	980	980	980
Boiler Load Rate (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Present Blowdown Rate (lb/lb Steam)	-	-	-	-	-	-	-	-	-	-
Heat Content of Blowdown (BTU/lb)	-	-	-	-	-	-	-	-	-	-
Blowdown Loss (%)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Radiation Losses (%)	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	#DIV/0!	#DIV/0!
Overall Boiler Efficiency (%)	84.0%	78.0%	78.0%	81.1%	78.0%	94.0%	79.0%	84.0%	0.0%	0.0%

PROPOSED OVERALL BOILER EFFICIENCY

	Public Library	Village Hall	Village Hall	Ambulance Corps. Building	Ogden Engine Company	Pool House and Offices at Gould Park (Seasonal)	Embassy Club	Memorial Park Building	DPW Office
Boiler Addition	N	Y	Y	N	N	N	N	N	0.0%
Burner Control Links	Y	N	N	N	N	N	N	N	0.0%
Location	Boiler Room	Boiler Room	Boiler Room	Basement	Boiler Room	Mechanical Room	First Floor	Bay/Offices	0.0%
Label	PL-B-1	VH-B-1	VH-B-2	AC-B-1	OE-B-1	PH-B-1	EC-B-1,2	Furnace	UH
Quantity to be Replaced	1	1	3	1	1	1	2	1	6
Percent of Building Load (%)	-	28%	72%	-	-	-	-	-	100%
Proposed Fuel	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
Capacity (MMBTU/hr)	2,163	333	870	300	228	250	285	-	-
Heating Medium	Hot Water	Hot Water	Hot Water	Hot Water	Hot Water	Hot Water	Hot Water	Hot Water	Direct Fired
Combustion Efficiency (%)	-	92.1%	92.1%	-	-	-	-	-	85.0%
Losses Due to Radiation (% of MCR)	0.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Losses Due to Blowdown (% of MCR)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.0%
% Makeup Water (%)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Makeup T.D.S. (PPM)	80	80	80	80	80	80	80	80	80
Blowdown T.D.S. (PPM)	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
Annual Boiler Usage (MMBTU)	-	285	744	-	-	-	-	-	-
Feedwater Temperature [°F]	180	180	180	180	180	180	180	180	180
MCR of Boilers (MMBTU/hr)	2.2	0.3	0.9	0.3	0.2	0.3	0.3	-	-
Condensate Return Temperature [°F]	200	200	200	200	200	200	200	200	200
Makeup Water Temperature [°F]	60	60	60	60	60	60	60	60	60
Hours of Operation (hrs/yr)	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136
Blowdown Temperature [°F]	220	220	220	220	220	220	220	220	220
Heat Required to Raise a lb of Steam (BTU/lb)	980	980	980	980	980	980	980	980	980
Boiler Load Rate (%)	-	50.0%	50.0%	-	-	-	-	-	-
Present Blowdown Rate (lb/lb Steam)	-	-	-	-	-	-	-	-	-
Heat Content of Blowdown (BTU/lb)	-	-	-	-	-	-	-	-	-
Blowdown Loss (%)	-	0.0%	0.0%	-	-	-	-	-	-
Radiation Losses (%)	0.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
*Overall Boiler Efficiency (%)	84.0%	91.1%	91.1%	78.0%	81.5%	78.0%	94.0%	79.0%	84.0%

ECM DESCRIPTION

Install new high efficiency boilers to optimize plant efficiency and reduce equipment maintenance costs.

DATA / ASSUMPTIONS

Heating Season Hours 4,136 Hours

- * Initial utility baseline reduced to account for miscellaneous loads (domestic hot water, science labs, and kitchen usage where applicable)
- * An adjusted baseline is used for the boiler baseline usage as to not double dip on savings.

COMMISSIONING

Verify all aspects of boiler operation including controls and safety measures. Verify air/fuel ratio is consistent throughout firing range. Provide training of the boiler operators.

RECOVERY/SAFETY FACTOR

Thermal Safety Factor [%] = 5%

A safety factor of 5% is used to account for parameter variability.

FORMULAE

$Q_{savings} = ((\eta_{NW} - \eta_{OL}) / \eta_{OL}) \cdot Fuel_{OL}$

Variable	Units	Description
$Q_{savings}$	Therms	Thermal Savings
η_{NW}	%	Efficiency of New Boiler
η_{OL}	%	Efficiency of Old Boiler
$Fuel_{OL}$	Therms	Adjusted Boiler Fuel Usage

*Inputs are blue

Building	Label	Boilers to be Added
Village Hall	VH-B-1	1
Village Hall	VH-B-2	3
Totals		4

CALCULATIONS

	Village Hall	Village Hall
Label	VH-B-1	VH-B-2
No. of Units to be Replaced	1	3
Fuel Switch	N	N
Existing Fuel	Natural Gas	Natural Gas
Proposed Fuel	Natural Gas	Natural Gas
Existing Boiler Efficiency (%)	78.0%	78.0%
Proposed Boiler Efficiency (%)	91.1%	91.1%
Annual Boiler Fuel Use (Therms)	2,847	7,437
Adjusted Boiler Usage (Therms)	2,260	5,904
Percentage of Building Load (%)	28%	72%
Safety Factor (%)	10%	10%
Thermal Savings (Therms)	325	849

Notes:
Replacing the existing boilers with new, high efficiency units will reduce operating costs at this location.
Note that the boiler efficiency discussed here is the overall boiler thermal efficiency, not just its combustion efficiency. The value of this number will be much lower than for combustion efficiency alone as it includes losses from radiation, blowdown, and other related losses. The value for annual boiler fuel has been adjusted for the effect of other ECMs.

SAVINGS SUMMARY

Building ID	kWh Savings	kW Savings	Thermal Savings	Safety Factor
	kWh	kW	Therms	%
Village Hall	-	-	1,174	20.0%
Subtotal	-	-	1,174	

ECM DESCRIPTION

Replace existing AHUs to improve operating efficiency

DATA / ASSUMPTIONS

Efficiency Gain with Refurbishment [%]	3.5%
Efficiency Gain with Replacement [%]	7.0%
Supply Air Temperature [°F]	85.0
Return Air Temperature [°F]	70.0

*Supply CFM and OA CFM is obtained by drawings and equipment manuals
*Peak load is assumed to occur at 7.5 degrees F bin average temperature

COMMISSIONING

Verify all items in refurbishment task list have been completed and unit is operating as designed

RECOVERY/SAFETY FACTOR

Thermal Safety Factor [%] =	0%
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FORMULAE

$$Q_{SAVINGS} = \sum_{i=1}^{60} [(Q_{AHPUT} - Q_{REFURB/REPLACE}) / 100,000]$$
$$Q_{AHPUT} = \sum_{i=1}^{60} [(I_{DCC} \cdot Q_{LOAD} \cdot \eta_a) / \eta_{BOILER}]$$
$$Q_{LOAD} = \sum_{i=1}^{60} [1.08 \cdot CFM_{SUPPLY} \cdot T_{REH}]$$
$$T_{REH} = \sum_{i=1}^{60} [T_{SUPPLY} \cdot T_{RETURN}]$$
$$T_{RETURN} = \sum_{i=1}^{60} [(CFM_{RETURN} \cdot T_{RETURN} + (CFM_{OA} \cdot T_{OA})) / (CFM_{SUPPLY})]$$

Village of Dobbs Ferry
Exhibit D-5-4
ECM 4 - Air Handling Unit Replacement

Variable	Units	Description
$Q_{LAVINGS}$	Therms	Thermal Savings
$\sum_{i=1}^N T_{BIN,i}$	-	Summation of all bins from -15°F to 60°F
η_{BOILER}	%	Efficiency of boiler
T_{BIN}	°F	Temperature of respective bin
Q_{INPUT}	BTU	Input heat provided by unit at respective bin temperature
Q_{LOAD}	BTU/hr	Heat load on the unit
$L_{\%}$	%	Load % at respective bin
T_{RSE}	°F	Temperature rise across the coil (100% Design at 7.5°F)
T_{MIXED}	°F	Mixed air temperature
T_{SUPPLY}	°F	Temperature of supply air
T_{RETURN}	°F	Temperature of return air
CFM_{SUPPLY}	CFM	Total supply air CFM
CFM_{OA}	CFM	Total outside air CFM
CFM_{RETURN}	CFM	Total return air CFM
$\eta_{REFURB/REPL}$	%	Efficiency improvement from refurbishment OR replacement
DOE	Hrs	Occupied bin hours in respective temperature bin

*inputs are blue

Building	Location Served	Qty (Refurbished)	Qty (Replaced)	Total Supply [CFM]	Total OA [CFM]	Proposed Boiler Efficiency [%]
Village Hall	Fire Station Lounge Room	-	1	2,000	600	91.1%
Village Hall	Lockers Room	-	1	2,000	600	91.1%
Village Hall	Fire Station Meeting Room	-	1	2,000	900	91.1%
Village Hall	1st Floor Police Station	-	1	4,000	1,200	91.1%
Totals		-	4	11,000	3,300	

	Village Hall	Village Hall	Village Hall	Village Hall
No. of Units to be Refurbished	-	-	-	-
No. of Units to be Replaced	1	1	1	1
Total Supply Air (CFM)	2,000	2,000	3,000	4,000
Total Outdoor Air (CFM)	600	600	900	1,200
Total Return Air (CFM)	1,400	1,400	2,100	2,800
Efficiency Gain w/ Refurbished and Replaced Units (%)	7.0%	7.0%	7.0%	7.0%
Return Air Temperature (°F)	70.0	70.0	70.0	70.0
Supply Air Temperature (°F)	85.0	85.0	85.0	85.0
Proposed Boiler Efficiency (%)	91.1%	91.1%	91.1%	91.1%
Annual Energy Savings (Therms)	131	131	196	261
Thermal Safety Factor (%)	5%	5%	5%	5%
Annual Energy Savings (Therms)	124	124	186	248

CALCULATIONS

VILLAGE HALL

Fire Station Lounge Room

Amb. Temp Bin (°F)	Avg Temp (°F)	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occup Bin Hours	Mixed Air Temp (°F)	Temp Rise Across Coil (°F)	Heat Load on the Unit (BTU/h)	Load % at Bin OA Temp (%)	Heat Provided by Units (BTU)	Input Heat to Units (BTU)	Savings By Refurb/Replace (Therms)
HEATING											BTU	BTU	Therms
55 to 60	57.5	50	141	68	259	259	66.3	18.8	40,500	54%	5,827,500	6,396,817	4.5
50 to 55	52.5	94	203	147	444	444	64.8	20.3	43,740	60%	11,552,336	12,790,709	9.0
45 to 50	47.5	95	125	151	371	371	63.3	21.8	46,980	64%	11,232,396	12,329,743	8.6
40 to 45	42.5	201	140	218	559	559	61.8	23.3	50,220	69%	19,339,164	21,228,501	14.9
35 to 40	37.5	240	192	188	620	620	60.3	24.8	53,460	73%	24,306,480	26,681,098	18.7
30 to 35	32.5	205	211	193	609	609	58.8	26.3	56,700	78%	26,856,900	29,490,681	20.6
25 to 30	27.5	124	135	128	437	437	57.3	27.8	59,940	82%	21,537,108	23,641,172	16.5
20 to 25	22.5	235	92	147	474	474	55.8	29.3	63,180	87%	25,954,844	28,489,950	19.9
15 to 20	17.5	99	61	53	213	213	54.3	30.8	66,420	91%	12,889,908	14,149,186	9.9
10 to 15	12.5	45	17	28	90	90	52.8	32.3	69,660	96%	5,990,760	6,576,026	4.6
5 to 10	7.5	29	5	15	49	49	51.3	33.8	72,900	100%	3,572,100	3,931,076	2.7
0 to 5	2.5	9	1	1	11	11	49.8	35.3	76,140	100%	837,540	919,363	0.6
-5 to 0	-2.5	-	-	-	-	-	48.3	36.8	79,380	100%	-	-	-
-10 to -5	-7.5	-	-	-	-	-	46.8	38.3	82,620	100%	-	-	-
-15 to -10	-12.5	-	-	-	-	-	45.3	39.8	85,860	100%	-	-	-
Total		1,426	1,323	1,187	4,136	4,136							130.6

VILLAGE HALL

Leaders Room

Amb. Temp Bin [°F]	Avg Temp [°F]	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occup Bin Hours	Mixed Air Temp [°F]	Temp Rise Across Coil [°F]	Heat Load on the Unit [BTU/h]	Load % at Bin OA Temp [°F]	Heat Provided by Units [BTU/h]	Input Heat to Units [BTU/h]	Savings by Re-Use/Replace [Therms]
HEATING											BTU	BTU	Therms
55 to 60	57.5	50	141	68	259	259	66.3	18.8	40,500	56%	5,827,500	6,396,617	4.5
50 to 55	52.5	94	203	147	444	444	64.8	20.3	43,740	60%	11,652,136	12,790,709	9.0
45 to 50	47.5	95	125	151	371	371	63.3	21.8	44,980	64%	11,232,196	12,329,743	8.4
40 to 45	42.5	201	140	218	559	559	61.8	23.3	50,220	69%	19,319,164	21,228,501	14.9
35 to 40	37.5	240	192	188	620	620	60.3	24.8	53,460	73%	24,336,402	26,681,258	18.7
30 to 35	32.5	205	211	193	609	609	58.8	26.3	56,700	78%	26,854,900	29,482,681	20.6
25 to 30	27.5	124	135	128	437	437	57.3	27.8	59,940	82%	21,517,108	23,641,172	16.5
20 to 25	22.5	235	92	147	474	474	55.8	29.3	63,180	87%	25,954,344	28,489,950	19.9
15 to 20	17.5	99	61	53	213	213	54.3	30.8	66,420	91%	12,888,908	14,149,186	9.9
10 to 15	12.5	45	17	28	90	90	52.8	32.3	69,660	96%	5,990,760	6,576,026	4.6
5 to 10	7.5	29	5	15	49	49	51.3	33.8	72,900	100%	3,572,100	3,921,076	2.7
0 to 5	2.5	9	1	1	11	11	49.8	35.3	76,140	100%	837,540	919,363	0.6
-5 to 0	-2.5						48.3	36.8	79,380	100%			
-10 to -5	-7.5						46.8	38.3	82,620	100%			
-15 to -10	-12.5						45.3	39.8	85,860	100%			
Total		1,426	1,323	1,387	4,136	4,136							130.6

VILLAGE HALL

Fire Station Meeting Room

Amb. Temp Bin [°F]	Avg Temp [°F]	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occup Bin Hours	Mixed Air Temp [°F]	Temp Rise Across Coil [°F]	Heat Load on the Unit [BTU/h]	Load % at Bin OA Temp [°F]	Heat Provided by Units [BTU/h]	Input Heat to Units [BTU/h]	Savings by Re-Use/Replace [Therms]
HEATING											BTU	BTU	Therms
55 to 60	57.5	50	141	68	259	259	66.3	18.8	60,750	56%	8,741,310	9,595,225	6.7
50 to 55	52.5	94	203	147	444	444	64.8	20.3	65,610	60%	17,478,504	19,186,064	13.4
45 to 50	47.5	95	125	151	371	371	63.3	21.8	70,470	64%	16,848,594	18,494,615	12.9
40 to 45	42.5	201	140	218	559	559	61.8	23.3	75,330	69%	29,008,746	31,842,751	22.3
35 to 40	37.5	240	192	188	620	620	60.3	24.8	80,190	73%	36,459,710	40,021,647	28.0
30 to 35	32.5	205	211	193	609	609	58.8	26.3	85,050	78%	40,245,150	44,221,021	31.0
25 to 30	27.5	124	135	128	437	437	57.3	27.8	89,910	82%	32,305,663	35,461,759	24.8
20 to 25	22.5	235	92	147	474	474	55.8	29.3	94,770	87%	38,911,516	42,734,524	29.9
15 to 20	17.5	99	61	53	213	213	54.3	30.8	99,630	91%	19,334,682	21,223,778	14.9
10 to 15	12.5	45	17	28	90	90	52.8	32.3	104,490	96%	8,966,140	9,864,040	6.9
5 to 10	7.5	29	5	15	49	49	51.3	33.8	109,350	100%	5,358,150	5,881,614	4.1
0 to 5	2.5	9	1	1	11	11	49.8	35.3	114,210	100%	1,256,110	1,379,045	1.0
-5 to 0	-2.5						48.3	36.8	119,070	100%			
-10 to -5	-7.5						46.8	38.3	123,930	100%			
-15 to -10	-12.5						45.3	39.8	128,790	100%			
Total		1,426	1,323	1,387	4,136	4,136							185.9

VILLAGE HALL1st Floor Police Station

Amb. Temp Bin [°F]	Avg Temp [°F]	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occup Bin Hours	Mixed Air Temp [°F]	Temp Rise Across Coil [°F]	Heat Load on the Unit [BTU/h]	Load % at Bin OA Temp [°F]	Heat Provided by Units [BTU]	Input Heat to Units [BTU]	Savings by Refurb/Replace [Therms]
HEATING											BTU	BTU	Therms
55 to 60	57.5	50	141	68	259	259	66.3	18.8	81,000	56%	11,655,000	12,793,633	9.0
50 to 55	52.5	94	203	147	444	444	64.8	20.3	87,480	60%	23,304,672	25,581,418	17.9
45 to 50	47.5	95	125	151	371	371	63.3	21.8	93,960	64%	22,464,792	24,659,486	17.3
40 to 45	42.5	201	140	218	559	559	61.8	23.3	100,440	69%	38,678,328	42,457,001	29.7
35 to 40	37.5	240	192	188	620	620	60.3	24.8	106,920	73%	48,612,960	53,362,135	37.4
30 to 35	32.5	295	211	191	699	609	58.8	26.3	113,400	78%	53,713,800	58,961,361	41.3
25 to 30	27.5	124	135	178	437	437	57.3	27.8	119,880	82%	43,074,216	47,282,345	33.1
20 to 25	22.5	235	92	147	474	474	55.8	29.3	126,360	87%	51,908,688	56,979,899	39.9
15 to 20	17.5	99	61	53	213	213	54.3	30.8	132,840	91%	25,779,816	28,298,371	19.8
10 to 15	12.5	45	17	28	90	90	52.8	32.3	139,320	96%	11,981,520	13,152,053	9.2
5 to 10	7.5	29	5	15	49	49	51.3	33.8	145,800	100%	7,144,200	7,842,151	5.5
0 to 5	2.5	9	1	1	11	11	49.8	35.3	152,280	100%	1,675,080	1,838,727	1.3
-5 to 0	-2.5	-	-	-	-	-	48.3	36.8	158,760	100%	-	-	-
-10 to -5	-7.5	-	-	-	-	-	46.8	38.3	165,240	100%	-	-	-
-15 to -10	-12.5	-	-	-	-	-	45.3	39.8	171,720	100%	-	-	-
Total		1,426	1,323	1,387	4,136	4,136							261.2

SAVINGS SUMMARY

Building ID	kWh Savings	kW Savings	Thermal Savings	Thermal Safety Factor
	kWh	kW	Therms	%
Village Hall	-	-	683	0.0%
Subtotal	-	-	683	-

ECM DESCRIPTION

Replace existing Rooftop Units with high efficiency units

DATA / ASSUMPTIONS

RTU Supply Air Temperature is assumed at, unless stated otherwise 85 °F
Full Load is estimated at 7.5°F for heating and 92.5°F for cooling unless stated otherwise

MEASUREMENT AND VERIFICATION

Option A (Electric) - Direct kW and savings measurements before and after installation conducted. A report is generated showing the reduction in kW
Option C (Fuel) - Savings Calculations are based on regression analysis of utility billing meter data

COMMISSIONING

Verify all functions of the rooftop system, safety and operation

RECOVERY/SAFETY FACTOR

Safety Factor (Thermal) = 5%

A safety factor of 0.05 is used due to minimal variables and the proven results of this measure

FORMULAE

$W_{savings} = W_i - W_o$

$W_o = \{W_{heating} + W_{cooling}\}$

$W_i = \{W_{heating} + W_{cooling}\}$

$W_{heating} = \sum_{i=1}^{12} \dot{V}_{air} C_p (T_{supply} - T_{return}) / (T_{supply} - T_{design}) \cdot \eta_{fan}$

$W_{cooling} = \sum_{i=1}^{12} \dot{V}_{air} C_p (T_{supply} - T_{return}) / (T_{supply} - T_{design}) \cdot \eta_{fan}$

$W_{heating} = \sum_{i=1}^{12} \dot{V}_{air} C_p (T_{supply} - T_{return}) / (T_{supply} - T_{design}) \cdot \eta_{fan}$

$W_{cooling} = \sum_{i=1}^{12} \dot{V}_{air} C_p (T_{supply} - T_{return}) / (T_{supply} - T_{design}) \cdot \eta_{fan}$

$Q_{heating} = \sum_{i=1}^{12} \dot{V}_{air} \rho \cdot Q_{heating} - Q_{cooling}$

$Q_{heating} = \sum_{i=1}^{12} \dot{V}_{air} \rho \cdot Q_{heating} - Q_{cooling} / \eta_{fan}$

$Q_{cooling} = \sum_{i=1}^{12} \dot{V}_{air} \rho \cdot Q_{cooling} - Q_{heating} / \eta_{fan}$

$Q_{cooling} = \sum_{i=1}^{12} \dot{V}_{air} \rho \cdot CFM_{supply} \cdot (T_{supply} - T_{return})$

$T_{supply} = \sum_{i=1}^{12} \dot{V}_{air} \cdot T_{supply} - T_{return}$

$T_{return} = \sum_{i=1}^{12} \dot{V}_{air} \cdot ((CFM_{heating} \cdot T_{heating}) + (CFM_{cooling} \cdot T_{cooling})) / (CFM_{heating} + CFM_{cooling})$

Variable	Units	Description
$W_{savings}$	kWh	Electrical Savings
W_o	kWh	Existing RTU Consumption
W_i	kWh	Proposed RTU Consumption
η_{fan}	%	Efficiency gain due to RTU optimization
$\sum_{i=1}^{12} \dot{V}_{air}$	-	Summation of all bins from 60°F to 105°F
C_p	Ton	Tonnage of RTU
η	-	Existing efficiency of RTU (EER)
η_i	-	Proposed efficiency of RTU (EER)
T_{design}	°F	Design Temperature of RTU (Usually 92.5°F)

T _{bin}	°F	Bin Weather Temperature
T _{occ}	°F	Temperature of building during occupied hours
T _{unocc}	°F	Temperature of building during unoccupied hours
T _{occ}	Hrs	Existing occupied Bin Hours in respective temperature bin
T _{unocc}	Hrs	Existing unoccupied Bin Hours in respective temperature bin
Q _{thermal}	Therms	Thermal Savings
Σ	-	Summation of all bins from -1°F to 60°F
T _{bin}	°F	Temperature of respective bin
Q _{bin,T}	Therms	Existing input heat provided by RTUs at respective bin temperature
Q _{bin,T}	Therms	Proposed input heat provided by RTUs at respective bin temperature
Q _{bin,T}	Therms	Heat load on the unit vent
T _{in}	°F	Load % at respective bin
T _{out}	°F	Temperature near across the cap (100% Design at 10°F)
T _{amb}	°F	Mixed air temperature
T _{supply}	Hrs	Temperature of supply air
T _{return}	Hrs	Temperature of return air
CFM _{supply}	CFM	Total supply CFM of unit vent
CFM _{in}	CFM	Total outside air CFM of unit vent
CFM _{return}	CFM	Total return air CFM of unit vent
R	-	Quantity of replaced/rehabilitated RTUs
*R _{eff,unit}	%	Efficiency improvement of rehabilitated unit vent
*R _{eff,unit}	%	Efficiency improvement of replaced unit vent
T _{occ}	Hrs	Occupied Bin Hours in respective temperature bin

* Inputs are in blue

* Checks against baseline are in purple

Building	Label	Thermal Fuel	Area Serving
Village Hall	VH-RTU-1	Natural Gas	Second Floor
Village Hall	VH-RTU-2	Natural Gas	Second Floor
Village Hall	VH-RTU-3	Natural Gas	Second Floor
Village Hall	VH-RTU-4	Natural Gas	Second Floor
Village Hall	VH-RTU-5	Natural Gas	Second Floor
Village Hall	VH-RTU-6	Natural Gas	Second Floor
Totals			

CALCULATIONS

	Village Hall	Village Hall	Village Hall	Village Hall	Village Hall	Village Hall
	VH-RTU-1	VH-RTU-2	VH-RTU-3	VH-RTU-4	VH-RTU-5	VH-RTU-6
Label	N	N	N	N	N	N
Fuel Switch	N	N	N	N	N	N
Existing Thermal Fuel	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
Proposed Thermal Fuel	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
Area Serving	Second Floor	Second Floor	Second Floor	Second Floor	Second Floor	Second Floor
Quantity	3	1	1	3	1	1
RTU Tonnage	5.0	5.0	5.0	5.0	4.0	2.5
RTU Supply Air CFM	1,600	1,600	1,600	1,600	1,600	1,600
RTU Fresh Air CFM	480	480	480	480	480	480
RTU Return Air CFM	1,120	1,120	1,120	1,120	1,120	1,120
Current Thermal Efficiency	91%	91%	91%	91%	91%	91%
Proposed Thermal Efficiency	91%	91%	91%	91%	91%	91%
Current EER	10.5	10.5	10.5	10.5	10.5	10.5
Proposed EER	12.0	12.0	12.0	12.0	12.0	12.0
Proposed Occupied Heating Sizing	54.0	54.0	54.0	54.0	54.0	54.0
Proposed Unoccupied Heating Sizing	55.0	55.0	55.0	55.0	55.0	55.0
Proposed Occupied Cooling Sizing	74.0	74.0	74.0	74.0	74.0	74.0
Proposed Unoccupied Cooling Sizing	75.0	75.0	75.0	75.0	75.0	75.0
Supply Air Temperature	55.0	55.0	55.0	55.0	55.0	55.0
Current RTU kWh Consumption	900	900	900	900	720	1,150
Current RTU Thermal Consumption	1,513	1,513	1,513	1,513	1,513	1,513
Proposed RTU kWh Consumption	788	788	788	788	640	1,150
Proposed RTU Thermal Consumption	1,513	1,513	1,513	1,513	1,513	1,513
Safety Factor	3%	3%	3%	3%	3%	3%
Electrical Savings	107	112	112	112	86	179
Natural Gas Savings						
NW Savings (kW)	0.71	0.88	0.71	0.71	0.57	1.19

VILLAGE HALL

RTU 1

Amb. Temp Bin °F	Avg Temp °F	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occur Bin Hours	Unocc. Bin Hours	Occupied Tons	Unoccupied Tons	Occupied Ton-Hrs	Unoccupied Ton-Hrs	Current Conditioning Unit Consumption (TWh)	Proposed Conditioning Unit Consumption (TWh)	Savings (TWh)
100 to 105	102.5	-	-	-	-	-	-	5.0	5.0	-	-	-	-	-
95 to 100	97.5	-	13	1	14	10	4	5.0	5.0	50	20	80	70	10
90 to 95	92.5	-	19	6	25	16	9	3.9	5.0	64	34	112	98	14
85 to 90	87.5	-	59	17	76	54	22	1.9	1.0	154	22	201	176	25
80 to 85	82.5	9	146	55	210	147	63	1.8	-	265	103	363	263	100
75 to 80	77.5	18	215	93	326	240	86	1.7	0.7	178	178	204	178	26
70 to 75	72.5	108	267	194	569	379	190	-	-	-	-	-	-	-
65 to 70	67.5	254	325	316	995	534	461	-	-	-	-	-	-	-
60 to 65	62.5	583	292	362	1,237	540	697	-	-	-	-	-	-	-
Total		782	1,311	1,042	3,135	1,969	1,166	14.4	11.0	711	76	800	728	113

Amb. Temp Bin °F	Avg Temp °F	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occupied Bin Hours	Unoccupied Bin Hours	Mixed Air Temp °F	Temp rise across coil °F	Heat Load on the unit Btu/hr	100% °F BTU/HR temp (Photo 1) %	Heat provided by unit Btu/hr
55 to 60	57.5	50	141	68	259	177	82	55.8	29.3	50,544	66.1%	5,930,353
50 to 55	52.5	94	203	147	444	302	142	54.3	30.8	11,136	69.5%	11,158,779
45 to 50	47.5	95	175	151	421	250	171	52.8	32.3	55,728	72.9%	10,144,365
40 to 45	42.5	201	140	218	559	372	187	51.3	33.8	58,320	76.3%	16,529,580
35 to 40	37.5	240	197	168	605	413	192	49.8	35.3	60,912	79.3%	20,041,781
30 to 35	32.5	205	211	193	609	408	201	48.3	36.8	63,504	83.1%	21,522,407
25 to 30	27.5	124	135	179	437	293	144	46.8	38.3	66,096	86.4%	16,747,554
20 to 25	22.5	235	93	147	475	311	163	45.3	39.8	68,688	89.8%	19,193,317
15 to 20	17.5	99	61	53	213	141	72	43.8	41.3	71,280	93.3%	9,964,839
10 to 15	12.5	45	17	28	90	59	31	42.3	42.8	73,872	96.6%	4,711,978
5 to 10	7.5	29	5	15	49	32	17	40.8	44.3	76,464	100.0%	2,477,049
0 to 5	2.5	9	1	1	11	7	4	39.3	45.8	79,056	100.0%	154,098
-5 to 0	-2.5	-	-	-	-	-	-	37.8	47.3	81,648	100.0%	-
-10 to -5	-7.5	-	-	-	-	-	-	36.3	48.8	84,240	100.0%	-
-15 to -10	-12.5	-	-	-	-	-	-	34.8	50.3	86,832	100.0%	-
Total		1,426	1,313	1,387	4,126	2,763	1,363	-	-	-	-	137,823,809

VILLAGE HALL

RTU 2

Amb. Temp Bin °F	Avg Temp °F	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occur Bin Hours	Unocc. Bin Hours	Occupied Tons	Unoccupied Tons	Occupied Ton-Hrs	Unoccupied Ton-Hrs	Current Conditioning Unit Consumption (TWh)	Proposed Conditioning Unit Consumption (TWh)	Savings (TWh)
100 to 105	102.5	-	-	-	-	-	-	5.0	5.0	-	-	-	-	-
95 to 100	97.5	-	13	1	14	10	4	5.0	5.0	50	20	80	70	10
90 to 95	92.5	-	19	6	25	16	9	3.9	5.0	64	34	112	98	14
85 to 90	87.5	-	59	17	76	54	22	1.9	1.0	154	22	201	176	25
80 to 85	82.5	9	146	55	210	147	63	1.8	-	265	103	363	263	100
75 to 80	77.5	18	215	93	326	240	86	1.7	0.7	178	178	204	178	26
70 to 75	72.5	108	267	194	569	379	190	-	-	-	-	-	-	-
65 to 70	67.5	254	325	316	995	534	461	-	-	-	-	-	-	-
60 to 65	62.5	583	292	362	1,237	540	697	-	-	-	-	-	-	-
Total		782	1,311	1,042	3,135	1,969	1,166	14.4	11.0	711	76	800	728	113

Amb. Temp Bin °F	Avg Temp °F	03-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occupied Bin Hours	Unoccupied Bin Hours	Mixed Air Temp	Temp rise across coil	Heat Load on the unit	Load % of Btu QLT/4	Heat provided by unit
°F								°F	°F	Btu/hr	%	Btu/hr
55 to 60	57.5	50	141	68	259	177	82	55.8	29.3	50,544	66.1%	5,930,353
50 to 55	52.5	84	203	147	434	303	141	54.3	30.8	53,136	69.5%	11,158,279
45 to 50	47.5	95	125	151	371	250	121	52.8	32.3	55,728	73.9%	10,144,765
40 to 45	42.5	201	140	218	559	377	182	51.3	33.8	58,320	76.3%	16,525,590
35 to 40	37.5	240	192	188	620	413	207	49.8	35.3	60,912	79.7%	20,041,781
30 to 35	32.5	205	215	195	609	408	201	48.3	36.8	63,504	83.1%	21,532,487
25 to 30	27.5	124	125	178	427	293	134	46.8	38.3	66,096	86.4%	16,747,354
20 to 25	22.5	235	92	147	474	311	163	45.3	39.8	68,688	89.8%	19,191,217
15 to 20	17.5	99	61	53	213	141	72	43.8	41.3	71,280	93.2%	9,364,939
10 to 15	12.5	45	17	28	90	59	31	42.3	42.8	73,872	96.6%	4,211,978
5 to 10	7.5	29	5	15	49	32	17	40.8	44.3	76,464	100.0%	2,437,049
0 to 5	2.5	9	1	1	11	7	4	39.3	45.8	79,056	100.0%	554,098
5 to 0	2.5							37.8	47.3	81,648	100.0%	
10 to -5	7.5							36.3	48.8	84,240	100.0%	
15 to -10	12.5							34.8	50.3	86,832	100.0%	
Total		1,426	1,321	1,387	4,134	2,765	1,371					137,823,809

VILLAGE HALL

RTU 1

Amb. Temp Bin °F	Avg Temp °F	03-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occupied Bin Hours	Unocc. Bin Hours	Occupied Tons	Unoccupied Tons	Occupied Ton-Hrs	Unoccupied Ton-Hrs	Current Condensing Unit Consumption (kWh)	Proposed Condensing Unit Consumption (kWh)	Savings (kWh)
100 to 105	102.5	-	-	-	-	-	-	5.0	5.0	-	-	-	-	-
95 to 100	97.5	-	12	3	14	10	4	5.0	5.0	50	20	80	70	10
90 to 95	92.5	-	19	4	23	16	7	3.9	5.0	64	34	112	98	14
85 to 90	87.5	-	38	17	55	34	21	2.9	5.0	134	22	201	176	25
80 to 85	82.5	9	146	55	210	147	63	1.8	-	265	-	303	265	38
75 to 80	77.5	38	215	93	346	240	106	2.7	-	178	-	204	178	25
70 to 75	72.5	108	262	196	566	378	188	-	-	-	-	-	-	-
65 to 70	67.5	254	325	216	875	584	291	-	-	-	-	-	-	-
60 to 65	62.5	583	292	362	1,237	590	647	-	-	-	-	-	-	-
Total		763	1,311	1,042	3,116	1,868	1,248	14.4	11.0	711	76	920	788	132

Amb. Temp Bin °F	Avg Temp °F	03-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occupied Bin Hours	Unoccupied Bin Hours	Mixed Air Temp	Temp rise across coil	Heat Load on the unit	Load % of Btu QLT/4	Heat provided by unit
°F								°F	°F	Btu/hr	%	Btu/hr
55 to 60	57.5	50	141	68	259	177	82	55.8	29.3	50,544	66.1%	5,930,353
50 to 55	52.5	84	203	147	434	303	141	54.3	30.8	53,136	69.5%	11,158,279
45 to 50	47.5	95	125	151	371	250	121	52.8	32.3	55,728	73.9%	10,144,765
40 to 45	42.5	201	140	218	559	377	182	51.3	33.8	58,320	76.3%	16,525,590
35 to 40	37.5	240	192	188	620	413	207	49.8	35.3	60,912	79.7%	20,041,781
30 to 35	32.5	205	215	195	609	408	201	48.3	36.8	63,504	83.1%	21,532,487
25 to 30	27.5	124	125	178	427	293	134	46.8	38.3	66,096	86.4%	16,747,354
20 to 25	22.5	235	92	147	474	311	163	45.3	39.8	68,688	89.8%	19,191,217
15 to 20	17.5	99	61	53	213	141	72	43.8	41.3	71,280	93.2%	9,364,939
10 to 15	12.5	45	17	28	90	59	31	42.3	42.8	73,872	96.6%	4,211,978
5 to 10	7.5	29	5	15	49	32	17	40.8	44.3	76,464	100.0%	2,437,049
0 to 5	2.5	9	1	1	11	7	4	39.3	45.8	79,056	100.0%	554,098
5 to 0	2.5							37.8	47.3	81,648	100.0%	
10 to -5	7.5							36.3	48.8	84,240	100.0%	
15 to -10	12.5							34.8	50.3	86,832	100.0%	
Total		1,426	1,321	1,387	4,134	2,765	1,371					137,823,809

VILLAGE HALL

RTU 4

Avg. Temp Bin °F	Avg Temp °F	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occupied Bin Hours	Unocc. Bin Hours	Occupied Tons	Unoccupied Tons	Occupied Ton Hrs	Unoccupied Ton Hrs	Current Conditioning Unit Consumption (kBtu)	Proposed Conditioning Unit Consumption (kBtu)	Savings (Btu)
COOLING														
100 to 105	103.5	-	-	-	-	-	-	5.0	5.0	-	-	-	-	-
95 to 100	97.5	-	13	1	14	10	4	5.0	5.0	50	20	80	70	10
90 to 95	91.5	-	19	4	23	16	7	3.9	5.0	34	54	112	98	14
85 to 90	87.5	-	19	17	36	22	14	2.9	1.0	25	22	201	176	25
80 to 85	82.5	9	146	55	210	147	63	1.8	-	154	265	303	265	38
75 to 80	77.5	18	215	93	346	240	106	0.7	-	178	178	204	178	26
70 to 75	72.5	108	262	194	564	378	186	-	-	-	-	-	-	25
65 to 70	67.5	254	305	316	875	534	341	-	-	-	-	-	-	-
60 to 65	62.5	183	297	367	1,037	590	447	-	-	-	-	-	-	-
Total		792	1,111	1,042	3,145	1,969	1,176	14.4	11.0	711	761	925	728	197

Avg. Temp Bin °F	Avg Temp °F	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occupied Bin Hours	Unoccupied Bin Hours	Mixed Air Temp °F	Temp rise across coil °F	Heat Load on the Unit Btu/hr	Load % at Bin D/T temp (Point 1) %	Heat provided by unit Btu/hr
HEATING												
55 to 60	57.5	50	141	68	259	177	82	55.8	29.3	50,544	66.1%	5,930,353
50 to 55	52.5	64	203	147	444	302	142	54.3	30.8	53,136	69.5%	11,158,279
45 to 50	47.5	95	175	151	371	250	121	52.8	32.3	55,728	72.9%	10,144,765
40 to 45	42.5	201	140	218	559	371	187	51.3	33.8	58,320	76.3%	10,525,590
35 to 40	37.5	340	197	188	625	413	212	49.8	35.3	60,912	78.7%	10,941,781
30 to 35	32.5	305	211	193	609	408	201	48.3	36.8	63,504	83.1%	11,527,407
25 to 30	27.5	124	135	178	437	293	144	46.8	38.3	66,096	86.4%	16,747,354
20 to 25	22.5	235	92	147	474	311	163	45.3	39.8	68,688	89.8%	19,191,217
15 to 20	17.5	99	81	53	233	141	72	43.8	41.3	71,280	93.2%	9,364,939
10 to 15	12.5	45	17	28	90	59	31	42.3	42.8	73,872	96.6%	4,211,978
5 to 10	7.5	9	5	15	29	17	12	40.8	44.3	76,464	100.0%	2,427,049
0 to 5	2.5	9	1	1	11	7	4	39.3	45.8	79,056	100.0%	554,098
-5 to 0	-2.5	-	-	-	-	-	-	37.8	47.3	81,648	100.0%	-
-10 to -5	-7.5	-	-	-	-	-	-	36.3	48.8	84,240	100.0%	-
-15 to -10	-12.5	-	-	-	-	-	-	34.8	50.3	86,832	100.0%	-
Total		1,426	1,323	1,387	4,136	2,765	1,371					137,833,809

VILLAGE HALL

RTU 5

Avg. Temp Bin °F	Avg Temp °F	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occupied Bin Hours	Unocc. Bin Hours	Occupied Tons	Unoccupied Tons	Occupied Ton Hrs	Unoccupied Ton Hrs	Current Conditioning Unit Consumption (kBtu)	Proposed Conditioning Unit Consumption (kBtu)	Savings (Btu)
COOLING														
100 to 105	103.5	-	-	-	-	-	-	4.0	4.0	-	-	-	-	-
95 to 100	97.5	-	13	1	14	10	4	4.0	4.0	40	16	64	56	8
90 to 95	91.5	-	19	4	23	16	7	3.1	4.0	27	51	77	63	14
85 to 90	87.5	-	19	17	36	22	14	2.3	0.8	23	123	141	123	20
80 to 85	82.5	9	146	55	210	147	63	1.4	-	122	212	243	212	30
75 to 80	77.5	18	215	93	346	240	106	0.6	-	143	143	143	143	20
70 to 75	72.5	108	262	194	564	378	177	-	-	-	-	-	-	-
65 to 70	67.5	254	305	316	875	534	341	-	-	-	-	-	-	-
60 to 65	62.5	183	297	367	1,037	590	447	-	-	-	-	-	-	-
Total		792	1,111	1,042	3,145	1,969	1,176	11.5	8.8	546	61	720	630	90

Amb. Temp Bin °F	Avg Temp °F	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occupied Bin Hours	Unoccupied Bin Hours	Mixed Air Temp °F	Temp rise across coil °F	Heat Load on the unit Btu/hr	Load % at BtU QTR temp (Note 1) %	Heat provided by unit Btu/hr
POSITIVE												
55 to 60	57.5	50	141	68	259	177	82	55.8	29.3	50,544	66.1%	5,320,353
50 to 55	52.5	94	203	147	444	302	142	54.3	30.8	51,136	69.5%	11,158,779
45 to 50	47.5	95	175	151	371	250	121	52.8	32.3	55,728	72.9%	10,144,765
40 to 45	42.5	201	140	218	559	372	187	51.3	33.8	56,320	76.1%	16,529,590
35 to 40	37.5	240	197	188	625	207	418	49.8	35.3	66,912	79.7%	20,641,781
30 to 35	32.5	205	211	193	609	408	201	48.3	36.8	63,504	83.1%	21,522,607
25 to 30	27.5	124	135	178	437	293	144	46.8	38.3	66,096	86.6%	16,747,354
20 to 25	22.5	235	92	147	474	311	163	45.3	39.8	66,688	89.8%	19,191,217
15 to 20	17.5	99	61	53	213	141	72	43.8	41.3	71,280	93.2%	9,364,939
10 to 15	12.5	45	17	28	90	59	31	42.3	42.8	71,872	96.6%	4,211,978
5 to 10	7.5	29	5	15	49	32	17	40.8	44.3	76,464	100.0%	2,437,049
0 to 5	2.5	9	1	1	11	7	4	39.3	45.8	79,056	100.0%	554,098
5 to 0	2.5							37.8	47.3	81,648	100.0%	
10 to 5	7.5							36.3	48.8	84,240	100.0%	
15 to 10	12.5							34.8	50.3	86,832	100.0%	
Total		1,426	1,323	1,387	4,136	2,765	1,371					137,813,809

VILLAGE HALL

RTU 6

Amb. Temp Bin °F	Avg Temp °F	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occupied Bin Hours	Unoccupied Bin Hours	Occupied Tons	Unoccupied Tons	Occupied Ton-Hrs	Unoccupied Ton-Hrs	Current Condensing Unit Consumption (EWH)	Proposed Condensing Unit Consumption (EWH)	Savings (EWH)
POSITIVE														
120 to 100	102.5	-	-	-	-	-	-	7.5	7.5	-	7.5	-	-	-
95 to 100	97.5	-	13	1	14	10	4	7.5	7.5	75	30	120	103	17
90 to 95	92.5	-	19	4	23	16	7	5.9	7.5	96	51	168	144	24
85 to 90	87.5	-	58	17	76	54	22	4.9	7.5	231	94	602	560	42
80 to 85	82.5	9	146	55	210	147	63	2.7	-	96	-	455	392	63
75 to 80	77.5	38	215	91	344	240	104	1.1	-	268	-	306	263	43
70 to 75	72.5	108	267	196	571	379	192	-	-	-	-	-	-	-
65 to 70	67.5	254	305	316	875	534	341	-	-	-	-	-	-	-
60 to 65	62.5	383	297	363	1,043	590	453	-	-	-	-	-	-	-
Total		792	1,311	1,043	3,146	1,968	1,178	21.5	16.5	1,067	115	1,350	1,162	188

Amb. Temp Bin °F	Avg Temp °F	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occupied Bin Hours	Unoccupied Bin Hours	Mixed Air Temp °F	Temp rise across coil °F	Heat Load on the unit Btu/hr	Load % at BtU QTR temp (Note 1) %	Heat provided by unit Btu/hr
POSITIVE												
55 to 60	57.5	50	141	68	259	177	82	55.8	29.3	91,611	66.1%	10,748,765
50 to 55	52.5	94	203	147	444	302	142	54.3	30.8	96,329	69.5%	20,224,380
45 to 50	47.5	95	175	151	371	250	121	52.8	32.3	101,007	72.9%	18,387,346
40 to 45	42.5	201	140	218	559	372	187	51.3	33.8	105,705	76.1%	29,959,881
35 to 40	37.5	240	197	188	625	413	212	49.8	35.3	110,403	79.7%	36,225,728
30 to 35	32.5	205	211	193	609	408	201	48.3	36.8	115,101	83.1%	39,029,363
25 to 30	27.5	124	135	178	437	293	144	46.8	38.3	118,799	86.6%	32,545,579
20 to 25	22.5	235	92	147	474	311	163	45.3	39.8	126,437	89.8%	36,734,081
15 to 20	17.5	99	61	53	213	141	72	43.8	41.3	129,195	93.2%	16,972,951
10 to 15	12.5	45	17	28	90	59	31	42.3	42.8	133,893	96.6%	7,684,211
5 to 10	7.5	29	5	15	49	32	17	40.8	44.3	138,591	100.0%	4,399,027
0 to 5	2.5	9	1	1	11	7	4	39.3	45.8	143,289	100.0%	1,004,302
5 to 0	2.5							37.8	47.3	147,987	100.0%	
10 to 5	7.5							36.3	48.8	152,685	100.0%	
15 to 10	12.5							34.8	50.3	157,383	100.0%	
Total		1,426	1,323	1,387	4,136	2,765	1,371					349,805,555

Village of Dobbs Ferry
Exhibit D-5 Chart
Condensing Unit Replacement Chart

EXISTING								
Building	Equipment Label	Qty	Replace (Y/N)	Manufacturer	Model No.	Area Served	Capacity [Tons]	Existing SEER
Village Hall	VH-CU-1	1	Y	Trane	TTA120A300FA	Police Station First Floor	10.0	9.5
Village Hall	VH-CU-2	1	Y	Daikin	DX13SA0603AC	Fire Station Lounge Room	5.0	12.4
Village Hall	VH-CU-3	1	Y	NA	NA	Fire Station Meeting Room	7.5	10.8
Village Hall	VH-CU-4	1	Y	NA	NA	Records Room	5.0	10.8
Totals		4					27.5	

PROPOSED				
Manufacturer	Model No.	Qty	Capacity [Tons]	Proposed SEER
Trane	TTA12043CAB	1	10.0	13.3
Trane	4TTA3060D	1	5.0	13.0
Trane	TTA09043A	1	7.5	13.0
Trane	4TTA3060D	1	5.0	13.0
		4	27.5	

EXISTING CONDENSING UNIT SPECIFICATIONS

Building	Village Hall	Village Hall	Village Hall	Village Hall
Label	VH-CU-1	VH-CU-2	VH-CU-3	VH-CU-4
	Police Station First Floor	Fire Station Lounge Room	Fire Station Meeting Room	Records Room
Area Serving				
Quantity	1	1	1	1
Capacity [Tons]	10.0	5.0	7.5	5.0
Existing EER	9.5	12.4	10.8	10.8

PROPOSED CONDENSING UNIT SPECIFICATIONS

	Village Hall	Village Hall	Village Hall	Village Hall
CU Replacement	Y	Y	Y	Y
Label	VH-CU-1	VH-CU-2	VH-CU-3	VH-CU-4
	Police Station First Floor	Fire Station Lounge Room	Fire Station Meeting Room	Records Room
Area Serving				
Quantity	1	1	1	1
Tonnage	10.0	5.0	7.5	5.0
Proposed EER	13.3	13.0	13.0	13.0

ECM DESCRIPTION

Replace existing low efficiency condensing units in respective buildings with new high efficiency condensing units with an EER of 12+

DATA / ASSUMPTIONS

Run Hours based on occupancy schedule
Full Load Design Temperature [°F] =

92.5

COMMISSIONING

Start up equipment ensure proper operation

RECOVERY/SAFETY FACTOR

Electric Safety Factor [%] =

0%

FORMULAE

REPLACEMENT

$$W_{SAVINGS} = W_{C,EXT} - W_{C,PROP}$$

$$W_{C,EXT} = \sum_{60}^{105} \left[\left(\left(C \cdot \left(\frac{T_{BIN} - T_{UNOCC}}{T_{BIN} - T_{DESIGN}} \right) \cdot T_{UNOCC} \right) + \left(C \cdot \left(\frac{T_{BIN} - T_{OCC}}{T_{BIN} - T_{DESIGN}} \right) \cdot T_{OCC} \right) \right) \cdot \left(\frac{12}{\eta_{EXT}} \right) \right]$$

$$W_{C,PROP} = \sum_{60}^{105} \left[\left(\left(C \cdot \left(\frac{T_{BIN} - T_{UNOCC}}{T_{BIN} - T_{DESIGN}} \right) \cdot T_{UNOCC} \right) + \left(C \cdot \left(\frac{T_{BIN} - T_{OCC}}{T_{BIN} - T_{DESIGN}} \right) \cdot T_{OCC} \right) \right) \cdot \left(\frac{12}{\eta_{PROP}} \right) \right]$$

Variable	Units	Description
$W_{SAVINGS}$	kWh	Electrical Savings
$W_{C,EXT}$	kWh	Existing condensing unit Consumption
$W_{C,PROP}$	kWh	Proposed condensing unit Consumption
\sum_{60}^{105}	-	Summation of all bins from 60°F to 105°F
C	Ton	Tonnage of condensing unit
η_{EXT}	-	Existing efficiency of condensing unit (EER)
η_{PROP}	-	Proposed efficiency of condensing unit (EER)
T_{DESIGN}	°F	Design Temperature of condensing unit (Usually 92.5°F)
T_{BIN}	°F	Bin temperature
T_{OCC}	°F	Temperature of building during occupied hours
T_{UNOCC}	°F	Temperature of building during unoccupied hours
T_{OCC}	Hrs	Occupied Bin Hours in respective temperature bin
T_{UNOCC}	Hrs	Unoccupied Bin Hours in respective temperature bin

* Inputs are in blue

Building	Label	Capacity [Tons]	Current EER	Proposed EER	Area Serving
Village Hall	VH-CU-1	10.0	9.5	13.3	Police Station First Floor
Village Hall	VH-CU-2	5.0	12.4	13.0	Fire Station Lounge Room
Village Hall	VH-CU-3	7.5	10.8	13.0	Fire Station Meeting Room
Village Hall	VH-CU-4	5.0	10.8	13.0	Records Room
Totals		27.5			

CALCULATIONS

Label	Village Hall VH-CU-1	Village Hall VH-CU-2	Village Hall VH-CU-3 Fire Station	Village Hall VH-CU-4
Area Serving	Police Station First Floor	Fire Station Lounge Room	Meeting Room	Records Room
Condensing Unit Capacity [Tons]	10.0	5.0	7.5	5.0
Current EER	9.5	12.4	10.8	10.8
Proposed EER	13.3	13.0	13.0	13.0
Proposed Occ. Cooling Setpoint [°F]	74.0	74.0	74.0	74.0
Proposed Unocc. Cooling Setpoint [°F]	85.0	85.0	85.0	85.0
Current Condensing Unit Consumption [kWh]	3,214	1,236	2,120	1,413
Proposed Condensing Unit Consumption [kWh]	2,295	1,174	1,761	1,174
Electric Safety Factor [%]	0%	0%	0%	0%
Electrical Savings [kWh]	918	62	359	239

VILLAGE HALL

Police Station First Floor

Amb. Temp Bin [°F]	Average Temp. [°F]	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occ. Bin Hours	Unocc. Bin Hours	Occ. Load [Tons]	Unocc. Load [Tons]	Occ. Consumption [Ton-Hrs]	Unocc. Consumption [Ton-Hrs]	Existing Total Consumption [kWh]	Proposed Total Consumption [kWh]	Total Electrical Savings [kWh]
COOLING														
100 to 105	102.5	-	-	-	-	-	-	10.0	10.0	-	-	-	-	-
95 to 100	97.5	-	13	1	14	14	0	10.0	10.0	140	0	177	126	51
90 to 95	92.5	-	19	4	23	23	0	10.0	10.0	230	0	291	208	83
85 to 90	87.5	-	59	17	76	76	0	7.3	3.3	555	0	701	500	200
80 to 85	82.5	9	146	55	210	210	0	4.6	-	965	-	1,219	871	348
75 to 80	77.5	38	215	93	346	346	0	1.9	-	655	-	827	591	236
70 to 75	72.5	108	254	194	556	556	0	-	-	-	-	-	-	-
65 to 70	67.5	251	244	303	798	798	0	-	-	-	-	-	-	-
60 to 65	62.5	356	228	306	890	890	0	-	-	-	-	-	-	-
Total			762	1,178	2,913	2,913	0					3,214	2,295	918

VILLAGE HALL

Fire Station Lounge Room

Amb. Temp Bin [°F]	Average Temp. [°F]	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occ. Bin Hours	Unocc. Bin Hours	Occ. Load [Tons]	Unocc. Load [Tons]	Occ. Consumption [Ton-Hrs]	Unocc. Consumption [Ton-Hrs]	Existing Total Consumption [kWh]	Proposed Total Consumption [kWh]	Total Electrical Savings [kWh]
COOLING														
100 to 105	102.5	-	-	-	-	-	-	5.0	5.0	-	-	-	-	-
95 to 100	97.5	-	13	1	14	14	0	5.0	5.0	70	0	68	65	3
90 to 95	92.5	-	19	4	23	23	0	5.0	5.0	115	0	112	108	6
85 to 90	87.5	-	59	17	76	76	0	3.6	1.7	277	0	269	256	13
80 to 85	82.5	9	146	55	210	210	0	2.3	-	482	-	469	445	23
75 to 80	77.5	38	215	93	346	346	0	0.9	-	327	-	318	302	16
70 to 75	72.5	108	254	194	556	556	0	-	-	-	-	-	-	-
65 to 70	67.5	251	244	303	798	798	0	-	-	-	-	-	-	-
60 to 65	62.5	356	228	306	890	890	0	-	-	-	-	-	-	-
Total			762	1,178	2,913	2,913	0					1,236	1,174	62

VILLAGE HALL

Amb. Temp Bin °F	Avg Temp °F	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occup Bin Hours	Unocc. Bin Hours	Occupied Tons	Unoccupied Tons	Occupied Ton-Hrs	Unoccupied Ton-Hrs	Current Condensing Unit Consumption kWh	Proposed Condensing Unit Consumption kWh	Savings kWh
COOLING														
100 to 105	102.5	-	-	-	-	-	-	7.5	7.5	-	-	-	-	-
95 to 100	97.5	-	13	1	14	14	0	7.5	7.5	105	0	117	97	20
90 to 95	92.5	-	19	4	23	23	0	7.5	7.5	172	0	192	159	32
85 to 90	87.5	-	59	17	76	76	0	5.5	2.5	416	0	462	384	78
80 to 85	82.5	9	146	55	210	210	0	3.4	-	724	-	804	668	136
75 to 80	77.5	38	215	93	346	346	0	1.4	-	491	-	545	453	92
70 to 75	72.5	108	254	194	556	556	0	-	-	-	-	-	-	-
65 to 70	67.5	251	244	303	798	798	0	-	-	-	-	-	-	-
60 to 65	62.5	356	228	306	890	890	0	-	-	-	-	-	-	-
Total		762	1,178	973	2,913	2,913	0	32.8	25.0	1,908	0	2,120	1,761	359

VILLAGE HALL

Amb. Temp Bin °F	Avg Temp °F	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occup Bin Hours	Unocc. Bin Hours	Occupied Tons	Unoccupied Tons	Occupied Ton-Hrs	Unoccupied Ton-Hrs	Current Condensing Unit Consumption kWh	Proposed Condensing Unit Consumption kWh	Savings kWh
COOLING														
100 to 105	102.5	-	-	-	-	-	-	5.0	5.0	-	-	-	-	-
95 to 100	97.5	-	13	1	14	14	0	5.0	5.0	70	0	78	65	13
90 to 95	92.5	-	19	4	23	23	0	5.0	5.0	115	0	128	106	22
85 to 90	87.5	-	59	17	76	76	0	3.6	1.7	277	0	308	256	52
80 to 85	82.5	9	146	55	210	210	0	2.3	-	482	-	536	445	91
75 to 80	77.5	38	215	93	346	346	0	0.9	-	327	-	364	302	62
70 to 75	72.5	108	254	194	556	556	0	-	-	-	-	-	-	-
65 to 70	67.5	251	244	303	798	798	0	-	-	-	-	-	-	-
60 to 65	62.5	356	228	306	890	890	0	-	-	-	-	-	-	-
Total		762	1,178	973	2,913	2,913	0	21.9	16.7	1,272	0	1,413	1,174	239

SAVINGS SUMMARY

Building ID	kWh Savings	Electric Safety Factor %
Village Hall	1,578	0.0%
Subtotal	1,578	

VARIABLE FREQUENCY DRIVE AND MOTOR TABLE

*Inputs are blue

VARIABLE FREQUENCY DRIVE AND MOTOR TABLE							
Building	Equipment Label	Equipment Configuration	Qty	Total Horsepower [HP]*	Existing Efficiency [%]	Replace Motor (Y/N)	Install VFD (Y/N)
Village Hall	HWP	Lead/Lag	2	4.0	84.0%	Y	N
Totals			2	4.0			

Village Hall	
Equipment Label	HWP
Equipment Configuration	Lead/Lag
Quantity	2
Horsepower [HP]	4.0
Existing Efficiency [%]	84.0%
Replace Motor	Y
Install VFD	N

Village of Dobbs Ferry
Exhibit D-5-7
ECM 7 - Pump & Motor Replacement
VFD & Motor Replacement

ECM DESCRIPTION

Install Variable Frequency Drives (VFDs) to modulate speed based on actual demand.

DATA / ASSUMPTIONS

Motor Load Factor [%]
*Run hours are based on the audit and through interviews with facility staff

COMMISSIONING

Review installation documents for alignments and vibrations and provide equipment start up.

RECOVERY/SAFETY FACTOR

Electric Safety Factor [%] =

FORMULAE

VFD
 $W_{\text{VFD Savings}} = W_{\text{EXISTING}} - W_{\text{VFD}}$
 $W_{\text{VFD}} = \frac{60}{24} \left[\left(\left(\text{HP} \cdot 0.746 \right) \cdot \left(\text{Lf} / \eta_{\text{PROPOSED}} \right) \right)^2 \cdot \text{t}_f \cdot \left(\text{t}_{\text{PROPOSED}} / \eta_{\text{VFD}} \right) \right]$

Variable	Units	Description
$W_{\text{VFD Savings}}$	kWh	Electrical Savings for Motor Replacement
HP	HP	Horsepower of motor
$\text{t}_{\text{EXISTING}}$	Hrs	Existing Run Hours
$\text{t}_{\text{PROPOSED}}$	Hrs	Proposed Run Hours
Lf	%	Load Factor of motor
η_{EXISTING}	%	Existing efficiency of motor
η_{PROPOSED}	%	Proposed efficiency of motor
$\sum_{f=0}^{60}$	-	Summation of all frequencies (0 Hz to 60 Hz)
f	%	Frequency of drive, as a percentage of full frequency (60 Hz)
t_f	%	Percentage of time motor will run at a particular frequency
η_{VFD}	%	VFD efficiency
W_{VFD}	kWh	Proposed electrical consumption with VFD
W_{EXISTING}	kWh	Existing electrical consumption of motor
W_{PROPOSED}	kWh	Proposed electrical consumption of motor

ASSUMPTIONS / INPUTS

* Inputs are in blue

Building	Equipment Label	Configuration	Qty	Horsepower [HP]	Existing Efficiency [%]	Replace Motor	Install VFD
Village Hall	HWP	Lead/Lag	2	4.0	84.0%	Y	N
Total							

CALCULATIONS (MOTOR)

	Village Hall
Equipment Label	HWP
Equipment Configuration	Lead/Lag
Replace Motor	Y
Install VFD	N
Quantity	2
Existing Motor Horsepower [HP]	4.0
Proposed Motor Horsepower [HP]	4.0
Existing Run Hours [Hrs]	2,068
Proposed Run Hours [Hrs]	2,068
Load Factor [%]	70.0%
Existing Motor Efficiency [%]	84.0%
Proposed Motor Efficiency [%]	86.5%
Existing kW [kW]	2.49
Proposed kW [kW]	2.41
Existing Motor kWh Consumption [kWh]	5,142
Proposed Motor kWh Consumption w/o VFD [kWh]	4,994
Proposed Motor kWh Consumption w/ VFD [kWh]	-
Electric Safety Factor [%]	0%
kW Savings [kW]	0.07
kWh Savings [kWh]	149

SAVINGS SUMMARY

Building ID	kWh Savings kWh	kW Savings kW	Electric Safety Factor %
Village Hall	149	0.07	0.0%
Subtotal	149	0.07	

THERMAL NIGHT SETBACK SAVINGS CALCULATIONS

	Public Library	Village Hall	Memorial Park Building	DPW Office	Ambulance Corps Building	Ogden Engine Company	Pistol House and Offices at Gould Park (Seasonal)	Emkeny Club
Occupied Bin Hours	1,831	4,136	1,496	4,136	4,136	4,136	1,823	1,496
Occupied Heating Degree Hours (HDD-Hrs)	63,168	151,373	54,043	147,237	159,645	138,365	38,152	46,541
Annual Boiler Usage (Therms)	8,321	10,284	1,918	7,938	2,670	4,006	1,055	5,117
Adjusted Annual Boiler Usage (Therms)	7,774	8,163	1,735	8,030	2,334	3,908	1,055	4,813
Existing Heating Degree Hours (HDD-Hrs)	151,373	151,373	118,641	147,237	159,645	138,365	130,693	138,365
Proposed Heating Degree Hours (HDD-Hrs)	100,957	130,693	96,612	130,693	130,693	130,693	77,270	96,612
Thermal Normalization Factor (%)	5%	10%	15%	5%	5%	5%	20%	40%
Thermal Safety Factor (%)	10%	10%	10%	10%	10%	10%	10%	10%
Thermal Savings (%)	28.1%	11.1%	30.2%	9.6%	15.5%	5.1%	29.1%	16.4%
Thermal Savings (Therms)	2,314	905	324	771	362	199	311	791

ELECTRIC NIGHT SETBACK SAVINGS CALCULATIONS

Annual Electric Usage (kWh)	231,040	196,740	9,564	97,446	17,280	30,818	107,430	67,400
Annual Cooling Electric Baseline (kWh)	36,960	22,800	144	680	1,170	1,067	1,428	4,080
Existing Cooling Degree Hours (CD-Hrs)	5,658	6,392	5,471	6,392	6,392	6,392	5,874	5,471
Proposed Cooling Degree Hours (CD-Hrs)	3,911	4,776	3,661	4,776	4,776	4,776	3,532	3,661
Electric Normalization Factor (%)	15%	15%	15%	15%	15%	15%	15%	15%
Electric Safety Factor (%)	10%	10%	10%	10%	10%	10%	10%	10%
Electrical Savings (%)	23.6%	19.3%	25.2%	19.2%	19.2%	19.2%	26.2%	25.2%
Electrical Savings (kWh)	8,731	4,409	35	133	226	206	374	1,032

PUBLIC LIBRARY

Current Operating Schedule														Proposed Operating Schedule														
Amb. Temp Bin [°F]	Ave Temp [°F]	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occup. Bin Hours	Unocc. Bin Hours	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Unocc. Cooling Degree Hours [CD-Hrs]	Unocc. Cooling Degree Hours [CD-Hrs]	Total Cooling Degree Hours [CD-Hrs]	Unocc. Cooling Degree Hours [CD-Hrs]	Occup. Bin Hours	Unocc. Bin Hours	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Unocc. Cooling Degree Hours [CD-Hrs]	Unocc. Cooling Degree Hours [CD-Hrs]	Total Cooling Degree Hours [CD-Hrs]	Unocc. Cooling Degree Hours [CD-Hrs]	Occup. Bin Hours	Unocc. Bin Hours	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Unocc. Cooling Degree Hours [CD-Hrs]	Unocc. Cooling Degree Hours [CD-Hrs]	Total Cooling Degree Hours [CD-Hrs]
COOLING																												
100 to 105	102.5	-	-	-	-	-	-	72.0	76.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
95 to 100	97.5	-	13	1	14	13	1	72.0	76.0	141	14	354	-	-	-	-	-	354	13	9	74.0	85.0	114	8	122	-	-	
90 to 95	92.5	-	19	4	23	20	3	72.0	76.0	410	43	461	-	-	-	-	-	461	20	5	74.0	85.0	179	19	268	-	-	
85 to 90	87.5	-	58	17	75	65	11	72.0	76.0	1,011	124	1,135	-	-	-	-	-	1,135	65	11	74.0	85.0	881	27	907	-	-	
80 to 85	82.5	9	146	55	210	186	44	72.0	76.0	1,744	285	2,030	-	-	-	-	-	2,030	186	44	74.0	85.0	1,412	54	1,412	-	-	
75 to 80	77.5	38	215	93	346	249	97	72.0	76.0	1,310	145	1,515	-	-	-	-	-	1,515	249	97	74.0	85.0	817	-	817	-	-	
70 to 75	72.5	108	254	194	556	325	231	72.0	76.0	183	-	183	-	-	-	-	-	183	325	231	74.0	85.0	-	-	-	-	-	
65 to 70	67.5	251	244	303	798	555	443	72.0	76.0	-	-	-	-	-	-	-	-	-	555	443	74.0	85.0	-	-	-	-	-	
60 to 65	62.5	356	228	806	890	540	550	72.0	76.0	-	-	-	-	-	-	-	-	-	540	550	74.0	85.0	-	-	-	-	-	
Total		762	1,178	979	2,919	1,584	1,335			5,048	610	5,658						5,658	1,534	1,379					3,857	54	3,911	
HEATING																												
Amb. Temp Bin [°F]	Ave Temp [°F]	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occup. Bin Hours	Unocc. Bin Hours	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Unocc. Heating Degree Hours [HD-Hrs]	Unocc. Heating Degree Hours [HD-Hrs]	Total Heating Degree Hours [HD-Hrs]	Unocc. Heating Degree Hours [HD-Hrs]	Occup. Bin Hours	Unocc. Bin Hours	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Unocc. Heating Degree Hours [HD-Hrs]	Unocc. Heating Degree Hours [HD-Hrs]	Total Heating Degree Hours [HD-Hrs]	Unocc. Heating Degree Hours [HD-Hrs]	Occup. Bin Hours	Unocc. Bin Hours	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Unocc. Heating Degree Hours [HD-Hrs]	Unocc. Heating Degree Hours [HD-Hrs]	Total Heating Degree Hours [HD-Hrs]
55 to 60	57.5	50	141	68	259	184	93	73.0	73.0	2,571	1,443	4,015	-	-	-	-	-	4,015	184	93	68	55	1,742	-	1,742	-	-	
50 to 55	52.5	84	203	147	434	297	187	73.0	73.0	3,245	3,837	5,102	-	-	-	-	-	5,102	297	187	68	55	3,081	468	4,449	-	-	
45 to 50	47.5	95	125	111	331	180	151	73.0	73.0	4,547	4,864	9,411	-	-	-	-	-	9,411	180	151	68	55	1,656	1,490	3,146	-	-	
40 to 45	42.5	201	140	218	559	230	329	73.0	73.0	6,704	10,145	17,050	-	-	-	-	-	17,050	230	329	68	55	5,605	4,240	9,845	-	-	
35 to 40	37.5	240	197	188	625	261	359	73.0	73.0	9,259	12,751	22,010	-	-	-	-	-	22,010	261	359	68	55	7,955	6,286	14,241	-	-	
30 to 35	32.5	205	211	193	609	282	327	73.0	73.0	11,407	13,258	24,665	-	-	-	-	-	24,665	282	327	68	55	9,999	7,365	17,364	-	-	
25 to 30	27.5	124	135	128	437	205	237	73.0	73.0	6,107	10,776	16,884	-	-	-	-	-	16,884	205	237	68	55	8,107	6,512	14,620	-	-	
20 to 25	22.5	229	97	147	474	146	328	73.0	73.0	7,364	16,313	23,677	-	-	-	-	-	23,677	146	328	68	55	6,634	10,666	17,301	-	-	
15 to 20	17.5	99	61	53	213	80	133	73.0	73.0	4,442	7,359	11,822	-	-	-	-	-	11,822	80	133	68	55	4,060	4,972	9,033	-	-	
10 to 15	12.5	45	17	28	90	27	63	73.0	73.0	1,449	3,796	5,445	-	-	-	-	-	5,445	27	63	68	55	1,512	2,667	4,179	-	-	
5 to 10	7.5	29	5	15	49	10	39	73.0	73.0	447	2,122	1,210	-	-	-	-	-	1,210	10	39	68	55	670	1,479	2,404	-	-	
0 to 5	2.5	9	1	1	11	1	10	73.0	73.0	96	479	776	-	-	-	-	-	776	1	10	68	55	89	506	595	-	-	
5 to 0	(2.5)	-	-	-	-	-	-	73.0	73.0	-	-	-	-	-	-	-	-	-	-	-	68	55	-	-	-	-	-	
10 to -5	(7.5)	-	-	-	-	-	-	73.0	73.0	-	-	-	-	-	-	-	-	-	-	-	68	55	-	-	-	-	-	
15 to -10	(12.5)	-	-	-	-	-	-	73.0	73.0	-	-	-	-	-	-	-	-	-	-	-	68	55	-	-	-	-	-	
Total		1,426	1,323	1,387	4,136	1,831	2,305			63,168	88,205	151,373						151,373	1,831	2,305					54,015	46,941	100,957	

VILLAGE HALL

Amb. Temp Bin [°F]	Ave Temp [°F]	01-08 hours	09-16 hours	17-24 hours	Total Bin hours	Current Operating Schedule														Proposed Operating Schedule															
						Occup. Bin hours	Unocc. Bin hours	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Unocc. Cooling Degree Hours [CDH-Hrs]	Unocc. Heating Degree Hours [HD-Hrs]	Total Cooling Degree Hours [CDH-Hrs]	Total Heating Degree Hours [HD-Hrs]	Occup. Bin hours	Unocc. Bin hours	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Unocc. Cooling Degree Hours [CDH-Hrs]	Unocc. Heating Degree Hours [HD-Hrs]	Total Cooling Degree Hours [CDH-Hrs]	Total Heating Degree Hours [HD-Hrs]														
COOLING																																			
100 to 105	102.5	-	-	-	-	-	-	-	72.0	76.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
95 to 100	97.5	-	13	1	14	14	0	72.0	76.0	357	0	357	-	-	-	-	-	-	357	14	0	74.0	85.0	329	0	329	-	-	-	-	-	-	-	-	-
90 to 95	92.5	-	19	4	23	23	0	72.0	76.0	471	0	471	-	-	-	-	-	-	471	23	0	74.0	85.0	425	0	425	-	-	-	-	-	-	-	-	-
85 to 90	87.5	-	59	17	76	76	0	72.0	76.0	1,178	0	1,178	-	-	-	-	-	-	1,178	76	0	74.0	85.0	1,026	0	1,026	-	-	-	-	-	-	-	-	-
80 to 85	82.5	9	148	55	212	212	0	72.0	76.0	2,205	0	2,205	-	-	-	-	-	-	2,205	212	0	74.0	85.0	1,785	0	1,785	-	-	-	-	-	-	-	-	-
75 to 80	77.5	38	215	93	346	346	0	72.0	76.0	1,903	0	1,903	-	-	-	-	-	-	1,903	346	0	74.0	85.0	1,311	0	1,311	-	-	-	-	-	-	-	-	-
70 to 75	72.5	108	254	184	556	556	0	72.0	76.0	278	0	278	-	-	-	-	-	-	278	556	0	74.0	85.0	-	0	-	-	-	-	-	-	-	-	-	-
65 to 70	67.5	251	244	203	798	798	0	72.0	76.0	-	-	-	-	-	-	-	-	-	798	0	74.0	85.0	-	0	-	-	-	-	-	-	-	-	-	-	-
60 to 65	62.5	766	278	306	890	890	0	72.0	76.0	-	-	-	-	-	-	-	-	-	890	0	74.0	85.0	-	0	-	-	-	-	-	-	-	-	-	-	-
Total		762	1,178	973	2,913	2,913	0			6,392	0	6,392							6,392	2,913	0												4,776	0	4,776
HEATING																																			
55 to 60	57.5	50	141	68	259	259	0	73.0	73.0	4,014	0	4,015	-	-	-	-	-	-	4,015	259	0	68	55	2,719	0	2,719	-	-	-	-	-	-	-	-	-
50 to 55	52.5	94	203	147	444	444	0	73.0	73.0	9,107	0	9,107	-	-	-	-	-	-	9,107	444	0	68	55	6,887	0	6,887	-	-	-	-	-	-	-	-	-
45 to 50	47.5	95	125	151	375	375	0	73.0	73.0	9,460	0	9,462	-	-	-	-	-	-	9,462	375	0	68	55	7,605	0	7,605	-	-	-	-	-	-	-	-	-
40 to 45	42.5	201	140	218	559	559	0	73.0	73.0	17,049	0	17,050	-	-	-	-	-	-	17,050	559	0	68	55	14,254	0	14,254	-	-	-	-	-	-	-	-	-
35 to 40	37.5	240	197	186	620	620	0	73.0	73.0	37,070	0	37,070	-	-	-	-	-	-	37,070	620	0	68	55	18,910	0	18,910	-	-	-	-	-	-	-	-	-
30 to 35	32.5	205	211	193	609	609	0	73.0	73.0	24,665	0	24,665	-	-	-	-	-	-	24,665	609	0	68	55	21,619	0	21,619	-	-	-	-	-	-	-	-	-
25 to 30	27.5	124	133	128	437	437	0	73.0	73.0	19,883	0	19,884	-	-	-	-	-	-	19,884	437	0	68	55	17,698	0	17,698	-	-	-	-	-	-	-	-	-
20 to 25	22.5	235	97	147	474	474	0	73.0	73.0	23,937	0	23,937	-	-	-	-	-	-	23,937	474	0	68	55	21,567	0	21,567	-	-	-	-	-	-	-	-	-
15 to 20	17.5	99	61	53	213	213	0	73.0	73.0	11,821	0	11,822	-	-	-	-	-	-	11,822	213	0	68	55	10,756	0	10,756	-	-	-	-	-	-	-	-	-
10 to 15	12.5	45	17	28	70	70	0	73.0	73.0	5,445	0	5,445	-	-	-	-	-	-	5,445	70	0	68	55	4,995	0	4,995	-	-	-	-	-	-	-	-	-
5 to 10	7.5	29	5	15	49	49	0	73.0	73.0	3,208	0	3,210	-	-	-	-	-	-	3,210	49	0	68	55	2,964	0	2,964	-	-	-	-	-	-	-	-	-
0 to 5	2.5	9	1	1	11	11	0	73.0	73.0	775	0	776	-	-	-	-	-	-	776	11	0	68	55	720	0	720	-	-	-	-	-	-	-	-	-
5 to 0	(2.5)	-	-	-	-	-	-	-	73.0	73.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10 to 5	(7.5)	-	-	-	-	-	-	-	73.0	73.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15 to 10	(12.5)	-	-	-	-	-	-	-	73.0	73.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		1,426	1,123	1,387	4,136	4,136	0			151,375	0	151,375							151,375	4,136	0												130,683	0	130,683

MEMORIAL PARK BUILDING

Amb. Temp Bin [°F]	Ave Temp [°F]	01-08 Hours	09-16 Hours	17-24 hours	Total Bin Hours	Current Operating Schedule														Proposed Operating Schedule													
						Occup. Bin Hours	Unocc. Bin Hours	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Occup. Cooling Degree Hours [CDH-hrs]	Unocc. Cooling Degree Hours [CDH-hrs]	Total Cooling Degree Hours [CDH-hrs]	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Occup. Cooling Degree Hours [CDH-hrs]	Unocc. Cooling Degree Hours [CDH-hrs]	Total Cooling Degree Hours [CDH-hrs]	Occup. Bin Hours	Unocc. Bin Hours	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Occup. Cooling Degree Hours [CDH-hrs]	Unocc. Cooling Degree Hours [CDH-hrs]	Total Cooling Degree Hours [CDH-hrs]									
COOLING																																	
100 to 105	102.5	-	-	-	-	-	-	72.0	76.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
95 to 100	97.5	-	13	1	14	13	1	72.0	76.0	335	19	353	-	-	-	-	-	353	13	1	74.0	81.0	308	11	319	-	-	-	-				
90 to 95	92.5	-	19	4	23	19	4	71.0	75.0	400	14	413	-	-	-	-	-	413	19	4	74.0	81.0	361	26	387	-	-	-	-				
85 to 90	87.5	-	58	17	75	61	15	72.0	76.0	947	171	1,118	-	-	-	-	-	1,118	61	15	74.0	81.0	825	37	862	-	-	-	-				
80 to 85	82.5	9	146	55	210	133	37	72.0	76.0	1,605	371	1,976	-	-	-	-	-	1,976	133	37	74.0	81.0	1,299	57	1,356	-	-	-	-				
75 to 80	77.5	38	275	93	346	227	119	72.0	76.0	1,246	199	1,445	-	-	-	-	-	1,445	227	119	74.0	81.0	793	-	793	-	-	-	-				
70 to 75	72.5	108	254	184	546	278	278	72.0	76.0	139	-	139	-	-	-	-	-	139	278	278	74.0	81.0	-	-	-	-	-	-	-				
65 to 70	67.5	251	244	303	798	282	516	72.0	76.0	-	-	-	-	-	-	-	-	-	282	516	74.0	81.0	-	-	-	-	-	-	-				
60 to 65	62.5	316	278	306	899	266	634	72.0	76.0	-	-	-	-	-	-	-	-	-	266	634	74.0	81.0	-	-	-	-	-	-	-				
Total		762	1,578	973	2,913	1,380	1,533			6,673	768	5,473						5,473	1,380	1,533			1,587	74	8,661								
Amb. Temp Bin [°F]	Ave Temp [°F]	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occup. Bin Hours	Unocc. Bin Hours	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Occup. Heating Degree Hours [HDH-hrs]	Unocc. Heating Degree Hours [HDH-hrs]	Total Heating Degree Hours [HDH-hrs]	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Occup. Heating Degree Hours [HDH-hrs]	Unocc. Heating Degree Hours [HDH-hrs]	Total Heating Degree Hours [HDH-hrs]	Occup. Bin Hours	Unocc. Bin Hours	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Occup. Heating Degree Hours [HDH-hrs]	Unocc. Heating Degree Hours [HDH-hrs]	Total Heating Degree Hours [HDH-hrs]	Occup. Bin Hours	Unocc. Bin Hours	Occup. Heating Degree Hours [HDH-hrs]	Unocc. Heating Degree Hours [HDH-hrs]	Total Heating Degree Hours [HDH-hrs]				
HEATING																																	
55 to 60	57.5	50	141	68	259	149	110	75.0	71.0	2,818	1,916	4,533	-	-	-	-	4,533	149	110	68	55	1,570	-	1,570	-	-	-	-	-				
50 to 55	52.5	94	203	147	444	221	223	75.0	71.0	4,981	5,009	9,990	-	-	-	-	9,990	221	223	68	55	3,431	157	3,588	-	-	-	-	-				
45 to 50	47.5	46	125	151	321	144	177	75.0	71.0	3,917	6,144	10,203	-	-	-	-	10,203	144	177	68	55	2,949	1,708	4,657	-	-	-	-	-				
40 to 45	42.5	201	140	218	559	187	372	75.0	71.0	5,436	12,732	18,168	-	-	-	-	18,168	187	372	68	55	4,265	4,997	9,162	-	-	-	-	-				
35 to 40	37.5	740	187	188	1,115	315	800	75.0	71.0	8,081	15,168	23,249	-	-	-	-	23,249	315	800	68	55	6,573	7,079	13,652	-	-	-	-	-				
30 to 35	32.5	205	211	183	600	235	364	75.0	71.0	9,953	15,960	25,883	-	-	-	-	25,883	235	364	68	55	8,847	8,412	16,759	-	-	-	-	-				
25 to 30	27.5	124	111	178	413	157	256	75.0	71.0	7,408	13,288	20,746	-	-	-	-	20,746	157	256	68	55	6,369	7,893	14,262	-	-	-	-	-				
20 to 25	22.5	270	87	147	404	110	294	75.0	71.0	5,795	19,080	24,875	-	-	-	-	24,875	110	294	68	55	5,022	11,818	16,840	-	-	-	-	-				
15 to 20	17.5	99	61	53	213	68	145	75.0	71.0	3,888	6,959	10,248	-	-	-	-	10,248	68	145	68	55	3,415	5,452	8,867	-	-	-	-	-				
10 to 15	12.5	45	17	28	90	30	60	75.0	71.0	1,281	4,444	5,625	-	-	-	-	5,625	30	70	68	55	1,118	2,354	3,472	-	-	-	-	-				
5 to 10	7.5	29	5	15	49	7	42	75.0	71.0	444	2,843	3,308	-	-	-	-	3,308	7	42	68	55	416	2,207	2,623	-	-	-	-	-				
0 to 5	2.5	9	1	1	11	1	10	75.0	71.0	80	716	796	-	-	-	-	796	1	10	68	55	74	518	592	-	-	-	-	-				
5 to 10	(2.5)	-	-	-	-	-	-	75.0	71.0	-	-	-	-	-	-	-	-	-	-	-	68	55	-	-	-	-	-	-	-	-			
10 to 15	(7.5)	-	-	-	-	-	-	75.0	71.0	-	-	-	-	-	-	-	-	-	-	-	68	55	-	-	-	-	-	-	-	-			
15 to 20	(12.5)	-	-	-	-	-	-	75.0	71.0	-	-	-	-	-	-	-	-	-	-	-	68	55	-	-	-	-	-	-	-	-			
Total		1,426	1,523	1,387	4,136	1,476	2,660			54,043	105,902	155,645						155,645	1,476	2,660			43,568	53,083	96,651								

DPW OFFICE

Current Operating Schedule													Proposed Operating Schedule													
Amb. Temp Bin [°F]	Ave Temp [°F]	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occup Bin Hours	Unocc Bin Hours	Occup Indoor Temp [°F]	Unocc Indoor Temp [°F]	Occup Cooling Degree Hours (CD-Hrs)	Unocc Cooling Degree Hours (CD-Hrs)	Total Cooling Degree Hours (CD-Hrs)	Occup Bin Hours	Unocc Bin Hours	Occup Indoor Temp [°F]	Unocc Indoor Temp [°F]	Occup Cooling Degree Hours (CD-Hrs)	Unocc Cooling Degree Hours (CD-Hrs)	Total Cooling Degree Hours (CD-Hrs)	Occup Bin Hours	Unocc Bin Hours	Occup Indoor Temp [°F]	Unocc Indoor Temp [°F]	Occup Cooling Degree Hours (CD-Hrs)	Unocc Cooling Degree Hours (CD-Hrs)	Total Cooling Degree Hours (CD-Hrs)
COOLING																										
Building																										
100 to 105	102.5	-	-	-	-	-	-	72.0	76.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
95 to 100	97.5	-	13	1	14	14	0	72.0	76.0	35.7	0	35.7	14	0	74.0	85.0	329	0	329	14	0	74.0	85.0	329	0	
90 to 95	92.5	-	19	4	23	23	0	72.0	76.0	47.1	0	47.1	23	0	74.0	85.0	475	0	475	23	0	74.0	85.0	475	0	
85 to 90	87.5	-	59	17	76	76	0	72.0	76.0	1,178	0	1,178	76	0	74.0	85.0	1,026	0	1,026	76	0	74.0	85.0	1,026	0	
80 to 85	82.5	9	146	33	188	188	0	72.0	76.0	2,205	0	2,205	188	0	74.0	85.0	1,785	0	1,785	188	0	74.0	85.0	1,785	0	
75 to 80	77.5	18	215	83	316	316	0	72.0	76.0	1,903	0	1,903	316	0	74.0	85.0	1,311	0	1,311	316	0	74.0	85.0	1,311	0	
70 to 75	72.5	108	254	184	546	546	0	72.0	76.0	278	0	278	546	0	74.0	85.0	-	0	-	546	0	74.0	85.0	-	0	
65 to 70	67.5	251	244	353	798	798	0	72.0	76.0	-	0	-	798	0	74.0	85.0	-	0	-	798	0	74.0	85.0	-	0	
60 to 65	62.5	356	228	326	890	890	0	72.0	76.0	-	0	-	890	0	74.0	85.0	-	0	-	890	0	74.0	85.0	-	0	
Total		762	1,178	973	2,913	2,913	0			6,992	0	6,992	2,913	0					6,992	2,913	0				6,992	
Building																										
100 to 105	102.5	-	-	-	-	-	-	72.0	76.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
95 to 100	97.5	-	13	1	14	14	0	72.0	76.0	35.7	0	35.7	14	0	74.0	85.0	329	0	329	14	0	74.0	85.0	329	0	
90 to 95	92.5	-	19	4	23	23	0	72.0	76.0	47.1	0	47.1	23	0	74.0	85.0	475	0	475	23	0	74.0	85.0	475	0	
85 to 90	87.5	-	59	17	76	76	0	72.0	76.0	1,178	0	1,178	76	0	74.0	85.0	1,026	0	1,026	76	0	74.0	85.0	1,026	0	
80 to 85	82.5	9	146	33	188	188	0	72.0	76.0	2,205	0	2,205	188	0	74.0	85.0	1,785	0	1,785	188	0	74.0	85.0	1,785	0	
75 to 80	77.5	18	215	83	316	316	0	72.0	76.0	1,903	0	1,903	316	0	74.0	85.0	1,311	0	1,311	316	0	74.0	85.0	1,311	0	
70 to 75	72.5	108	254	184	546	546	0	72.0	76.0	278	0	278	546	0	74.0	85.0	-	0	-	546	0	74.0	85.0	-	0	
65 to 70	67.5	251	244	353	798	798	0	72.0	76.0	-	0	-	798	0	74.0	85.0	-	0	-	798	0	74.0	85.0	-	0	
60 to 65	62.5	356	228	326	890	890	0	72.0	76.0	-	0	-	890	0	74.0	85.0	-	0	-	890	0	74.0	85.0	-	0	
Total		762	1,178	973	2,913	2,913	0			6,992	0	6,992	2,913	0					6,992	2,913	0				6,992	
Building																										
100 to 105	102.5	-	-	-	-	-	-	72.0	76.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
95 to 100	97.5	-	13	1	14	14	0	72.0	76.0	35.7	0	35.7	14	0	74.0	85.0	329	0	329	14	0	74.0	85.0	329	0	
90 to 95	92.5	-	19	4	23	23	0	72.0	76.0	47.1	0	47.1	23	0	74.0	85.0	475	0	475	23	0	74.0	85.0	475	0	
85 to 90	87.5	-	59	17	76	76	0	72.0	76.0	1,178	0	1,178	76	0	74.0	85.0	1,026	0	1,026	76	0	74.0	85.0	1,026	0	
80 to 85	82.5	9	146	33	188	188	0	72.0	76.0	2,205	0	2,205	188	0	74.0	85.0	1,785	0	1,785	188	0	74.0	85.0	1,785	0	
75 to 80	77.5	18	215	83	316	316	0	72.0	76.0	1,903	0	1,903	316	0	74.0	85.0	1,311	0	1,311	316	0	74.0	85.0	1,311	0	
70 to 75	72.5	108	254	184	546	546	0	72.0	76.0	278	0	278	546	0	74.0	85.0	-	0	-	546	0	74.0	85.0	-	0	
65 to 70	67.5	251	244	353	798	798	0	72.0	76.0	-	0	-	798	0	74.0	85.0	-	0	-	798	0	74.0	85.0	-	0	
60 to 65	62.5	356	228	326	890	890	0	72.0	76.0	-	0	-	890	0	74.0	85.0	-	0	-	890	0	74.0	85.0	-	0	
Total		762	1,178	973	2,913	2,913	0			6,992	0	6,992	2,913	0					6,992	2,913	0				6,992	
Building																										
100 to 105	102.5	-	-	-	-	-	-	72.0	76.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
95 to 100	97.5	-	13	1	14	14	0	72.0	76.0	35.7	0	35.7	14	0	74.0	85.0	329	0	329	14	0	74.0	85.0	329	0	
90 to 95	92.5	-	19	4	23	23	0	72.0	76.0	47.1	0	47.1	23	0	74.0	85.0	475	0	475	23	0	74.0	85.0	475	0	
85 to 90	87.5	-	59	17	76	76	0	72.0	76.0	1,178	0	1,178	76	0	74.0	85.0	1,026	0	1,026	76	0	74.0	85.0	1,026	0	
80 to 85	82.5	9	146	33	188	188	0	72.0	76.0	2,205	0	2,205	188	0	74.0	85.0	1,785	0	1,785	188	0	74.0	85.0	1,785	0	
75 to 80	77.5	18	215	83	316	316	0	72.0	76.0	1,903	0	1,903	316	0	74.0	85.0	1,311	0	1,311	316	0	74.0	85.0	1,311	0	
70 to 75	72.5	108	254	184	546	546	0	72.0	76.0	278	0	278	546	0	74.0	85.0	-	0	-	546	0	74.0	85.0	-	0	
65 to 70	67.5	251	244	353	798	798	0	72.0	76.0	-	0	-	798	0	74.0	85.0	-	0	-	798	0	74.0	85.0	-	0	
60 to 65	62.5	356	228	326	890	890	0	72.0	76.0	-	0	-	890	0	74.0	85.0	-	0	-	890	0	74.0	85.0	-	0	
Total		762	1,178	973	2,913	2,913	0			6,992	0	6,992	2,913	0					6,992	2,913	0				6,992	
Building																										
100 to 105	102.5	-	-	-	-	-	-	72.0	76.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
95 to 100	97.5	-	13	1	14	14	0	72.0	76.0	35.7	0	35.7	14	0	74.0	85.0	329	0	329	14	0	74.0	85.0	329	0	
90 to 95	92.5	-	19	4	23	23	0	72.0	76.0	47.1	0	47.1	23	0	74.0	85.0	475	0	475	23	0	74.0	85.0	475	0	
85 to 90	87.5	-	59	17	76	76	0	72.0	76.0	1,178	0	1,178	76	0	74.0	85.0	1,026	0	1,026	76	0	74.0	85.0	1,026	0	
80 to 85	82.5	9	146	33	188	188	0	72.0	76.0	2,205	0	2,205	188	0	74.0	85.0	1,785	0	1,785	188	0	74.0	85.0	1,785	0	
75 to 80	77.5	18	215	83	316	316	0	72.0	76.0	1,903	0	1,903	316	0	74.0	85.0	1,311	0	1,311	316	0	74.0	85.0	1,311	0	
70 to 75	72.5	108	254	184	546	546	0	72.0	76.0	278	0	278	546	0	74.0	85.0	-	0	-	546	0	74.0	85.0	-	0	
65 to 70	67.5	251	244	353	798	798	0	72.0	76.0	-	0	-	798	0	74.0	85.0	-	0	-	798	0	74.0	85.0	-	0	
60 to 65	62.5	356	228	326	890	890	0	72.0	76.0	-	0	-	890	0	74.0	85.0	-	0	-	890	0	74.0	85.0	-	0	
Total		762	1,178	973	2,913	2,913	0			6,992	0	6,992	2,913	0					6,992	2,913	0				6,992	
Building																										
100 to 105	102.5	-	-	-	-	-	-	72.0	76.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
95 to 100	97.5	-	13	1	14	14	0	72.0	76.0	35.7	0	35.7	14	0	74.0	85.0	329	0	329	14	0	74.0	85.0	329	0	
90 to 95	92.5	-	19	4	23	23	0	72.0	76.0	47.1	0	47.1	23	0	74.0	85.0	475	0	475	23	0	74.0	85.0	475	0	
85 to 90	87.5	-	59	17	76	76	0	72.0	76.0	1,178	0	1,178	76	0	74.0	85.0	1,026	0	1,026	76	0	74.0	85.0	1,026	0	
80 to 85	82.5	9	146	33	188	188	0	72.0	76.0	2,205	0	2,205	188	0	74.0	85.0	1,785	0	1,785	188	0	74.0	85.0	1,785	0	
75 to 80	77.5	18	215	83	316	316	0	72.0	76.0	1,903	0	1,903	316	0	74.0	85.0	1,311	0	1,311	316	0	74.0	85.0	1,311	0	
70 to 75	72.5	108	254	184	546	546	0	72.0	76.0	278	0	278	546	0	74.0	85.0	-	0	-	546	0	74.0	85.0	-	0	
65 to 70	67.5	251	244	353	798	798	0	72.0	76.0	-	0	-	798	0	74.0	85.0	-	0	-	798	0	74.0	85.0	-	0	
60 to 65	62.5	356	228	326	890	890	0	72.0	76.0	-	0	-	890	0	74.0	85.0	-	0	-	890	0	74.0	85.0	-	0	
Total		762	1,178	973	2,913	2,913	0			6,992	0	6,992	2,913	0					6,992	2,913	0				6,992	
Building																										
100 to 105	102.5	-	-	-	-	-	-	72.0	76.0	-	-	-	-	-	-	-										

AMBULANCE CORPS BUILDING

Current Operating Schedule														Proposed Operating Schedule																	
Amb. Temp Bin [°F]	Ave Temp [°F]	01-08 hours	09-16 hours	17-24 hours	Total Bin Hours	Occup. Bin Hours	Unocc. Bin Hours	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Occup. Cooling Degree Hours (CD-Hrs)	Unocc. Cooling Degree Hours (CD-Hrs)	Total Cooling Degree Hours (CD-Hrs)	Total Cooling Degree Hours (CD-Hrs)	Occup. Bin Hours	Unocc. Bin Hours	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Occup. Cooling Degree Hours (CD-Hrs)	Unocc. Cooling Degree Hours (CD-Hrs)	Total Cooling Degree Hours (CD-Hrs)	Total Cooling Degree Hours (CD-Hrs)	Occup. Bin Hours	Unocc. Bin Hours	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Occup. Cooling Degree Hours (CD-Hrs)	Unocc. Cooling Degree Hours (CD-Hrs)	Total Cooling Degree Hours (CD-Hrs)	Total Cooling Degree Hours (CD-Hrs)		
COOLING																															
100 to 105	102.5	-	-	-	-	-	-	-	-	72.0	76.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
95 to 100	97.5	-	13	1	14	14	0	72.0	76.0	357	0	357	-	-	-	-	-	-	-	-	357	14	0	76.0	83.0	329	0	329	-	-	
90 to 95	92.5	-	13	4	23	23	0	72.0	76.0	471	0	471	-	-	-	-	-	-	-	-	471	33	0	76.0	83.0	475	0	475	-	-	
85 to 90	87.5	-	16	17	76	76	0	72.0	76.0	1,178	0	1,178	-	-	-	-	-	-	-	-	1,178	76	0	76.0	83.0	1,026	0	1,026	-	-	
80 to 85	82.5	9	146	55	210	210	0	72.0	76.0	2,205	0	2,205	-	-	-	-	-	-	-	-	2,205	210	0	76.0	83.0	1,783	0	1,783	-	-	
75 to 80	77.5	38	215	88	346	346	0	72.0	76.0	1,903	0	1,903	-	-	-	-	-	-	-	-	1,903	346	0	76.0	83.0	1,211	0	1,211	-	-	
70 to 75	72.5	108	254	184	556	556	0	72.0	76.0	278	-	278	-	-	-	-	-	-	-	-	278	556	0	76.0	83.0	-	-	-	-	-	
65 to 70	67.5	251	244	303	798	798	0	72.0	76.0	-	-	-	-	-	-	-	-	-	-	-	798	-	0	76.0	83.0	-	-	-	-	-	
60 to 65	62.5	356	228	306	890	890	0	72.0	76.0	-	-	-	-	-	-	-	-	-	-	-	890	-	0	76.0	83.0	-	-	-	-	-	
Total		762	1,178	873	2,813	2,813	0			6,982	0	6,982									6,982	2,813	0				4,776	0	4,776		
Amb. Temp Bin [°F]	Ave Temp [°F]	01-08 hours	09-16 hours	17-24 hours	Total Bin Hours	Occup. Bin Hours	Unocc. Bin Hours	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Occup. Heating Degree Hours (HD-Hrs)	Unocc. Heating Degree Hours (HD-Hrs)	Total Heating Degree Hours (HD-Hrs)	Total Heating Degree Hours (HD-Hrs)	Occup. Bin Hours	Unocc. Bin Hours	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Occup. Heating Degree Hours (HD-Hrs)	Unocc. Heating Degree Hours (HD-Hrs)	Total Heating Degree Hours (HD-Hrs)	Total Heating Degree Hours (HD-Hrs)	Occup. Bin Hours	Unocc. Bin Hours	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Occup. Heating Degree Hours (HD-Hrs)	Unocc. Heating Degree Hours (HD-Hrs)	Total Heating Degree Hours (HD-Hrs)	Total Heating Degree Hours (HD-Hrs)		
HEATING																															
55 to 60	57.5	50	141	68	259	259	0	75.0	75.0	4,532	0	4,533	-	-	-	-	-	-	-	-	4,533	259	0	68	55	2,719	-	2,719	-	-	
50 to 55	52.5	94	303	147	444	444	0	75.0	75.0	9,990	0	9,990	-	-	-	-	-	-	-	-	9,990	444	0	68	55	6,882	-	6,882	-	-	
45 to 50	47.5	95	125	151	371	371	0	75.0	75.0	10,203	0	10,203	-	-	-	-	-	-	-	-	10,203	371	0	68	55	7,605	-	7,605	-	-	
40 to 45	42.5	201	140	218	559	559	0	75.0	75.0	18,147	0	18,148	-	-	-	-	-	-	-	-	18,148	559	0	68	55	14,254	-	14,254	-	-	
35 to 40	37.5	140	132	186	458	458	0	75.0	75.0	23,250	0	23,250	-	-	-	-	-	-	-	-	23,250	458	0	68	55	18,910	-	18,910	-	-	
30 to 35	32.5	205	211	283	699	699	0	75.0	75.0	25,882	0	25,883	-	-	-	-	-	-	-	-	25,883	699	0	68	55	21,619	-	21,619	-	-	
25 to 30	27.5	124	135	178	437	437	0	75.0	75.0	20,757	0	20,758	-	-	-	-	-	-	-	-	20,758	437	0	68	55	17,698	-	17,698	-	-	
20 to 25	22.5	235	92	147	474	474	0	75.0	75.0	24,885	0	24,885	-	-	-	-	-	-	-	-	24,885	474	0	68	55	21,567	-	21,567	-	-	
15 to 20	17.5	99	61	19	219	219	0	75.0	75.0	12,247	0	12,248	-	-	-	-	-	-	-	-	12,248	219	0	68	55	10,756	-	10,756	-	-	
10 to 15	12.5	45	17	28	90	90	0	75.0	75.0	5,625	0	5,625	-	-	-	-	-	-	-	-	5,625	90	0	68	55	4,995	-	4,995	-	-	
5 to 10	7.5	29	5	15	49	49	0	75.0	75.0	3,107	0	3,108	-	-	-	-	-	-	-	-	3,108	49	0	68	55	2,964	-	2,964	-	-	
0 to 5	2.5	9	1	1	11	11	0	75.0	75.0	797	0	798	-	-	-	-	-	-	-	-	798	11	0	68	55	720	-	720	-	-	
5 to 0	(2.5)	-	-	-	-	-	-	75.0	75.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10 to -5	(7.5)	-	-	-	-	-	-	75.0	75.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
15 to -10	(12.5)	-	-	-	-	-	-	75.0	75.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total		1,426	1,323	1,387	4,136	4,136	0			159,645	0	159,645									159,645	4,136	0				130,653	0	130,653		

OSDEN ENGINE COMPANY

Current Operating Schedule														Proposed Operating Schedule																
Amb. Temp Bin [°F]	Air Temp [°F]	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occup. Bin Hours	Unocc. Bin Hours	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Occup. Cooling Degree Hours [CD-Hrs]	Unocc. Cooling Degree Hours [CD-Hrs]	Total Cooling Degree Hours [CD-Hrs]	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Occup. Cooling Degree Hours [CD-Hrs]	Unocc. Cooling Degree Hours [CD-Hrs]	Total Cooling Degree Hours [CD-Hrs]	Occup. Bin Hours	Unocc. Bin Hours	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Occup. Heating Degree Hours [HD-Hrs]	Unocc. Heating Degree Hours [HD-Hrs]	Total Heating Degree Hours [HD-Hrs]	Occup. Bin Hours	Unocc. Bin Hours	Occup. Heating Degree Hours [HD-Hrs]	Unocc. Heating Degree Hours [HD-Hrs]	Total Heating Degree Hours [HD-Hrs]	
COOLING														COOLING																
100 to 105	102.5	-	-	-	-	-	-	72.0	76.0	-	-	-	-	-	-	-	-	-	-	-	74.0	81.0	-	-	-	-	-	-	-	-
95 to 100	97.5	-	13	1	14	14	0	72.0	76.0	357	0	357	-	-	-	-	-	357	14	0	74.0	85.0	329	0	329	0	329	0	329	
90 to 95	92.5	-	19	4	23	23	0	72.0	76.0	471	0	471	-	-	-	-	-	471	23	0	74.0	85.0	425	0	425	0	425	0	425	
85 to 90	87.5	-	54	17	71	71	0	72.0	76.0	1,178	0	1,178	-	-	-	-	-	1,178	71	0	74.0	85.0	1,026	0	1,026	0	1,026	0	1,026	
80 to 85	82.5	9	146	33	210	210	0	72.0	76.0	2,205	0	2,205	-	-	-	-	-	2,205	210	0	74.0	85.0	1,785	0	1,785	0	1,785	0	1,785	
75 to 80	77.5	38	215	33	346	346	0	72.0	76.0	1,903	0	1,903	-	-	-	-	-	1,903	346	0	74.0	85.0	1,311	0	1,311	0	1,311	0	1,311	
70 to 75	72.5	108	254	154	516	516	0	72.0	76.0	278	0	278	-	-	-	-	-	278	516	0	74.0	85.0	-	0	-	0	-	0	-	
65 to 70	67.5	251	244	803	798	798	0	72.0	76.0	-	-	-	-	-	-	-	-	798	0	74.0	85.0	-	-	-	-	-	-	-	-	
60 to 65	62.5	336	218	306	860	860	0	72.0	76.0	-	-	-	-	-	-	-	-	860	0	74.0	85.0	-	-	-	-	-	-	-	-	
Total		762	1,178	973	2,913	2,913	0			6,982	0	6,982						6,982	2,913	0			4,776	0	4,776	0	4,776	0	4,776	
HEATING														HEATING																
55 to 60	57.5	50	141	68	259	259	0	70.0	70.0	3,237	0	3,238	-	-	-	-	-	3,238	259	0	68	55	2,719	0	2,719	0	2,719	0	2,719	
50 to 55	52.5	94	303	147	444	444	0	70.0	70.0	7,770	0	7,770	-	-	-	-	-	7,770	444	0	68	55	6,887	0	6,887	0	6,887	0	6,887	
45 to 50	47.5	95	125	151	371	371	0	70.0	70.0	8,847	0	8,848	-	-	-	-	-	8,848	371	0	68	55	7,805	0	7,805	0	7,805	0	7,805	
40 to 45	42.5	201	140	218	559	559	0	70.0	70.0	15,972	0	15,973	-	-	-	-	-	15,973	559	0	68	55	14,254	0	14,254	0	14,254	0	14,254	
35 to 40	37.5	140	110	138	400	400	0	70.0	70.0	20,150	0	20,150	-	-	-	-	-	20,150	400	0	68	55	18,610	0	18,610	0	18,610	0	18,610	
30 to 35	32.5	205	211	193	609	609	0	70.0	70.0	22,837	0	22,838	-	-	-	-	-	22,838	609	0	68	55	21,619	0	21,619	0	21,619	0	21,619	
25 to 30	27.5	124	133	178	437	437	0	70.0	70.0	18,572	0	18,573	-	-	-	-	-	18,573	437	0	68	55	17,698	0	17,698	0	17,698	0	17,698	
20 to 25	22.5	235	92	147	474	474	0	70.0	70.0	22,315	0	22,315	-	-	-	-	-	22,315	474	0	68	55	21,567	0	21,567	0	21,567	0	21,567	
15 to 20	17.5	99	61	13	213	213	0	70.0	70.0	11,180	0	11,180	-	-	-	-	-	11,180	213	0	68	55	10,754	0	10,754	0	10,754	0	10,754	
10 to 15	12.5	45	17	28	90	90	0	70.0	70.0	5,175	0	5,175	-	-	-	-	-	5,175	90	0	68	55	4,995	0	4,995	0	4,995	0	4,995	
5 to 10	7.5	29	5	15	49	49	0	70.0	70.0	3,062	0	3,063	-	-	-	-	-	3,063	49	0	68	55	2,964	0	2,964	0	2,964	0	2,964	
0 to 5	2.5	9	1	1	11	11	0	70.0	70.0	742	0	743	-	-	-	-	-	743	11	0	68	55	720	0	720	0	720	0	720	
10 to 0	(2.5)	-	-	-	-	-	0	70.0	70.0	-	-	-	-	-	-	-	-	-	-	68	55	-	-	-	-	-	-	-	-	
15 to -10	(7.5)	-	-	-	-	-	0	70.0	70.0	-	-	-	-	-	-	-	-	-	-	68	55	-	-	-	-	-	-	-	-	
15 to -10	(12.5)	-	-	-	-	-	0	70.0	70.0	-	-	-	-	-	-	-	-	-	-	68	55	-	-	-	-	-	-	-	-	
Total		1,426	1,323	1,387	4,136	4,136	0			138,965	0	138,965						138,965	4,136	0			130,693	0	130,693	0	130,693	0	130,693	

POOL HOUSE AND OFFICES AT GOULD PARK (SEASONAL)

Current Operating Schedule																Proposed Operating Schedule																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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										Current Operating Schedule													Proposed Operating Schedule												
Amb. Temp Bin [°F]	Amb Temp [°F]	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Unocc. Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Unocc. Cooling Degree Hours (CDH-Hrs)	Unocc. Heating Degree Hours (HDH-Hrs)	Total Cooling Degree Hours (CDH-Hrs)	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Unocc. Cooling Degree Hours (CDH-Hrs)	Unocc. Heating Degree Hours (HDH-Hrs)	Total Cooling Degree Hours (CDH-Hrs)	Total Heating Degree Hours (HDH-Hrs)	Occup. Bin Hours	Unocc. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Unocc. Cooling Degree Hours (CDH-Hrs)	Unocc. Heating Degree Hours (HDH-Hrs)	Total Cooling Degree Hours (CDH-Hrs)	Total Heating Degree Hours (HDH-Hrs)												
COOLING																																			
100 to 105	102.5	-	-	-	-	-	-	72.0	76.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-											
95 to 100	97.5	-	13	1	14	13	1	72.0	76.0	355	19	353	-	-	-	-	-	353	13	1	74.0	85.0	308	11	31										
90 to 95	92.5	-	-	-	-	-	-	72.0	76.0	400	54	457	-	-	-	-	-	457	19	4	74.0	85.0	36	26	38										
85 to 90	87.5	-	-	-	-	-	-	72.0	76.0	947	171	1,118	-	-	-	-	-	1,118	61	17	74.0	85.0	823	91	94										
80 to 85	82.5	9	146	53	223	133	57	72.0	76.0	1,605	371	1,976	-	-	-	-	-	1,976	153	57	74.0	85.0	1,299	179	179										
75 to 80	77.5	8	715	345	1,060	227	119	72.0	76.0	1,246	179	1,425	-	-	-	-	-	1,425	227	119	74.0	85.0	993	179	179										
70 to 75	72.5	108	234	194	546	226	278	72.0	76.0	339	-	139	-	-	-	-	-	139	238	278	74.0	85.0	-	-	-										
65 to 70	67.5	251	244	303	798	282	316	72.0	76.0	-	-	-	-	-	-	-	-	282	316	74.0	85.0	-	-	-											
60 to 65	62.5	305	728	106	892	266	624	72.0	76.0	-	-	-	-	-	-	-	-	266	624	74.0	85.0	-	-	-											
Total			762	1,178	973	2,913	1,300	1,613	4,673	768	5,472	-	-	-	-	-	-	5,473	1,300	1,613	3,587	76	846	-	-										
Amb. Temp Bin [°F]	Amb Temp [°F]	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Unocc. Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Unocc. Heating Degree Hours (HDH-Hrs)	Unocc. Cooling Degree Hours (CDH-Hrs)	Total Heating Degree Hours (HDH-Hrs)	Occup. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Unocc. Heating Degree Hours (HDH-Hrs)	Unocc. Cooling Degree Hours (CDH-Hrs)	Total Heating Degree Hours (HDH-Hrs)	Total Cooling Degree Hours (CDH-Hrs)	Occup. Bin Hours	Unocc. Indoor Temp [°F]	Unocc. Indoor Temp [°F]	Unocc. Heating Degree Hours (HDH-Hrs)	Unocc. Cooling Degree Hours (CDH-Hrs)	Total Heating Degree Hours (HDH-Hrs)	Total Cooling Degree Hours (CDH-Hrs)												
HEATING																																			
55 to 60	57.5	50	141	68	259	149	110	70.0	1,868	1,369	3,238	-	-	-	-	-	-	3,238	149	110	68	55	1,570	-	1,570										
50 to 55	52.5	94	203	147	444	221	223	70.0	3,874	3,896	7,770	-	-	-	-	-	-	7,770	221	223	68	55	3,431	557	3,988										
45 to 50	47.5	95	125	151	372	144	227	70.0	3,237	5,110	8,348	-	-	-	-	-	-	8,348	144	227	68	55	2,849	1,203	4,053										
40 to 45	42.5	201	140	2	234	187	292	70.0	5,599	10,773	15,373	-	-	-	-	-	-	15,373	187	292	68	55	4,265	4,807	9,072										
35 to 40	37.5	142	61	137	340	213	429	70.0	1,004	13,146	20,146	-	-	-	-	-	-	20,146	213	429	68	55	6,373	12,091	18,464										
30 to 35	32.5	205	211	183	609	285	374	70.0	8,817	14,020	22,838	-	-	-	-	-	-	22,838	285	374	68	55	8,847	16,715	25,562										
25 to 30	27.5	124	153	178	457	157	280	70.0	6,863	11,889	18,757	-	-	-	-	-	-	18,757	157	280	68	55	6,869	7,833	14,702										
20 to 25	22.5	235	92	167	432	150	364	70.0	3,243	17,477	20,721	-	-	-	-	-	-	20,721	110	364	68	55	3,077	11,818	15,895										
15 to 20	17.5	99	61	113	215	88	195	70.0	1,558	7,842	11,400	-	-	-	-	-	-	11,400	88	195	68	55	1,543	5,432	6,975										
10 to 15	12.5	45	17	28	90	30	70	70.0	1,179	3,996	5,175	-	-	-	-	-	-	5,175	20	70	68	55	1,138	2,154	4,091										
5 to 10	7.5	29	5	15	49	7	42	70.0	430	2,613	1,063	-	-	-	-	-	-	1,063	7	42	68	55	416	2,001	2,417										
0 to 5	2.5	9	1	1	11	1	10	70.0	76	647	243	-	-	-	-	-	-	243	1	10	68	55	74	518	592										
-5 to 0	(2.5)	-	-	-	-	-	-	70.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
-10 to -5	(7.5)	-	-	-	-	-	-	70.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
-15 to -10	(13.5)	-	-	-	-	-	-	70.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
Total		1,436	1,133	1,387	4,136	1,406	2,645	46,561	32,404	138,563	-	-	-	-	-	-	-	138,563	1,496	2,640	45,568	11,083	96,344	-	-										

SAVINGS SUMMARY

Building ID	kWh Savings	kW Savings	Thermal Savings	High-Water Savings Factor	Low-Water Savings Factor
	kWh	kW	Therms		
Public Library	6,731	-	2,214	10.0%	10.0%
Village Hall	4,409	-	903	10.0%	10.0%
Memorial Park Building	36	-	124	10.0%	10.0%
Town Office	138	-	771	10.0%	10.0%
Ambulance Corps Building	226	-	96.2	10.0%	10.0%
Ogden Engine Company	256	-	199	10.0%	10.0%
Post House and Offices at Gould Park	374	-	311	10.0%	10.0%
Swimmers Club	1,202	-	791	10.0%	10.0%
Subtotal	15,143	-	6,375		

Village of Dobbs Ferry
Exhibit D-5-9
ECM 9 - Building Envelope Improvements
Building Envelope LxL

Building	Report Group	Task	Units	Crack Size	Units2	LF/ Unit	Crack Length (LF)	Leakage Area (SF)	Savings (CFM)	Total Savings (MMBtu)
Ambulance Corps Building	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	2	1/24	2	20.0	40.0	0.1	0.0	0.0
Ambulance Corps Building	Garage Door Weather Stripping	Overhead Door Weather Strip - Sides, Top	2	1/24	2	34.0	68.0	0.2	31.4	5.4
					0		0.0	0.0	0.0	0.0
Embassy Community Center	Door Weather Stripping	Single Door - Sweep (UT)	3	1/12	3	3.0	9.0	0.1	0.0	0.0
Embassy Community Center	Caulking	Interior Seal Oversized (LF)	17	1/8	17	1.0	17.0	0.2	0.0	0.0
					0		0.0	0.0	0.0	0.0
Memorial Park Building	Attic Bypass Air Sealing	Install Soffit Baffles (UT)	48		48		0.0	0.0	0.0	0.0
Memorial Park Building	Attic Bypass Air Sealing	Seal (SF)	800	1/12	64	1.0	64.0	0.4	0.0	0.0
Memorial Park Building	Attic Bypass Air Sealing	Install New Attic Hatch (UT)	1		1		0.0	0.0	0.0	0.0
Memorial Park Building	Attic Insulation	12" Open Blow Cellulose (SF)	800		800		0.0	0.0	0.0	1.8
Memorial Park Building	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	2	1/12	2	20.0	40.0	0.3	0.0	0.0
Memorial Park Building	Door Weather Stripping	Install Door Jamb Spacer (UT)	2		2		0.0	0.0	0.0	0.0
Memorial Park Building	Caulking	Interior Seal (LF)	6	1/24	6	1.0	6.0	0.0	0.0	0.0
					0		0.0	0.0	0.0	0.0
Public Library	Door Weather Stripping	Double Door - Sweep, Center (UT)	5	1/8	5	13.0	65.0	0.7	0.0	0.0
					0		0.0	0.0	0.0	0.0
Ogden Engine Co.	Door Weather Stripping	Double Door - Sweep, Center (UT)	1	1/12	1	13.0	13.0	0.1	0.0	0.0
Ogden Engine Co.	Garage Door Weather Stripping	Overhead Door Weather Strip - Sides, Top	1	1/12	1	36.0	36.0	0.3	14.1	5.1
Ogden Engine Co.	Attic Bypass Air Sealing	Install New Attic Hatch (UT)	1	1/8	1	16.0	16.0	0.2	22.9	3.8
Ogden Engine Co.	Attic Bypass Air Sealing	Retrofit Existing Attic Hatch (UT)	1	1/12	1	10.0	10.0	0.1	3.1	1.4
Ogden Engine Co.	Wall Air Sealing	Block, Seal Exposed (SF)	40		40		0.0	0.0	0.0	0.1
					0		0.0	0.0	0.0	0.0
Village Hall	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	2	1/12	2	20.0	40.0	0.3	0.0	0.0
Village Hall	Door Weather Stripping	Double Door - Sides, Top, Sweep (UT)	1	1/12	1	26.0	26.0	0.2	0.0	0.0
Village Hall	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	1	1/12	1	33.0	33.0	0.2	0.0	0.0
Village Hall	Garage Door Weather Stripping	Overhead Door Weather Strip - Sides, Top	2	1/12	2	39.0	78.0	0.5	14.3	11.4
Village Hall	Window Weatherization	Double Hung Window Weatherization (UT)	15	1/24	15	19.0	285.0	1.0	135.7	22.7
Village Hall	Window Weatherization	Double Hung Window Weatherization (UT)	6	1/24	6	12.5	75.0	0.3	13.7	6.0
Village Hall	Window Weatherization	Double Hung Window Weatherization (UT)	3	1/24	3	21.2	63.5	0.2	10.2	5.1

ECM DESCRIPTION

Reduce building infiltration by weather stripping doors, sealing roof & wall joints, duct & piping penetrations, skylight perimeters and window corners. Install insulation where applicable.

DATA / ASSUMPTIONS

*Crack area determined by survey team

COMMISSIONING

Visual inspection per scope of work from subcontractor. Inspection might include smoke test.

RECOVERY/SAFETY FACTOR

Safety Factor (Electric) [%] =	0%
Safety Factor (Thermal) [%] =	0%

FORMULAE

$S_{SAVINGS} = ((1.08 \cdot Q_{EXISTING} \cdot \Delta T) - (1.08 \cdot Q_{PROPOSED} \cdot \Delta T)) \cdot T_{OCC/UNOCC}$

$Q_{PROPOSED} = A_{CRACK-PROPOSED} \cdot WD \cdot \sqrt{(C_{STACK} \cdot \Delta T + C_{WIND} \cdot (V_{WIND})^2)}$

$Q_{EXISTING} = A_{CRACK-EXISTING} \cdot WD \cdot \sqrt{(C_{STACK} \cdot \Delta T + C_{WIND} \cdot (V_{WIND})^2)}$

Variable	Units	Description
$S_{SAVINGS}$	BTU	Total sensible infiltration/exfiltration energy savings
$Q_{PROPOSED}$	CFM	Proposed infiltration/exfiltration air flow rate
$Q_{EXISTING}$	CFM	Existing infiltration/exfiltration air flow rate
ΔT	°F	Temperature difference between interior and exterior (based on bin data)
$T_{OCC/UNOCC}$	Hours	Occupied/unoccupied bin hours
V_{WIND}	MPH	Average wind speed
C_{WIND}	$CFM^2 / in^4 \cdot MPH^2$	Wind coefficient
WD	%	Wind diversity factor
C_{STACK}	$CFM^2 / in^4 \cdot °F$	Stack coefficient
$A_{CRACK-PROPOSED}$	in ²	Total crack area after retrofit
$A_{CRACK-EXISTING}$	in ²	Total crack area before retrofit

ASSUMPTIONS / DATA

Calculated Savings				
Building	Electric Savings [kWh]	Thermal Savings [Therms]	Electric De-Rate [%]	Thermal De-Rate [%]
Ambulance Corps. Building	145	81	0%	0%
Embassy Club	93	52	0%	0%
Memorial Park Building	821	188	0%	30%
Ogden Engine Company	266	133	0%	0%
Public Library	263	146	0%	0%
Village Hall	1,047	583	0%	0%
Totals	2,635	1,184		

kWh Savings		Natural Gas Therm Savings	
Ambulance Corp	145.5		81.0
Embassy Club	92.9		51.8
Memorial Park E	820.6		269.0
Ogden Engine C	266.2		133.2
Public Library	262.6		146.3
Village Hall	1,047.2		583.3
	2,635.1		1,264.7

SAVINGS SUMMARY

Building ID	kWh Savings	Thermal Savings	Electric Safety Factor	Thermal Safety Factor
	kWh	Therms	%	%
Public Library	263	146	0.0%	0.0%
Village Hall	1,047	583	0.0%	0.0%
Memorial Park Building	821	188	0.0%	30.0%
Ambulance Corps. Building	145	81	0.0%	0.0%
Ogden Engine Company	266	133	0.0%	0.0%
Embassy Club	93	52	0.0%	0.0%
Subtotal	2,635	1,184		

ECM DESCRIPTION

Insulate bare domestic hot water piping located in boiler rooms and in transition areas.

DATA / ASSUMPTIONS

Run Hours	4,136
* New Pipe Insulation Thermal Conductivity (k-factor)	0.27 BTU/ft ² °F ft
* Proposed boiler efficiencies are used for each building	

COMMISSIONING

Visual inspection per scope of work from subcontractor.

RECOVERY/SAFETY FACTOR

Thermal Safety Factor [N] =	Various
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FORMULAE

$T_{BASE} = ((Q_{CONV\,BASE} + Q_{RAD\,BASE}) - (Q_{CONV\,INS} + Q_{RAD\,INS})) \cdot t / 100,000$

Convection Analysis

$Q_{CONV\,INS} = h_{C\,INS} \cdot (\pi \cdot D_{INS} \cdot L_{PIPE}) \cdot (T_{INS} - T_{AMB})$
 $Q_{CONV\,BASE} = h_{C\,BASE} \cdot (\pi \cdot D_{BASE} \cdot L_{PIPE}) \cdot (T_{BASE} - T_{AMB})$
 $h_{C\,INS} = 0.27 \cdot ((T_{FILM\,INS} - T_{BASE}) / D_{INS})^{0.25}$
 $h_{C\,BASE} = 0.27 \cdot ((T_{BASE} - T_{AMB}) / D_{BASE})^{0.25}$
 $T_{FILM\,INS} = (T_{INS} + T_{AMB}) / 2$
 $T_{FILM\,BASE} = (T_{BASE} + T_{AMB}) / 2$

Iterative Insulation Surface Temp Analysis

$Q_{ITER} = ((T_{BASE} - T_{AMB}) \cdot 2 \cdot \pi) / [ln(D_{INS} / D_{BASE}) \cdot (1/k) + (1/(D_{INS} / 2 \cdot h_{INT}))]$
 $T_{INS} = T_{BASE} - Q_{ITER} \cdot ln(D_{INS} / D_{BASE}) \cdot (1/(2 \cdot \pi \cdot k))$
 $h_{ITER} = 0.27 \cdot (T_{INS} - T_{AMB}) / D_{INS})^{0.25}$

Radiation Analysis

$Q_{RAD\,INS} = \sigma \cdot \epsilon_{INS} \cdot (\pi \cdot D_{INS} \cdot L_{PIPE}) \cdot ((T_{INS} + 460)^4 - (T_{SURF} + 460)^4)$
 $Q_{RAD\,BASE} = \sigma \cdot \epsilon_{BASE} \cdot (\pi \cdot D_{BASE} \cdot L_{PIPE}) \cdot ((T_{BASE} + 460)^4 - (T_{SURF} + 460)^4)$
 $T_{SURF} = (T_{FLOOR} + T_{CEILING} + 2 \cdot T_{WALL}) / 4$

Village of Dobbs Ferry
 Exhibit D-5-10
 ECM 10 - Pipe Insulation
 Domestic Hot Water Piping Insulation

Variable	Units	Description
T_{SAV}	Therms	Total thermal savings
$Q_{CONV-INS}$	BTU/hr	Convective heat loss from insulated pipe
$Q_{CONV-BARE}$	BTU/hr	Convective heat loss from bare pipe
h_{C-INS}	BTU/hr-ft ² -°F	Natural convective insulated pipe heat transfer film coefficient
h_{C-BARE}	BTU/hr-ft ² -°F	Natural convective bare pipe heat transfer film coefficient
$T_{FILM-INS}$	°F	Average film temperature of insulated pipe
$T_{FILM-BARE}$	°F	Average film temperature of bare pipe
k	BTU/hr-ft-°F	Thermal conductivity of pipe insulation
Q_{ITER}	BTU/hr	Iterative heat loss
h_{ITER}	BTU/hr-ft ² -°F	Iterative natural convection heat transfer film coefficient
h_{INIT}	BTU/hr-ft ² -°F	Initial natural convection heat transfer film coefficient (for iterations)
t	hr	Duration of the heating season
$Q_{RAD-INS}$	BTU/hr	Net radiation heat loss from insulated pipe
$Q_{RAD-BARE}$	BTU/hr	Net radiation heat loss from bare pipe
σ	BTU/hr-ft ² -°R ⁴	Stefan-Boltzman constant (0.1713×10^{-8})
ϵ_{INS}	-	Emissivity of insulated pipe
ϵ_{BARE}	-	Emissivity of bare pipe
A_{INS}	ft ²	Surface area of insulated pipe
A_{BARE}	ft ²	Surface area of bare pipe
L_{PIPE}	ft	Pipe length
D_{INS}	ft	Diameter of insulated pipe
D_{BARE}	ft	Diameter of bare pipe
T_{AMB}	°F	Ambient air temperature
T_{INS}	°F	Surface temperature of insulated pipe
T_{BARE}	°F	Surface temperature of bare pipe
T_{SURR}	°F	Average Surrounding temperature
T_{FLOOR}	°F	Surrounding floor temperature
$T_{CEILING}$	°F	Surrounding ceiling temperature
T_{WALL}	°F	Surrounding wall temperature

CALCULATIONS

* inputs are in blue

Linear Feet of Pipe [ft] per Pipe Diameter Size [in]													
Building	14" Diameter	12" Diameter	8" Diameter	6" Diameter	5" Diameter	4" Diameter	3" Diameter	2.5" Diameter	2" Diameter	1.5" Diameter	1" Diameter	0.75" Diameter	0.5" Diameter
Ambulance Corps, Building	-	-	-	-	-	-	-	-	-	-	-	50.8	-
Totals	-	-	-	-	-	-	-	-	-	-	-	50.8	-

Ambulance Corps, Building	
Total Linear Feet of Insulation [ft]	50.8
Losses from Bare Pipe [BTU/hr]	1,595
Losses from Insulated Pipe [BTU/hr]	874
Proposed Boiler Efficiency [%]	78.0%
Thermal Savings [Therms/hr]	0.01
Safety Factor [%]	0%
Thermal Savings [Therms]	3.8

Village of Dobbs Ferry
Exhibit D-5-10
ECM 10 - Pipe Insulation
Domestic Hot Water Piping Insulation

Nominal Pipe Size (in)	14.00	10.00	8.00	6.00	5.00	4.00	3.00	2.50	2.00	1.50	1.00	0.75	0.50
Contact Temp. of Bare Pipe (Baseline) (°F)	120	120	120	120	120	120	120	120	120	120	120	120	120
Thickness of Insulation (in)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Insulation Thermal Conductivity (k-factor) (BTU/hr-ft ² -°F)	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270
Pipe Length (ft)	1	1	1	1	1	1	1	1	1	1	1	1	1
Hours of Operation (hr)	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136
Environment Temp (°F)	70	70	70	70	70	70	70	70	70	70	70	70	70
Contact Temp. of Floor (°F)	60	60	60	60	60	60	60	60	60	60	60	60	60
Contact Temp. of Ceiling (°F)	90	90	90	90	90	90	90	90	90	90	90	90	90
Contact Temp. of Walls (°F)	75	75	75	75	75	75	75	75	75	75	75	75	75
Initial Insulation Film Coefficient Estimate (BTU/hr-ft ² -°F)	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45
Emissivity of Bare Pipe	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Emissivity of Insulated Pipe	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Outside Diameter of Bare Pipe (in)	14.000	10.750	8.625	6.625	5.563	4.500	3.500	2.875	2.375	1.900	1.315	1.050	0.840
Outside Diameter of Insulated Pipe (in)	16.000	12.750	10.625	8.625	7.563	6.500	5.500	4.875	4.375	3.900	3.315	3.050	2.840
Characteristic Length of Bare Pipe (in)	1.167	0.866	0.719	0.542	0.464	0.375	0.292	0.240	0.198	0.158	0.110	0.088	0.070
Characteristic Length of Insulated Pipe (in)	1.333	1.063	0.885	0.719	0.630	0.542	0.458	0.406	0.365	0.325	0.276	0.254	0.237
Average Film Temp. of Bare Pipe (°F)	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0
Average Film Temp. of Insulated Pipe (°F)	91	90	90	90	90	89	89	89	88	88	88	87	87
Film Coefficient of Bare Pipe (BTU/hr-ft ² -°F)	0.651	0.788	0.780	0.838	0.870	0.917	0.977	1.026	1.076	1.138	1.248	1.320	1.386
Film Coefficient of Insulated Pipe (BTU/hr-ft ² -°F)	0.54	0.57	0.55	0.62	0.64	0.66	0.69	0.70	0.72	0.74	0.76	0.77	0.78
Convective Losses for Bare Pipe (BTU/hr-ft)	126.60	103.85	88.07	72.26	63.39	54.07	44.78	38.64	33.48	28.32	21.49	18.15	15.35
Convective Losses for Insulated Pipe (BTU/hr-ft)	56.10	47.16	41.02	34.95	31.58	28.09	24.68	22.46	20.63	18.83	16.53	15.44	14.35
Radiant Losses of Bare Pipe (BTU/hr-ft)	177	136	120	94	70	57	44	36	30	24	17	13	11
Radiant Losses of Insulated Pipe (BTU/hr-ft)	9	7	6	5	4	4	3	3	3	2	2	2	2
Total Losses of Bare Pipe (BTU/hr-ft)	303	239	207	166	134	111	89	75	63	52	38	31	26
Total Losses of Insulated Pipe (BTU/hr-ft)	65	55	47	40	36	32	28	25	23	21	18	17	16

INSULATION SURFACE TEMP. CALCULATION 14.0 inch pipe		1st Iteration Heat Loss (BTU/hr)	224
		1st Iteration Insulation Surface Temp. (°F)	102
		1st Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.599
		2nd Iteration Heat Loss (BTU/hr)	125
		2nd Iteration Insulation Surface Temp. (°F)	112
		2nd Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.629
		3rd Iteration Heat Loss (BTU/hr)	111
		3rd Iteration Insulation Surface Temp. (°F)	113
		3rd Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.637
		4th Iteration Heat Loss (BTU/hr)	110
		4th Iteration Insulation Surface Temp. (°F)	111
		4th Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.637
NPS Pipe Size (in)	14.00		
Bare Pipe Surface Temp. (°F)	120		
Initial Film Coefficient (BTU/hr-ft ² -°F)	1.45		
Insulation Thickness (in)	1.0		
Insulation k-factor (BTU/hr-ft ² -°F)	0.270		
Environment Temp. (°F)	70		
External Pipe Diameter (in)	14.00		
Insulation Surface Temp (°F)	111		

INSULATION SURFACE TEMP. CALCULATION 2.5 inch pipe		1st Iteration Heat Loss (BTU/hr)	64
		1st Iteration Insulation Surface Temp. (°F)	100
		1st Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.793
		2nd Iteration Heat Loss (BTU/hr)	38
		2nd Iteration Insulation Surface Temp. (°F)	108
		2nd Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.840
		3rd Iteration Heat Loss (BTU/hr)	40
		3rd Iteration Insulation Surface Temp. (°F)	107
		3rd Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.837
		4th Iteration Heat Loss (BTU/hr)	40
		4th Iteration Insulation Surface Temp. (°F)	108
		4th Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.837
NPS Pipe Size (in)	2.50		
Bare Pipe Surface Temp. (°F)	120		
Initial Film Coefficient (BTU/hr-ft ² -°F)	1.45		
Insulation Thickness (in)	1.0		
Insulation k-factor (BTU/hr-ft ² -°F)	0.270		
Environment Temp. (°F)	70		
External Pipe Diameter (in)	2.875		
Insulation Surface Temp (°F)	108		

INSULATION SURFACE TEMP. CALCULATION		1st Iteration Heat Loss [BTU/hr]	177
10.0 inch pipe		1st Iteration Insulation Surface Temp. [°F]	102
		1st Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.633
		2nd Iteration Heat Loss [BTU/hr]	87
NPS Pipe Size [in]	10.00	2nd Iteration Insulation Surface Temp. [°F]	111
Bare Pipe Surface Temp. [°F]	170	2nd Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.674
Initial Film Coefficient [BTU/hr · ft ² · °F]	1.45	3rd Iteration Heat Loss [BTU/hr]	70
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	111
Insulation k-factor [BTU/hr · ft · °F]	0.270	3rd Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.673
Environment Temp. [°F]	70	4th Iteration Heat Loss [BTU/hr]	92
External Pipe Diameter [in]	10.75	4th Iteration Insulation Surface Temp. [°F]	111
Insulation Surface Temp [°F]	111	4th Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.673

INSULATION SURFACE TEMP. CALCULATION		1st Iteration Heat Loss [BTU/hr]	147
8.0 inch pipe		1st Iteration Insulation Surface Temp. [°F]	102
		1st Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.662
		2nd Iteration Heat Loss [BTU/hr]	75
NPS Pipe Size [in]	8.00	2nd Iteration Insulation Surface Temp. [°F]	111
Bare Pipe Surface Temp. [°F]	120	2nd Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.703
Initial Film Coefficient [BTU/hr · ft ² · °F]	1.65	3rd Iteration Heat Loss [BTU/hr]	79
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	110
Insulation k-factor [BTU/hr · ft · °F]	0.270	3rd Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.701
Environment Temp. [°F]	70	4th Iteration Heat Loss [BTU/hr]	79
External Pipe Diameter [in]	8.625	4th Iteration Insulation Surface Temp. [°F]	110
Insulation Surface Temp [°F]	110	4th Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.701

INSULATION SURFACE TEMP. CALCULATION		1st Iteration Heat Loss [BTU/hr]	118
6.0 inch pipe		1st Iteration Insulation Surface Temp. [°F]	102
		1st Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.696
		2nd Iteration Heat Loss [BTU/hr]	63
NPS Pipe Size [in]	6.00	2nd Iteration Insulation Surface Temp. [°F]	110
Bare Pipe Surface Temp. [°F]	110	2nd Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.738
Initial Film Coefficient [BTU/hr · ft ² · °F]	1.45	3rd Iteration Heat Loss [BTU/hr]	66
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	110
Insulation k-factor [BTU/hr · ft · °F]	0.270	3rd Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.736
Environment Temp. [°F]	70	4th Iteration Heat Loss [BTU/hr]	66
External Pipe Diameter [in]	6.625	4th Iteration Insulation Surface Temp. [°F]	110
Insulation Surface Temp [°F]	110	4th Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.736

INSULATION SURFACE TEMP. CALCULATION		1st Iteration Heat Loss [BTU/hr]	56
2.0 inch pipe		1st Iteration Insulation Surface Temp. [°F]	100
		1st Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.812
		2nd Iteration Heat Loss [BTU/hr]	35
NPS Pipe Size [in]	2.00	2nd Iteration Insulation Surface Temp. [°F]	107
Bare Pipe Surface Temp. [°F]	120	2nd Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.860
Initial Film Coefficient [BTU/hr · ft ² · °F]	1.45	3rd Iteration Heat Loss [BTU/hr]	36
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	107
Insulation k-factor [BTU/hr · ft · °F]	0.270	3rd Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.856
Environment Temp. [°F]	70	4th Iteration Heat Loss [BTU/hr]	36
External Pipe Diameter [in]	2.375	4th Iteration Insulation Surface Temp. [°F]	107
Insulation Surface Temp [°F]	107	4th Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.857

INSULATION SURFACE TEMP. CALCULATION		1st Iteration Heat Loss [BTU/hr]	49
1.5 inch pipe		1st Iteration Insulation Surface Temp. [°F]	99
		1st Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.831
		2nd Iteration Heat Loss [BTU/hr]	31
NPS Pipe Size [in]	1.50	2nd Iteration Insulation Surface Temp. [°F]	107
Bare Pipe Surface Temp. [°F]	120	2nd Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.881
Initial Film Coefficient [BTU/hr · ft ² · °F]	1.65	3rd Iteration Heat Loss [BTU/hr]	33
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	106
Insulation k-factor [BTU/hr · ft · °F]	0.270	3rd Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.877
Environment Temp. [°F]	70	4th Iteration Heat Loss [BTU/hr]	32
External Pipe Diameter [in]	1.9	4th Iteration Insulation Surface Temp. [°F]	106
Insulation Surface Temp [°F]	106	4th Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.877

INSULATION SURFACE TEMP. CALCULATION		1st Iteration Heat Loss [BTU/hr]	40
1.0 inch pipe		1st Iteration Insulation Surface Temp. [°F]	98
		1st Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.857
		2nd Iteration Heat Loss [BTU/hr]	26
NPS Pipe Size [in]	1.00	2nd Iteration Insulation Surface Temp. [°F]	106
Bare Pipe Surface Temp. [°F]	120	2nd Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.910
Initial Film Coefficient [BTU/hr · ft ² · °F]	1.45	3rd Iteration Heat Loss [BTU/hr]	28
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	105
Insulation k-factor [BTU/hr · ft · °F]	0.270	3rd Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.906
Environment Temp. [°F]	70	4th Iteration Heat Loss [BTU/hr]	28
External Pipe Diameter [in]	1.315	4th Iteration Insulation Surface Temp. [°F]	105
Insulation Surface Temp [°F]	105	4th Iteration Film Coefficient [BTU/hr · ft ² · °F]	0.906

INSULATION SURFACE TEMP. CALCULATION 5.0 inch pipe		1st Iteration Heat Loss [BTU/hr]	103
		1st Iteration Insulation Surface Temp. [°F]	101
		1st Iteration Film Coefficient [BTU/hr ft ² °F]	0.717
		2nd Iteration Heat Loss [BTU/hr]	57
NPS Pipe Size [in]	5.00	2nd Iteration Insulation Surface Temp. [°F]	110
Bare Pipe Surface Temp. [°F]	120	2nd Iteration Film Coefficient [BTU/hr ft ² °F]	0.761
Initial Film Coefficient [BTU/hr ft ² °F]	1.65	3rd Iteration Heat Loss [BTU/hr]	59
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	109
Insulation k-factor [BTU/hr ft °F]	0.270	3rd Iteration Film Coefficient [BTU/hr ft ² °F]	0.759
Environment Temp. [°F]	70	4th Iteration Heat Loss [BTU/hr]	59
External Pipe Diameter [in]	5.563	4th Iteration Insulation Surface Temp. [°F]	109
Insulation Surface Temp [°F]	109	4th Iteration Film Coefficient [BTU/hr ft ² °F]	0.759

INSULATION SURFACE TEMP. CALCULATION 4.0 inch pipe		1st Iteration Heat Loss [BTU/hr]	87
		1st Iteration Insulation Surface Temp. [°F]	101
		1st Iteration Film Coefficient [BTU/hr ft ² °F]	0.743
		2nd Iteration Heat Loss [BTU/hr]	50
NPS Pipe Size [in]	4.00	2nd Iteration Insulation Surface Temp. [°F]	108
Bare Pipe Surface Temp. [°F]	120	2nd Iteration Film Coefficient [BTU/hr ft ² °F]	0.788
Initial Film Coefficient [BTU/hr ft ² °F]	1.65	3rd Iteration Heat Loss [BTU/hr]	52
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	109
Insulation k-factor [BTU/hr ft °F]	0.270	3rd Iteration Film Coefficient [BTU/hr ft ² °F]	0.785
Environment Temp. [°F]	70	4th Iteration Heat Loss [BTU/hr]	52
External Pipe Diameter [in]	4.5	4th Iteration Insulation Surface Temp. [°F]	109
Insulation Surface Temp [°F]	109	4th Iteration Film Coefficient [BTU/hr ft ² °F]	0.785

INSULATION SURFACE TEMP. CALCULATION 3.0 inch pipe		1st Iteration Heat Loss [BTU/hr]	73
		1st Iteration Insulation Surface Temp. [°F]	101
		1st Iteration Film Coefficient [BTU/hr ft ² °F]	0.772
		2nd Iteration Heat Loss [BTU/hr]	43
NPS Pipe Size [in]	3.00	2nd Iteration Insulation Surface Temp. [°F]	109
Bare Pipe Surface Temp. [°F]	120	2nd Iteration Film Coefficient [BTU/hr ft ² °F]	0.818
Initial Film Coefficient [BTU/hr ft ² °F]	1.65	3rd Iteration Heat Loss [BTU/hr]	45
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	108
Insulation k-factor [BTU/hr ft °F]	0.270	3rd Iteration Film Coefficient [BTU/hr ft ² °F]	0.815
Environment Temp. [°F]	70	4th Iteration Heat Loss [BTU/hr]	45
External Pipe Diameter [in]	3.5	4th Iteration Insulation Surface Temp. [°F]	108
Insulation Surface Temp [°F]	108	4th Iteration Film Coefficient [BTU/hr ft ² °F]	0.825

INSULATION SURFACE TEMP. CALCULATION 0.75 inch pipe		1st Iteration Heat Loss [BTU/hr]	16
		1st Iteration Insulation Surface Temp. [°F]	97
		1st Iteration Film Coefficient [BTU/hr ft ² °F]	0.870
		2nd Iteration Heat Loss [BTU/hr]	24
NPS Pipe Size [in]	0.75	2nd Iteration Insulation Surface Temp. [°F]	105
Bare Pipe Surface Temp. [°F]	120	2nd Iteration Film Coefficient [BTU/hr ft ² °F]	0.924
Initial Film Coefficient [BTU/hr ft ² °F]	1.65	3rd Iteration Heat Loss [BTU/hr]	25
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	104
Insulation k-factor [BTU/hr ft °F]	0.270	3rd Iteration Film Coefficient [BTU/hr ft ² °F]	0.919
Environment Temp. [°F]	70	4th Iteration Heat Loss [BTU/hr]	25
External Pipe Diameter [in]	1.05	4th Iteration Insulation Surface Temp. [°F]	104
Insulation Surface Temp [°F]	104	4th Iteration Film Coefficient [BTU/hr ft ² °F]	0.929

INSULATION SURFACE TEMP. CALCULATION 0.5 inch pipe		1st Iteration Heat Loss [BTU/hr]	13
		1st Iteration Insulation Surface Temp. [°F]	97
		1st Iteration Film Coefficient [BTU/hr ft ² °F]	0.879
		2nd Iteration Heat Loss [BTU/hr]	22
NPS Pipe Size [in]	0.50	2nd Iteration Insulation Surface Temp. [°F]	104
Bare Pipe Surface Temp. [°F]	120	2nd Iteration Film Coefficient [BTU/hr ft ² °F]	0.935
Initial Film Coefficient [BTU/hr ft ² °F]	1.65	3rd Iteration Heat Loss [BTU/hr]	23
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	103
Insulation k-factor [BTU/hr ft °F]	0.270	3rd Iteration Film Coefficient [BTU/hr ft ² °F]	0.930
Environment Temp. [°F]	70	4th Iteration Heat Loss [BTU/hr]	23
External Pipe Diameter [in]	0.94	4th Iteration Insulation Surface Temp. [°F]	103
Insulation Surface Temp [°F]	103	4th Iteration Film Coefficient [BTU/hr ft ² °F]	0.931

ECM DESCRIPTION

Insulate bare heating hot water piping located in boiler rooms and in transition areas. Insulate tank shells where applicable.

DATA / ASSUMPTIONS

Run Hours	4,116
* New Pipe Insulation Thermal Conductivity (k-Factor)	0.27 BTU/ft ² ·°F·hr
* Proposed boiler efficiencies are used for each building	

COMMISSIONING

Visual inspection per scope of work from subcontractor.

RECOVERY/SAFETY FACTOR

Thermal Safety Factor (M) =	Various
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FORMULAE

117.1

$$T_{SAVE} = \{ (Q_{CONV-BARE} + Q_{RAD-BARE}) - (Q_{CONV-INS} + Q_{RAD-INS}) \} \cdot t / 100,000$$

Convection Analysis

$$Q_{CONV-INS} = h_{C-INS} \cdot (\pi \cdot D_{INS} \cdot L_{PIPE}) \cdot (T_{INS} - T_{AMB})$$

$$Q_{CONV-BARE} = h_{C-BARE} \cdot (\pi \cdot D_{BARE} \cdot L_{PIPE}) \cdot (T_{BARE} - T_{AMB})$$

$$h_{C-INS} = 0.27 \cdot ((T_{FILM-INS} - T_{AMB}) / D_{INS})^{0.25}$$

$$h_{C-BARE} = 0.27 \cdot ((T_{BARE} - T_{AMB}) / D_{BARE})^{0.25}$$

$$T_{FILM-INS} = (T_{INS} + T_{AMB}) / 2$$

$$T_{FILM-BARE} = (T_{BARE} + T_{AMB}) / 2$$

Iterative Insulation Surface Temp Analysis

$$Q_{ITER} = [(T_{BARE} - T_{AMB}) \cdot 2 \cdot \pi] / [\ln(D_{INS} / D_{BARE}) \cdot (1 / k) + (1 / (D_{INS} / 2 \cdot h_{INT}))]$$

$$T_{INS} = T_{BARE} - Q_{ITER} \cdot \ln(D_{INS} / D_{BARE}) \cdot (1 / (2 \cdot \pi \cdot k))$$

$$h_{ITER} = 0.27 \cdot (T_{INS} - T_{AMB}) / D_{INS}^{0.25}$$

Radiation Analysis

$$Q_{RAD-INS} = \sigma \cdot \epsilon_{INS} \cdot (\pi \cdot D_{INS} \cdot L_{PIPE}) \cdot ((T_{INS} + 460)^4 - (T_{SURR} + 460)^4)$$

$$Q_{RAD-BARE} = \sigma \cdot \epsilon_{BARE} \cdot (\pi \cdot D_{BARE} \cdot L_{PIPE}) \cdot ((T_{BARE} + 460)^4 - (T_{SURR} + 460)^4)$$

$$T_{SURR} = (T_{FLOOR} + T_{CEILING} + 2 \cdot T_{WALL}) / 4$$

Village of Dobbs Ferry
 Exhibit D-5-10
 ECM 10 - Pipe Insulation
 Heating Hot Water Piping Insulation

Variable	Units	Description
T_{SHE}	Therms	Total thermal savings
$Q_{CONV-INS}$	BTU/hr	Convective heat loss from insulated pipe
$Q_{CONV-BARE}$	BTU/hr	Convective heat loss from bare pipe
h_{C-INS}	BTU/hr ft ² -°F	Natural convective insulated pipe heat transfer film coefficient
h_{C-BARE}	BTU/hr ft ² -°F	Natural convective bare pipe heat transfer film coefficient
$T_{FILM-INS}$	°F	Average film temperature of insulated pipe
$T_{FILM-BARE}$	°F	Average film temperature of bare pipe
k	BTU/hr ft-°F	Thermal conductivity of pipe insulation
Q_{ITER}	BTU/hr	Iterative heat loss
h_{ITER}	BTU/hr ft ² -°F	Iterative natural convection heat transfer film coefficient
h_{INIT}	BTU/hr ft ² -°F	Initial natural convection heat transfer film coefficient (for iterations)
t	hr	Duration of the heating season
$Q_{RAD-INS}$	BTU/hr	Net radiation heat loss from insulated pipe
$Q_{RAD-BARE}$	BTU/hr	Net radiation heat loss from bare pipe
σ	BTU/hr ft ² -°R ⁴	Stefan Boltzman constant (0.1713×10^{-8})
ϵ_{INS}	-	Emissivity of insulated pipe
ϵ_{BARE}	-	Emissivity of bare pipe
A_{INS}	ft ²	Surface area of insulated pipe
A_{BARE}	ft ²	Surface area of bare pipe
L_{PIPE}	ft	Pipe length
D_{INS}	ft	Diameter of insulated pipe
D_{BARE}	ft	Diameter of bare pipe
T_{AMB}	°F	Ambient air temperature
T_{INS}	°F	Surface temperature of insulated pipe
T_{BARE}	°F	Surface temperature of bare pipe
T_{SURR}	°F	Average Surrounding temperature
T_{FLOOR}	°F	Surrounding floor temperature
$T_{CEILING}$	°F	Surrounding ceiling temperature
T_{WALL}	°F	Surrounding wall temperature

CALCULATIONS

* inputs are in blue

Linear Feet of Pipe [ft] per Pipe Diameter Size [in]														
Building	14" + Diameter	12" Diameter	8" Diameter	6" Diameter	5" Diameter	4" Diameter	3" Diameter	2.5" Diameter	2" Diameter	1.5" Diameter	1" Diameter	0.75" Diameter	0.5" Diameter	
Ambulance Corps. Building	-	-	-	-	-	-	-	-	-	-	30.8	139.0	-	
Embassy Club	-	-	-	-	-	-	-	-	-	-	117.1	-	-	
Public Library	-	-	7.9	-	-	13.0	19.6	-	-	-	-	-	-	
Village Hall	-	-	-	-	-	10.8	74.7	-	6.0	-	-	-	-	
Totals	-	-	15.7	-	-	23.8	94.3	-	6.0	-	147.9	139.0	-	

	Ambulance Corps. Building	Embassy Club	Public Library	Village Hall
Total Linear Feet of Insulation [ft]	169.8	117.1	40.5	99.4
Losses from Bare Pipe [BTU/hr]	14,994	12,078	12,837	26,500
Losses from Insulated Pipe [BTU/hr]	7,837	5,723	3,538	7,799
Proposed Boiler Efficiency [%]	78.0%	94.0%	84.0%	91.1%
Thermal Savings [Therms/yr]	0.09	0.07	0.11	0.21
Safety Factor [%]	0%	0%	0%	0%
Thermal Savings [Therms]	380	280	458	849

Village of Dobbs Ferry
Exhibit D-5-10
ECM 10 - Pipe Insulation
Heating Hot Water Piping Insulation

Nominal Pipe Size (in)	14.00	10.00	8.00	6.00	5.00	4.00	3.00	2.50	2.00	1.50	1.00	0.75	0.50
Contact Temp. of Bare Pipe (Baselines) [°F]	180	180	180	180	180	180	180	180	180	180	180	180	180
Thickness of Insulation (in)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Insulation Thermal Conductivity (k-Factor) (BTU/hr-ft ² -°F-in)	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270
Pipe Length (ft)	1	1	1	1	1	1	1	1	1	1	1	1	1
Hours of Operation (hr)	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136
Environment Temp. [°F]	70	70	70	70	70	70	70	70	70	70	70	70	70
Contact Temp. of Floor [°F]	60	60	60	60	60	60	60	60	60	60	60	60	60
Contact Temp. of Ceiling [°F]	90	90	90	90	90	90	90	90	90	90	90	90	90
Contact Temp. of Walls [°F]	75	75	75	75	75	75	75	75	75	75	75	75	75
Initial Insulation Film Coefficient (Estimate) (BTU/hr-ft ² -°F)	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65
Emissivity of Bare Pipe	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Emissivity of Insulated Pipe	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Outside Diameter of Bare Pipe (in)	14.000	10.750	8.625	6.625	5.563	4.500	3.500	2.875	2.375	1.900	1.313	1.050	0.840
Outside Diameter of Insulated Pipe (in)	16.000	12.750	10.625	8.625	7.563	6.500	5.500	4.875	4.375	3.900	3.313	3.050	2.840
Characteristic Length of Bare Pipe (ft)	1.167	0.896	0.719	0.557	0.464	0.375	0.297	0.240	0.198	0.158	0.110	0.088	0.070
Characteristic Length of Insulated Pipe (ft)	1.333	1.063	0.885	0.719	0.630	0.542	0.458	0.406	0.365	0.325	0.276	0.254	0.237
Average Film Temp. of Bare Pipe [°F]	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0
Average Film Temp. of Insulated Pipe [°F]	114	113	113	117	111	111	110	109	109	108	106	105	104
Film Coefficient of Bare Pipe (BTU/hr-ft ² -°F)	0.841	0.899	0.950	1.014	1.060	1.117	1.190	1.250	1.311	1.366	1.520	1.608	1.700
Film Coefficient of Insulated Pipe (BTU/hr-ft ² -°F)	0.65	0.68	0.71	0.75	0.77	0.80	0.83	0.85	0.87	0.89	0.91	0.93	0.94
Convective Losses for Bare Pipe (BTU/hr-ft)	139.21	278.24	285.97	193.61	169.83	144.86	119.98	103.52	89.70	75.88	57.58	48.63	41.14
Convective Losses for Insulated Pipe (BTU/hr-ft)	148.98	125.19	108.83	92.67	83.72	74.44	65.34	59.43	54.56	49.78	43.64	40.74	38.36
Radiant Losses of Bare Pipe (BTU/hr-ft)	485	372	299	230	193	156	121	100	82	66	46	36	29
Radiant Losses of Insulated Pipe (BTU/hr-ft)	25	20	17	14	12	10	9	8	7	6	5	5	4
Total Losses of Bare Pipe (BTU/hr-ft)	624	651	585	423	363	301	241	203	172	142	103	85	70
Total Losses of Insulated Pipe (BTU/hr-ft)	174	145	126	106	96	85	74	67	61	56	49	46	43

INSULATION SURFACE TEMP. CALCULATION		14.0 inch pipe		1st Iteration Heat Loss (BTU/hr)	497
				1st Iteration Insulation Surface Temp. [°F]	141
				1st Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.730
				2nd Iteration Heat Loss (BTU/hr)	271
NPS Pipe Size (in)	14.00	2nd Iteration Insulation Surface Temp. [°F]	159		
Bare Pipe Surface Temp. [°F]	180	2nd Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.771		
Initial Film Coefficient (BTU/hr-ft ² -°F)	1.65	2nd Iteration Heat Loss (BTU/hr)	283		
Insulation Thickness (in)	1.0	2nd Iteration Insulation Surface Temp. [°F]	158		
Insulation k-Factor (BTU/hr-ft ² -°F)	0.270	2nd Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.769		
Environment Temp. [°F]	70	4th Iteration Heat Loss (BTU/hr)	283		
External Pipe Diameter (in)	14.00	4th Iteration Insulation Surface Temp. [°F]	158		
Insulation Surface Temp [°F]	158	4th Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.769		

INSULATION SURFACE TEMP. CALCULATION		2.5 inch pipe		1st Iteration Heat Loss (BTU/hr)	140
				1st Iteration Insulation Surface Temp. [°F]	136
				1st Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.966
				2nd Iteration Heat Loss (BTU/hr)	98
NPS Pipe Size (in)	2.50	2nd Iteration Insulation Surface Temp. [°F]	150		
Bare Pipe Surface Temp. [°F]	180	2nd Iteration Film Coefficient (BTU/hr-ft ² -°F)	1.010		
Initial Film Coefficient (BTU/hr-ft ² -°F)	1.65	3rd Iteration Heat Loss (BTU/hr)	101		
Insulation Thickness (in)	1.0	3rd Iteration Insulation Surface Temp. [°F]	149		
Insulation k-Factor (BTU/hr-ft ² -°F)	0.270	3rd Iteration Film Coefficient (BTU/hr-ft ² -°F)	1.007		
Environment Temp. [°F]	70	4th Iteration Heat Loss (BTU/hr)	101		
External Pipe Diameter (in)	2.875	4th Iteration Insulation Surface Temp. [°F]	149		
Insulation Surface Temp [°F]	149	4th Iteration Film Coefficient (BTU/hr-ft ² -°F)	1.007		

INSULATION SURFACE TEMP. CALCULATION 10.0 inch pipe		1st Iteration Heat Loss (BTU/hr)	390
		1st Iteration Insulation Surface Temp. [°F]	141
		1st Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.771
		2nd Iteration Heat Loss (BTU/hr)	225
NPS Pipe Size [in]	10.00	2nd Iteration Insulation Surface Temp. [°F]	157
Bare Pipe Surface Temp. [°F]	180	2nd Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.823
Initial Film Coefficient (BTU/hr-ft ² -°F)	1.65	3rd Iteration Heat Loss (BTU/hr)	235
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	156
Insulation k-factor (BTU/hr-ft ² -°F)	0.270	3rd Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.811
Environment Temp. [°F]	70	4th Iteration Heat Loss (BTU/hr)	234
External Pipe Diameter [in]	10.75	4th Iteration Insulation Surface Temp. [°F]	156
Insulation Surface Temp [°F]	156	4th Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.811

INSULATION SURFACE TEMP. CALCULATION 8.0 inch pipe		1st Iteration Heat Loss (BTU/hr)	321
		1st Iteration Insulation Surface Temp. [°F]	140
		1st Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.836
		2nd Iteration Heat Loss (BTU/hr)	193
NPS Pipe Size [in]	8.00	2nd Iteration Insulation Surface Temp. [°F]	156
Bare Pipe Surface Temp. [°F]	180	2nd Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.848
Initial Film Coefficient (BTU/hr-ft ² -°F)	1.65	3rd Iteration Heat Loss (BTU/hr)	201
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	155
Insulation k-factor (BTU/hr-ft ² -°F)	0.270	3rd Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.846
Environment Temp. [°F]	70	4th Iteration Heat Loss (BTU/hr)	201
External Pipe Diameter [in]	8.625	4th Iteration Insulation Surface Temp. [°F]	155
Insulation Surface Temp [°F]	155	4th Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.846

INSULATION SURFACE TEMP. CALCULATION 6.0 inch pipe		1st Iteration Heat Loss (BTU/hr)	260
		1st Iteration Insulation Surface Temp. [°F]	140
		1st Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.847
		2nd Iteration Heat Loss (BTU/hr)	162
NPS Pipe Size [in]	6.00	2nd Iteration Insulation Surface Temp. [°F]	155
Bare Pipe Surface Temp. [°F]	180	2nd Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.890
Initial Film Coefficient (BTU/hr-ft ² -°F)	1.65	3rd Iteration Heat Loss (BTU/hr)	168
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	154
Insulation k-factor (BTU/hr-ft ² -°F)	0.270	3rd Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.887
Environment Temp. [°F]	70	4th Iteration Heat Loss (BTU/hr)	168
External Pipe Diameter [in]	6.625	4th Iteration Insulation Surface Temp. [°F]	154
Insulation Surface Temp [°F]	154	4th Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.887

INSULATION SURFACE TEMP. CALCULATION 2.0 inch pipe		1st Iteration Heat Loss (BTU/hr)	124
		1st Iteration Insulation Surface Temp. [°F]	135
		1st Iteration Film Coefficient (BTU/hr-ft ² -°F)	0.988
		2nd Iteration Heat Loss (BTU/hr)	88
NPS Pipe Size [in]	2.00	2nd Iteration Insulation Surface Temp. [°F]	148
Bare Pipe Surface Temp. [°F]	180	2nd Iteration Film Coefficient (BTU/hr-ft ² -°F)	1.033
Initial Film Coefficient (BTU/hr-ft ² -°F)	1.65	3rd Iteration Heat Loss (BTU/hr)	91
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	147
Insulation k-factor (BTU/hr-ft ² -°F)	0.270	3rd Iteration Film Coefficient (BTU/hr-ft ² -°F)	1.030
Environment Temp. [°F]	70	4th Iteration Heat Loss (BTU/hr)	91
External Pipe Diameter [in]	2.375	4th Iteration Insulation Surface Temp. [°F]	147
Insulation Surface Temp [°F]	147	4th Iteration Film Coefficient (BTU/hr-ft ² -°F)	1.030

INSULATION SURFACE TEMP. CALCULATION 1.5 inch pipe		1st Iteration Heat Loss (BTU/hr)	108
		1st Iteration Insulation Surface Temp. [°F]	134
		1st Iteration Film Coefficient (BTU/hr-ft ² -°F)	1.012
		2nd Iteration Heat Loss (BTU/hr)	79
NPS Pipe Size [in]	1.50	2nd Iteration Insulation Surface Temp. [°F]	146
Bare Pipe Surface Temp. [°F]	180	2nd Iteration Film Coefficient (BTU/hr-ft ² -°F)	1.058
Initial Film Coefficient (BTU/hr-ft ² -°F)	1.65	3rd Iteration Heat Loss (BTU/hr)	82
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	145
Insulation k-factor (BTU/hr-ft ² -°F)	0.270	3rd Iteration Film Coefficient (BTU/hr-ft ² -°F)	1.054
Environment Temp. [°F]	70	4th Iteration Heat Loss (BTU/hr)	81
External Pipe Diameter [in]	1.9	4th Iteration Insulation Surface Temp. [°F]	146
Insulation Surface Temp [°F]	146	4th Iteration Film Coefficient (BTU/hr-ft ² -°F)	1.054

INSULATION SURFACE TEMP. CALCULATION 1.0 inch pipe		1st Iteration Heat Loss (BTU/hr)	89
		1st Iteration Insulation Surface Temp. [°F]	132
		1st Iteration Film Coefficient (BTU/hr-ft ² -°F)	1.044
		2nd Iteration Heat Loss (BTU/hr)	67
NPS Pipe Size [in]	1.00	2nd Iteration Insulation Surface Temp. [°F]	144
Bare Pipe Surface Temp. [°F]	180	2nd Iteration Film Coefficient (BTU/hr-ft ² -°F)	1.091
Initial Film Coefficient (BTU/hr-ft ² -°F)	1.65	3rd Iteration Heat Loss (BTU/hr)	69
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	143
Insulation k-factor (BTU/hr-ft ² -°F)	0.270	3rd Iteration Film Coefficient (BTU/hr-ft ² -°F)	1.087
Environment Temp. [°F]	70	4th Iteration Heat Loss (BTU/hr)	69
External Pipe Diameter [in]	1.115	4th Iteration Insulation Surface Temp. [°F]	143
Insulation Surface Temp [°F]	143	4th Iteration Film Coefficient (BTU/hr-ft ² -°F)	1.087

Village of Dobbs Ferry
Exhibit D-5-10
ECM 10 - Pipe Insulation
Heating Hot Water Piping Insulation

INSULATION SURFACE TEMP. CALCULATION		1st Iteration Heat Loss [BTU/hr]	226
5.0 inch pipe		1st Iteration Insulation Surface Temp. [°F]	139
		1st Iteration Film Coefficient [BTU/hr·ft ² ·°F]	0.874
		2nd Iteration Heat Loss [BTU/hr]	145
NPS Pipe Size [in]	5.00	2nd Iteration Insulation Surface Temp. [°F]	154
Bare Pipe Surface Temp. [°F]	180	2nd Iteration Film Coefficient [BTU/hr·ft ² ·°F]	0.917
Initial Film Coefficient [BTU/hr·ft ² ·°F]	1.65	3rd Iteration Heat Loss [BTU/hr]	150
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	153
Insulation k-factor [BTU/hr·ft ² ·°F]	0.270	3rd Iteration Film Coefficient [BTU/hr·ft ² ·°F]	0.914
Environment Temp. [°F]	70	4th Iteration Heat Loss [BTU/hr]	150
External Pipe Diameter [in]	5.563	4th Iteration Insulation Surface Temp. [°F]	153
Insulation Surface Temp [°F]	153	4th Iteration Film Coefficient [BTU/hr·ft ² ·°F]	0.914

INSULATION SURFACE TEMP. CALCULATION		1st Iteration Heat Loss [BTU/hr]	192
4.0 inch pipe		1st Iteration Insulation Surface Temp. [°F]	138
		1st Iteration Film Coefficient [BTU/hr·ft ² ·°F]	0.905
		2nd Iteration Heat Loss [BTU/hr]	127
NPS Pipe Size [in]	4.00	2nd Iteration Insulation Surface Temp. [°F]	152
Bare Pipe Surface Temp. [°F]	180	2nd Iteration Film Coefficient [BTU/hr·ft ² ·°F]	0.948
Initial Film Coefficient [BTU/hr·ft ² ·°F]	1.65	3rd Iteration Heat Loss [BTU/hr]	132
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	151
Insulation k-factor [BTU/hr·ft ² ·°F]	0.270	3rd Iteration Film Coefficient [BTU/hr·ft ² ·°F]	0.946
Environment Temp. [°F]	70	4th Iteration Heat Loss [BTU/hr]	131
External Pipe Diameter [in]	4.5	4th Iteration Insulation Surface Temp. [°F]	152
Insulation Surface Temp [°F]	152	4th Iteration Film Coefficient [BTU/hr·ft ² ·°F]	0.946

INSULATION SURFACE TEMP. CALCULATION		1st Iteration Heat Loss [BTU/hr]	160
3.0 inch pipe		1st Iteration Insulation Surface Temp. [°F]	137
		1st Iteration Film Coefficient [BTU/hr·ft ² ·°F]	0.940
		2nd Iteration Heat Loss [BTU/hr]	108
NPS Pipe Size [in]	3.00	2nd Iteration Insulation Surface Temp. [°F]	151
Bare Pipe Surface Temp. [°F]	180	2nd Iteration Film Coefficient [BTU/hr·ft ² ·°F]	0.984
Initial Film Coefficient [BTU/hr·ft ² ·°F]	1.65	3rd Iteration Heat Loss [BTU/hr]	113
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	150
Insulation k-factor [BTU/hr·ft ² ·°F]	0.270	3rd Iteration Film Coefficient [BTU/hr·ft ² ·°F]	0.981
Environment Temp. [°F]	70	4th Iteration Heat Loss [BTU/hr]	113
External Pipe Diameter [in]	3.5	4th Iteration Insulation Surface Temp. [°F]	150
Insulation Surface Temp [°F]	150	4th Iteration Film Coefficient [BTU/hr·ft ² ·°F]	0.981

INSULATION SURFACE TEMP. CALCULATION		1st Iteration Heat Loss [BTU/hr]	79
0.75 inch pipe		1st Iteration Insulation Surface Temp. [°F]	130
		1st Iteration Film Coefficient [BTU/hr·ft ² ·°F]	1.019
		2nd Iteration Heat Loss [BTU/hr]	61
NPS Pipe Size [in]	0.75	2nd Iteration Insulation Surface Temp. [°F]	142
Bare Pipe Surface Temp. [°F]	180	2nd Iteration Film Coefficient [BTU/hr·ft ² ·°F]	1.107
Initial Film Coefficient [BTU/hr·ft ² ·°F]	1.65	3rd Iteration Heat Loss [BTU/hr]	63
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	141
Insulation k-factor [BTU/hr·ft ² ·°F]	0.270	3rd Iteration Film Coefficient [BTU/hr·ft ² ·°F]	1.103
Environment Temp. [°F]	70	4th Iteration Heat Loss [BTU/hr]	62
External Pipe Diameter [in]	1.05	4th Iteration Insulation Surface Temp. [°F]	141
Insulation Surface Temp [°F]	141	4th Iteration Film Coefficient [BTU/hr·ft ² ·°F]	1.103

INSULATION SURFACE TEMP. CALCULATION		1st Iteration Heat Loss [BTU/hr]	72
0.5 inch pipe		1st Iteration Insulation Surface Temp. [°F]	128
		1st Iteration Film Coefficient [BTU/hr·ft ² ·°F]	1.070
		2nd Iteration Heat Loss [BTU/hr]	56
NPS Pipe Size [in]	0.50	2nd Iteration Insulation Surface Temp. [°F]	140
Bare Pipe Surface Temp. [°F]	180	2nd Iteration Film Coefficient [BTU/hr·ft ² ·°F]	1.120
Initial Film Coefficient [BTU/hr·ft ² ·°F]	1.65	3rd Iteration Heat Loss [BTU/hr]	57
Insulation Thickness [in]	1.0	3rd Iteration Insulation Surface Temp. [°F]	139
Insulation k-factor [BTU/hr·ft ² ·°F]	0.270	3rd Iteration Film Coefficient [BTU/hr·ft ² ·°F]	1.115
Environment Temp. [°F]	70	4th Iteration Heat Loss [BTU/hr]	57
External Pipe Diameter [in]	0.84	4th Iteration Insulation Surface Temp. [°F]	139
Insulation Surface Temp [°F]	139	4th Iteration Film Coefficient [BTU/hr·ft ² ·°F]	1.115

CALCULATION SUMMARY

	Public Library	Village Hall	Memorial Park Building	DPW Office	Ambulance Corps. Building	Ogden Engine Company	Pool House and Offices at Gould Park (Seasonal)	Embassy Club
Include Heating Hot Water Pipe Insulation Savings	Y	Y	N	N	Y	N	N	Y
Heating Hot Water Pipe Insulation Savings (Therms)	458	849	-	-	380	-	-	280
Include Domestic Hot Water Pipe Insulation Savings	N	N	N	N	Y	N	N	N
Domestic Hot Water Pipe Insulation Savings (Therms)	-	-	-	-	38	-	-	-
Safety Factor (%)	0%	0%	0%	0%	35%	0%	0%	0%
Total Thermal Savings (Therms)	458	849	-	-	272	-	-	280

SAVINGS SUMMARY

Building ID	Thermal Savings Therms	Thermal Safety Factor %
Public Library	458	0.0%
Village Hall	849	0.0%
Ambulance Corps. Building	272	35.0%
Embassy Club	280	0.0%
Subtotal	1,858	

ECM DESCRIPTION

Install a centralized computer power management software to control desktop computers and reduce power consumption when not in use.

DATA / ASSUMPTIONS

* Annual Savings for Student Computers [kWh]	150
* Annual Savings for Administrative Computers [kWh]	150

COMMISSIONING

Verify the software has been properly installed and is functioning as designed

RECOVERY/SAFETY FACTOR

Electric Safety Factor [%] =	0%
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FORMULAE

$W_{CPU} = (CPU_{STUDENT} \cdot S_{STUDENT}) + (CPU_{ADMIN} \cdot S_{ADMIN})$

Variable	Units	Description
W_{CPU}	kWh	Electrical Savings associated with computer control
$CPU_{STUDENT}$	-	Numbers of Student Computers
CPU_{ADMIN}	-	Number of Admin Computers
$S_{STUDENT}$	kWh	Annual Student Computer Savings
S_{ADMIN}	kWh	Annual Admin Computer Savings

Village of Dobbs Ferry
Exhibit D-5-11
ECM 11 - Desktop Computer Power Management

* Inputs are in blue

Building	# Computers
Public Library	21
Village Hall	26
Memorial Park Building	4
Ambulance Corps. Building	3
Ogden Engine Company	2
DPW Office	3
Totals	59

CALCULATIONS

	Public Library	Village Hall	Memorial Park Building	Ambulance Corps. Building	Ogden Engine Company
Number of Student Computers	21	26	4	3	2
Number of Administrative Computers	-	-	-	-	-
Total Number of Computers	21	26	4	3	2
Number of CRTs to be Replaced	-	-	-	-	-
Monitor On Run Time [Hrs]	1,080	1,080	1,080	1,080	1,080
Monitor Sleep Mode Run Time [Hrs]	3,240	3,240	3,240	3,240	3,240
% of Monitors Turned Off During Unocc. Time [%]	65%	65%	65%	65%	65%
Monitor Electric Savings [kWh]	-	-	-	-	-
Computer Electric Savings [kWh]	3,150	3,900	600	450	300
Total Electric Savings [kWh]	3,150	3,900	600	450	300
Electric Safety Factor [%]	0%	0%	0%	0%	0%
Total Electric Savings [kWh]	3,150	3,900	600	450	300

SAVINGS SUMMARY

Building ID	kWh Savings	Electric Safety Factor
	kWh	%
Public Library	3,150	0.0%
Village Hall	3,900	0.0%
Memorial Park Building	600	0.0%
DPW Office	450	0.0%
Ambulance Corps. Building	450	0.0%
Ogden Engine Company	300	0.0%
Subtotal	8,850	

ECM DESCRIPTION

Furnish and install a new roofing system to improve insulation characteristics and reduce heat loss.

DATA / ASSUMPTIONS

Heating Season [Hrs] = 4,136

*U Factors for the new roof was obtained by manufacturer and product data. U Factors for the existing roof is based on construction type and material

COMMISSIONING

Verify area of new roof installed.

RECOVERY/SAFETY FACTOR

Electric Safety Factor [%] = 0%

Thermal Safety Factor [%] = 0%

FORMULAE

$Q_{HEAT_TOTAL} = Q_{HEAT_SAVINGS} \cdot 1,000,000 / 100,000 / \eta_{BOILER}$

$Q_{COOL_TOTAL} = Q_{COOL_SAVINGS} \cdot 1,000,000 / 3.413 / COP$

$Q_{HEAT_SAVINGS} = \sum_{i=1}^{40} [(Q_{HEAT_OCC_EXT} - Q_{HEAT_OCC_PRE}) + (Q_{HEAT_UNOCC_EXT} - Q_{HEAT_UNOCC_PRE})]$

$Q_{HEAT_UNOCC_EXT} = \sum_{i=1}^{40} [(T_{HEAT_UNOCC} - T_{BIN}) \cdot A_{ROOF} \cdot U_{ROOF_EXT} \cdot t_{UNOCC} / 1,000,000]$

$Q_{HEAT_OCC_EXT} = \sum_{i=1}^{40} [(T_{HEAT_OCC} - T_{BIN}) \cdot A_{ROOF} \cdot U_{ROOF_EXT} \cdot t_{OCC} / 1,000,000]$

$Q_{HEAT_UNOCC_PRE} = \sum_{i=1}^{40} [(T_{HEAT_UNOCC} - T_{BIN}) \cdot A_{ROOF} \cdot U_{ROOF_PRE} \cdot t_{UNOCC} / 1,000,000]$

$Q_{HEAT_OCC_PRE} = \sum_{i=1}^{40} [(T_{HEAT_OCC} - T_{BIN}) \cdot A_{ROOF} \cdot U_{ROOF_PRE} \cdot t_{OCC} / 1,000,000]$

$Q_{COOL_SAVINGS} = \sum_{i=60}^{105} [(Q_{COOL_OCC_EXT} - Q_{COOL_OCC_PRE}) + (Q_{COOL_UNOCC_EXT} - Q_{COOL_UNOCC_PRE})]$

$Q_{COOL_UNOCC_EXT} = \sum_{i=60}^{105} [(T_{BIN} - T_{COOL_UNOCC}) \cdot A_{ROOF} \cdot U_{ROOF_EXT} \cdot t_{UNOCC} / 1,000,000]$

$Q_{COOL_OCC_EXT} = \sum_{i=60}^{105} [(T_{BIN} - T_{COOL_OCC}) \cdot A_{ROOF} \cdot U_{ROOF_EXT} \cdot t_{OCC} / 1,000,000]$

$Q_{COOL_UNOCC_PRE} = \sum_{i=60}^{105} [(T_{BIN} - T_{COOL_UNOCC}) \cdot A_{ROOF} \cdot U_{ROOF_PRE} \cdot t_{UNOCC} / 1,000,000]$

$Q_{COOL_OCC_PRE} = \sum_{i=60}^{105} [(T_{BIN} - T_{COOL_OCC}) \cdot A_{ROOF} \cdot U_{ROOF_PRE} \cdot t_{OCC} / 1,000,000]$

Village of Dobbs Ferry
Exhibit D-S-12
ECM 12 - Roof Replacement

Variable	Units	Description
$Q_{HEAT-TOTAL}$	Therms	Total thermal heating savings
$Q_{COOL-TOTAL}$	kWh	Total electric cooling savings
$Q_{HEAT-SEAVINGS}$	MMBTU	Heating season thermal savings
η_{BOILER}	%	Boiler efficiency
$Q_{HEAT-UNOCC-EXT}$	MMBTU	Unoccupied heating season heat loss with existing roof
$Q_{HEAT-OC-EXT}$	MMBTU	Occupied heating season heat loss with existing roof
$Q_{HEAT-UNOCC-PROP}$	MMBTU	Unoccupied heating season heat loss with proposed roof
$Q_{HEAT-OC-PROP}$	MMBTU	Occupied heating season heat loss with proposed roof
$Q_{COOL-SEAVINGS}$	MMBTU	Cooling season electrical savings
COP	-	Cooling system efficiency
$Q_{COOL-UNOCC-EXT}$	MMBTU	Unoccupied cooling season heat gain with existing roof
$Q_{COOL-OC-EXT}$	MMBTU	Occupied cooling season heat gain with existing roof
$Q_{COOL-UNOCC-PROP}$	MMBTU	Unoccupied cooling season heat gain with proposed roof
$Q_{COOL-OC-PROP}$	MMBTU	Occupied cooling season heat gain with proposed roof
\sum_{-15}^{60}	-	Summation of all bins from -15°F to 60°F
\sum_{60}^{105}	-	Summation of all bins from 60°F to 105°F
$T_{HEAT-UNOCC}$	°F	Unoccupied heating setpoint
$T_{HEAT-OC}$	°F	Occupied heating setpoint
$T_{COOL-UNOCC}$	°F	Unoccupied cooling setpoint
$T_{COOL-OC}$	°F	Occupied cooling setpoint
T_{BIN}	°F	Temperature of respective bin
t_{UNOCC}	Hrs	Unoccupied bin hours
t_{OC}	Hrs	Occupied bin hours
A_{ROOF}	ft ²	Roof area to be replaced
$U_{EXIST-ROOF}$	BTU / ft ² · °F · hr	Existing roof U-Factor
$U_{PROF-ROOF}$	BTU / ft ² · °F · hr	Proposed roof U-Factor

* Inputs are in blue

Building	Roof Area [ft ²]	U-Factor of Existing Roof [BTU/ft ² ·°F·hr]	U-Factor of Proposed Roof [BTU/ft ² ·°F·hr]	COP of Cooling System (Average)	Proposed Boiler Efficiency [%]
Village Hall	7,017	0.08	0.07	3.8	91.1%
Village Hall	100	0.17	0.05	3.8	91.1%
Totals	7,117				

	SECTION 1 Village Hall	SECTION 2 Village Hall
Roof Area [ft ²]	7,017	100
U-Factor of Existing Roof [BTU/ft ² ·°F·hr]	0.08	0.17
U-Factor of Proposed Roof [BTU/ft ² ·°F·hr]	0.07	0.05
COP of Cooling System (Average)	3.8	3.8
Proposed Occ. Heating Setpoint [°F]	68.0	68.0
Proposed Unocc. Heating Setpoint [°F]	55.0	55.0
Proposed Occ. Cooling Setpoint [°F]	74.0	74.0
Proposed Unocc. Cooling Setpoint [°F]	85.0	85.0
Proposed Boiler Efficiency [%]	91.1%	91.1%
Electric Safety Factor [%]	0%	0%
Thermal Safety Factor [%]	0%	0%
Electrical Savings [kWh]	43	13
Thermal Savings [Therms]	168	2

CALCULATIONS

VILLAGE HALL

SECTION 1

Amb. Temp Bin [°F]	Avg Temp [°F]	01-08 Hours	09-16 Hours	17-24 Hours	Total Bin Hours	Occ. Hours	Unocc. Hours	Roof Area [ft²]	Existing Occ. Cooling Gain and Heating Loss [MMBTU]	Existing Unocc. Cooling Gain and Heating Loss [MMBTU]	Proposed Occ. Cooling Gain and Heating Loss [MMBTU]	Proposed Unocc. Cooling Gain and Heating Loss [MMBTU]	Total Cooling or Heating Savings [MMBTU]	Electric Savings [kWh]	Thermal Savings [Therms]
COOLING															
100 to 105	102.5	-	-	-	-	-	-	7,017	-	-	-	-	-	-	-
95 to 100	97.5	-	13	1	14	14	0	7,017	0.2	0.0	0.2	0.0	0.0	0.0	3
90 to 95	92.5	-	19	4	23	23	0	7,017	0.2	0.0	0.2	0.0	0.0	0.0	4
85 to 90	87.5	-	59	17	76	76	0	7,017	0.6	0.0	0.5	0.0	0.1	0.1	9
80 to 85	82.5	9	146	55	210	210	0	7,017	1.0	-	0.8	-	0.2	0.2	16
75 to 80	77.5	38	215	93	346	346	0	7,017	0.7	-	0.6	-	0.1	0.1	11
70 to 75	72.5	108	254	194	556	556	0	7,017	-	-	-	-	-	-	-
65 to 70	67.5	251	244	303	798	798	0	7,017	-	-	-	-	-	-	-
60 to 65	62.5	356	228	306	890	890	0	7,017	-	-	-	-	-	-	-
HEATING															
55 to 60	57.5	50	141	68	259	259	0	7,017	1.6	-	1.3	-	0.3	-	3
50 to 55	52.5	94	203	147	444	444	0	7,017	4.0	0.0	3.2	0.0	0.8	0.8	9
45 to 50	47.5	95	125	151	371	371	0	7,017	4.4	0.0	3.6	0.0	0.9	0.9	10
40 to 45	42.5	201	140	218	559	559	0	7,017	8.3	0.0	6.7	0.0	1.7	1.7	18
35 to 40	37.5	240	192	188	620	620	0	7,017	11.1	0.0	8.8	0.0	2.2	2.2	24
30 to 35	32.5	205	211	193	609	609	0	7,017	12.6	0.0	10.1	0.0	2.5	2.5	28
25 to 30	27.5	124	135	178	437	437	0	7,017	10.3	0.0	8.3	0.0	2.1	2.1	23
20 to 25	22.5	235	92	147	474	474	0	7,017	12.6	0.0	10.1	0.0	2.5	2.5	28
15 to 20	17.5	99	61	53	213	213	0	7,017	6.3	0.0	5.0	0.0	1.3	1.3	14
10 to 15	12.5	45	17	28	90	90	0	7,017	2.9	0.0	2.3	0.0	0.6	0.6	6
5 to 10	7.5	29	5	15	49	49	0	7,017	1.7	0.0	1.4	0.0	0.3	0.3	4
0 to 5	2.5	9	1	1	11	11	0	7,017	0.4	0.0	0.3	0.0	0.1	0.1	1
-5 to 0	-2.5	-	-	-	-	-	-	7,017	-	-	-	-	-	-	-
-10 to -5	-7.5	-	-	-	-	-	-	7,017	-	-	-	-	-	-	-
-15 to -10	-12.5	-	-	-	-	-	-	7,017	-	-	-	-	-	-	-
Total		2,188	2,501	2,360	7,049	7,049	0		79	0	63	0	16	43	168

SAVINGS SUMMARY

Building ID	kWh Savings	Thermal Savings	Electric Safety Factor	Thermal Safety Factor
	kWh	Therms		
Village Hall	55	169	0.0%	0.0%
Subtotal	55	169		

EXHIBIT D-6
OPERATIONS COST AVOIDANCE METHODOLOGY

OSD #1: LED LIGHTING & LIGHTING CONTROLS UPGRADE – O&M COST AVOIDANCE

- 1. Description and Connection to Scope of Work:** Attachment A, ECM 1 describes Honeywell's scope of work for implementing a comprehensive lighting retrofit with occupancy sensors throughout the Village.
- 2. Operational Cost Baseline:** Lighting related expenditures fall under Operations and Maintenance. The baseline is assumed and calculated to be the Mean Time Between Failures (MTBF) of the existing luminaries.
- 3. Operational Cost Conservation Methodology:** The new LED lighting fixtures and retrofit kits being installed have a longer material life than the standard existing equipment. This translates into a longer Mean Time Between Failures (MTBF) thus resulting in a longer timeframe between equipment replacement periods.
- 4. Determination of Operational Costs Avoided:** Operational cost reductions were calculated based on the quantity of lamps and ballasts being replaced, and the average life expectancy of the existing and proposed equipment. **This savings is agreed to be \$818/yr.**

OSD #2: STREET LIGHTING UPGRADES – O&M COST AVOIDANCE

- 1. Description and Connection to Scope of Work:** Attachment A, ECM 2 describes Honeywell's scope of work for implementing a street lighting LED upgrades throughout the Village.
- 2. Operational Cost Baseline:** Lighting related expenditures fall under Operations and Maintenance. The baseline is assumed and calculated to be the Mean Time Between Failures (MTBF) of the existing luminaries.
- 3. Operational Cost Conservation Methodology:** The new LED lighting fixtures and retrofit kits being installed have a longer material life than the standard existing equipment. This translates into a longer Mean Time Between Failures (MTBF) thus resulting in a longer timeframe between equipment replacement periods.
- 4. Determination of Operational Costs Avoided:** Operational cost reductions were calculated based on the quantity of lamps receiving a retrofit, and the average life expectancy of the existing and proposed equipment. **This savings is agreed to be \$805/yr.**

OSD #3: BOILER PLANT UPGRADES – O&M COST AVOIDANCE

- 1. Description and Connection to Scope of Work:** Attachment A, ECM 3 describes Honeywell's scope of work for installing new high efficiency condensing hot water boilers at the Village Hall.
- 2. Determination of Operational Costs Avoided:** Operational cost savings are a result of a reduction in the Village's current repair dollar spend on the existing equipment. **The savings is agreed to be \$5,000/yr.**

OSD #4: AIR HANDLING UNIT REPLACEMENT – O&M COST AVOIDANCE

- 1. Description and Connection to Scope of Work:** Attachment A, ECM 4 describes Honeywell's scope of work for the air handling unit replacements at the Village Hall.
- 2. Determination of Operational Costs Avoided:** Operational cost savings are a result of a reduction in the Village's current repair dollar spend on the existing equipment. **The savings is agreed to be \$5,000/yr.**

OSD #5: ROOF TOP UNIT REPLACEMENT – O&M COST AVOIDANCE

- 1. Description and Connection to Scope of Work:** Attachment A, ECM 5 describes Honeywell's scope of work for the roof top unit replacements at the Village Hall.
- 2. Determination of Operational Costs Avoided:** Operational cost savings are a result of a reduction in the Village's current repair dollar spend on the existing equipment. **The savings is agreed to be \$5,000/yr.**

EXHIBIT D-6
OPERATIONS COST AVOIDANCE METHODOLOGY

OSD #6: CONDENSING UNIT REPLACEMENT – O&M COST AVOIDANCE

- 1. Description and Connection to Scope of Work:** Attachment A, ECM 6 describes Honeywell's scope of work for the condensing unit replacements at the Village Hall.
- 2. Determination of Operational Costs Avoided:** Operational cost savings are a result of a reduction in the Village's current repair dollar spend on the existing equipment. **The savings is agreed to be \$5,000/yr.**

OSD #7: ROOF REPLACEMENT – O&M COST AVOIDANCE

- 1. Description and Connection to Scope of Work:** Attachment A, ECM 12 describes Honeywell's scope of work for the roof replacement at the Village Hall.
- 2. Determination of Operational Costs Avoided:** Operational cost savings are a result of a reduction in the Village's current repair dollar spend on the existing equipment. **The savings is agreed to be \$5,000/yr.**

Village of Delta Ferry NY
 Exhibit D To M&T Plan Summary

Potential-to-Save, Retained Substantive Method (RSTBL) PERIOD										Performance-based, Retained Substantive Method (RSTBL) Vitals, Verifiable Method (VPM) (PERFORMANCE PERIOD)				
ECM #	ECM	Energy-Options	Buildings Included in Energy Audit	ECM Intent	Baseline Description & Operational Scheduling Values	Measurement Strategy for Degree of Achievement	Key Parameters, Monitoring, Measuring Point & Secondary for Confirmation of Savings	Residual Measurement Responsibility & Periodicity	Baseline Measurement Verifiable, Measuring Point	Building(s) Included by Option C (Not Gas & Propane)	Measurement Responsibility & Frequency	Measurement Procedure	Annual Performance Monitoring Activities	Annual M&V to be Used
1a	LED Lighting Upgrades	A - Electric, C - Natural Gas, Propane	Village Hall, Public Library, Embassy Club, Memorial Park Building, Department of Public Works, Ambulance Corps, Building, Option Engine Company, Post House & Office at Gould Park	Reduce power draw due to higher fixture efficiency and optimization of scheduling	Run hours	50% confidence / 20% precision (0.5 coefficient of variation)	Wk by power meter. First "as built" will include heating energy (therms, or gas oil) associated with heat removed from new electric lighting equipment. Complete regression analysis of building based on HCO and input utility data to generate Gas utility savings	One time pre & post wk by power meter	Natural Gas and Propane Use at building Meters	Village Hall, Public Library, Embassy Club, Memorial Park Building, Department of Public Works, Ambulance Corps Building, Option Engine Company, Post House & Office at Gould Park	Customer to provide utility data monthly for heating energy pre/post-metric on	Option A - Apply measured values to engineering calculations to generate Electricity savings Option C - Complete regression analysis of building based on HCO and input utility data to generate natural gas and propane utility savings	None	Option A - ESCO to calculate savings for Year 1, and apply results to subsequent performance years Option C - ESCO to complete regression analysis to generate heating energy annually
1b	Lighting Controls Upgrades	A - Electric	Village Hall, Embassy Club, Memorial Park Building, Department of Public Works, Ambulance Corps, Building, Option Engine Company, Post House & Office at Gould Park	Reduce runtime of lamps further by installing occupancy sensors	Run hours	Representative sample of sensor locations	On / Off times of rooms w/ occupancy trigger	One time	No Annual Measurements	None	None	Option A - Apply measured values to engineering calculations to generate Electricity savings	None	Option A - ESCO to calculate savings for Year 1, and apply results to subsequent performance years
2	Street Lighting Upgrades	A - Electric	Street Lighting	Reduce power draw due to higher fixture efficiency	Run hours	N/A	Fixture power draw (W) and installed quantity from as built issue by line and manufacturer customers	One time	No Annual Measurements	None	None	Option A - Apply measured values to engineering calculations to generate Electricity savings	None	Option A - ESCO to calculate savings for Year 1, and apply results to subsequent performance years
3	Boiler Plant Upgrades - Boiler Replacement	C - Natural Gas	Village Hall	Reduce fuel use due to higher combustion efficiency and heat exchange efficiency and reduction of vent losses	Boiler Load, Seasonal Efficiency, Emission, Environment & Scheduling Data, Thermal Efficiency	4 Boilers, One Natural Gas Utility Meter	Pre-Post Retrofit Combustion efficiency	One time Pre-retrofit combustion efficiency testing Customer to provide utility data monthly for Option C sales	Natural Gas Use at building Meters	Village Hall	Customer to test and provide combustion efficiency values annually Customer to provide utility data monthly for Option C sales	Option C - Complete regression analysis of building based on HCO and input utility data to generate natural gas savings for Option C buildings	None	Combustion Efficiency testing and annual service including cleaning of boilers to customer Option A - generate data documentation from customer Option C - ESCO to complete regression analysis to generate heating savings annually
4	Air Handling Unit Replacement	C - Fuel	Village Hall	Reduce energy consumption by increasing the operating efficiency of air handling equipment through replacement or retrofit/modernization	Building Use & Building Load, Supply Outdoor Air Return Air for CFM, Return Supply Air Temperature	One Natural Gas Utility Meter	Verification of installed scope of work - Complete regression analysis of building based on HCO and input utility data to generate Gas utility savings	One-time as built verification Customer to provide utility data monthly for Option C sales	Natural Gas Use at building Meters	Village Hall	Customer to provide utility data monthly for Option C sales	Option C - Complete regression analysis of building based on HCO and input utility data to generate natural gas utility savings for Option C buildings	None	Option C - ESCO to complete regression analysis to generate heating savings annually
5	Roofing Unit Replacement	A - Electric	Village Hall	Reduce energy consumption by increasing the cooling efficiency of air handling equipment through replacement	Baseline Normalized Efficiency, Load, Schedule and Environment as documented in the projected energy savings Calculation	4 Roofing Units	Cooling efficiency (EER) verified by manufacturer's specification	One time photovoltaic verification	No Annual Measurements	None	None	Option A - Apply measured values to engineering calculations to generate Electricity savings	None	Option A - ESCO to calculate savings for Year 1, and apply results to subsequent performance years
6	Conditioning Unit Replacement	A - Electric	Village Hall	Reduce electric usage due to higher conditioning unit efficiency	Baseline Normalized Efficiency, Load, Schedule and Environment as documented in the projected energy savings Calculation	4 Conditioning Units	Cooling efficiency (BTU/R) verified by manufacturer's specification	One time photovoltaic verification	No Annual Measurements	None	None	Option A - Apply measured values to engineering calculations to generate Electricity savings	None	Option A - ESCO to calculate savings for Year 1, and apply results to subsequent performance years
7	Pump and Motor Replacement	A - Electric	Village Hall	Reduce energy usage due to higher motor efficiency	Baseline Normalized Efficiency, Load, Schedule and Environment as documented in the projected energy savings Calculation	Equivalent One Running Motor	Validate motor efficiency per manufacturer's data	One-time efficiency verification to be applied to retro and to be used for M&V determination of savings	No Annual Measurements	None	None	Option A - Apply measured values to engineering calculations to generate Electricity savings	None	Option A - ESCO to calculate savings for Year 1, and apply results to subsequent performance years
8	Building Management System Upgrades	A - Electric, C - Natural Gas, Propane	Village Hall, Public Library, Embassy Club, Memorial Park Building, Department of Public Works, Ambulance Corps, Building, Option Engine Company, Post House & Office at Gould Park	Reduce heating / cool / fan to control upgrades to enhance equipment scheduling and response	Baseline Schedules, Schedules, Load, and Environment as documented in the projected energy savings Calculation	Three Natural Gas Utility Meters	Night Setback, unoccupied setpoints and schedules to BAS trend. Complete regression analysis of building based on HCO and input utility data to generate Gas utility savings	Pre-Post 2 weeks of scheduling data during cooling and heating season. All 3 to be tested. will be reviewed to determine potential to save	3 weeks of trending data at 1 hr intervals, will be reviewed to determine potential to save Natural Gas and Propane Use at building Meters	Village Hall, Public Library, Embassy Club, Memorial Park Building, Department of Public Works, Ambulance Corps Building, Option Engine Company, Post House & Office at Gould Park	Build to maintain 14 months of trending at 1 hr intervals Customer to provide utility data monthly for Option C sales	Option A - Apply one time post retrofit measured values and contractor utility data to engineering calculations, to generate Electricity savings Option C - Complete regression analysis of building based on HCO and input utility data to generate natural gas and propane utility savings	Review 2 weeks of trend data, inspect and unoccupied temperature setpoints and status, to confirm potential to save	Review control strategies from BAS to ensure equipment is functioning and the sequence of operations based on occupied or unoccupied transitions Option A - ESCO to calculate savings for Year 1, and apply results to subsequent performance years Option C - ESCO to complete regression analysis to generate heating savings annually

[illegible]

Village of Dobbs Ferry NY
Exhibit D-7b
ECM by Building and M&V Option

		ECM 1a	ECM 1b	ECM 2	ECM 3	ECM 4	ECM 5	ECM 6	ECM 7	ECM 8	ECM 9	ECM 10	ECM 11	ECM 12
Bldg #	Bldg Description	LED Lighting Upgrades	Lighting Controls Upgrades	Street Lighting Upgrades	Boiler Plant Upgrades - Boiler Replacement	Air Handling Unit Replacement	Roofing Unit Replacement	Condensing Unit Replacement	Pump and Motor Replacement	Building Management System Upgrades	Building Envelope Improvements	Install Pipe Insulation	Desktop Computer Power Management	Roof Replacement
1	Village Hall	A/C	A/C		/C	/C	A/	A/	A/	A/C	A/C	/C	A/	A/
2	Public Library	A/C								A/C	A/C	/C	A/	
3	Embassy Club	A/C	A/C							A/C	A/C	/C		
4	Memorial Park Building	A/C	A/C							A/C	A/C		A/	
5	Department of Public Works	A/C(P)	A/C(P)							A/C(P)			A/	
6	Ambulance Corps Building	A/C	A/C							A/C	A/C	/C	A/	
7	Ogden Engine Company	A/C	A/C							A/C	A/C		A/	
8	Pool House & Offices at Gould Park	A/C	A/C							A/C				
9	Street Lighting			A/										

Note: The M&V options are distributed by utility type as Electric / Fuel (Natural Gas or Propane). An underscore indicates where an option is not applicable. A single letter represents the option type, for example, "A" is Option A. C indicates natural gas, C(P) indicates propane

EXHIBIT D-8 DATA LOGGING RESULTS

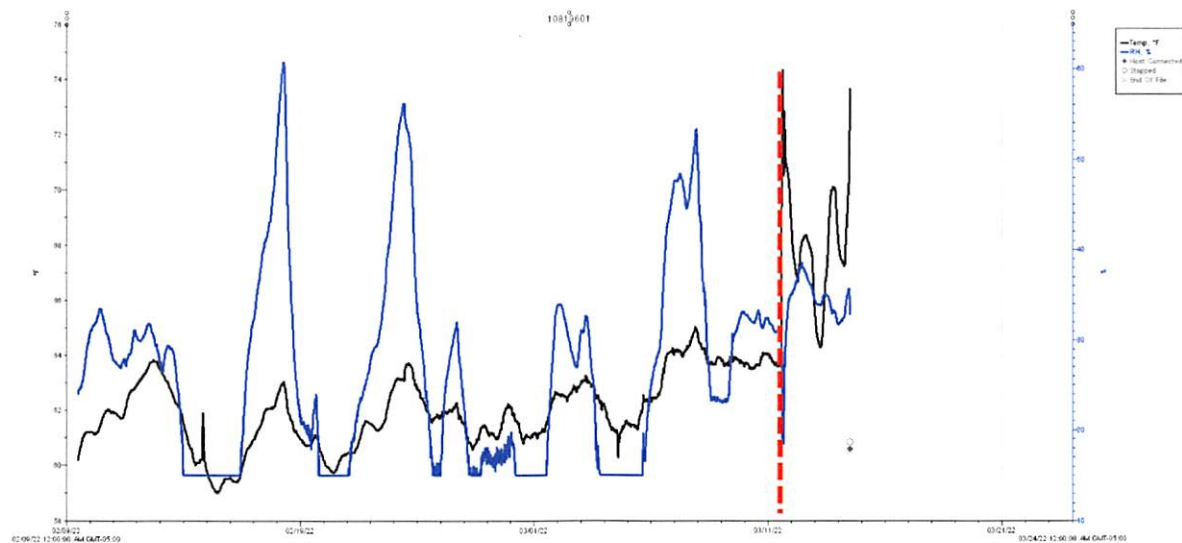
The Village facilities are controlled by a mixture of Direct Digital Controls (DDC) and standalone thermostats. Overall, it appears there is some limited equipment scheduling in place. There are definite opportunities to implement tighter equipment schedules to better match actual occupancy patterns while also utilizing a more aggressive temperature setback when the buildings are empty. Occupied temperatures were generally higher than recommended and could be decreased to drive additional savings while still maintaining comfortable conditions for occupants. The proposed Building Management System (BMS) upgrades will also allow for specific zones to be scheduled individually to allow for flexibility and prevent heating/cooling areas that are not needed.

Through discussions with Village personnel, as well as review of schedules and setpoints in the existing BMS, and local standalone thermostats, Honeywell determined the occupancy schedule of each facility.

Temperature data logging was performed for approximately four (4) weeks between February and March 2021 to capture existing conditions. Loggers were deployed across a variety of locations within all buildings in order to diversify the sample set as much as possible.

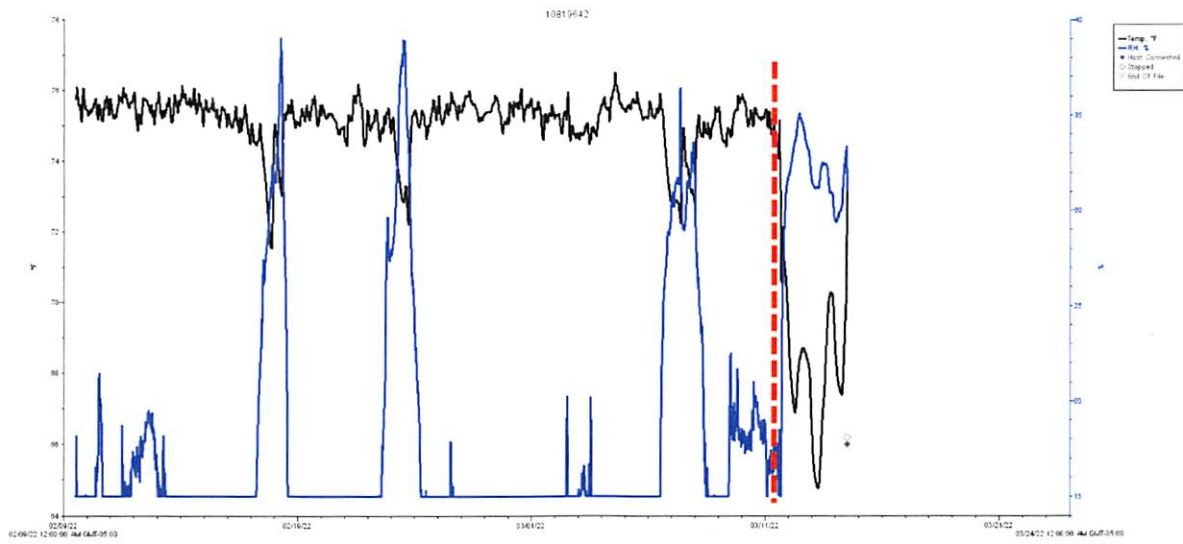
The following plots detail the temperatures and relative humidity (RH) levels recorded over this period. Note that the end of the deployments are shown with a red dashed lines and all later data should be ignored.

Village Hall

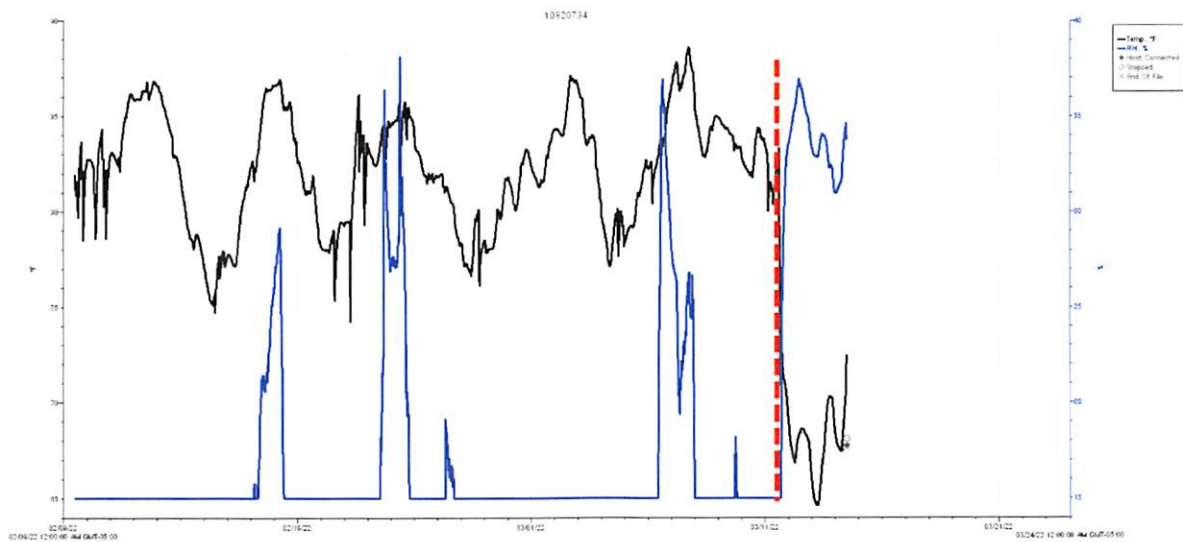


Basement Fire House Meeting Room Temperature (Black) and RH (Blue)

EXHIBIT D-8
DATA LOGGING RESULTS



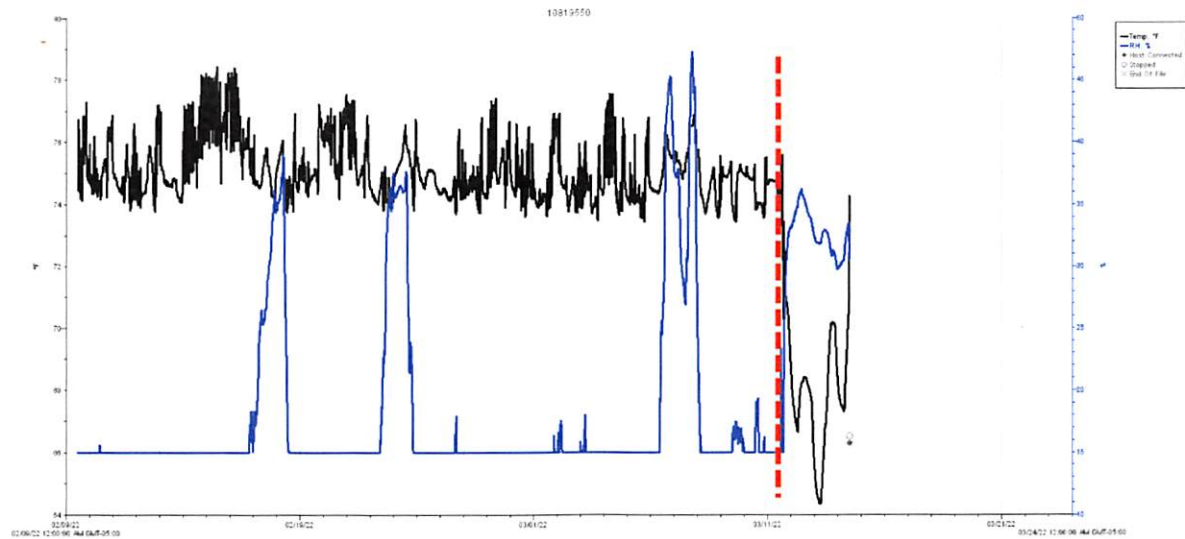
First Floor Break Room Temperature (Black) and RH (Blue)



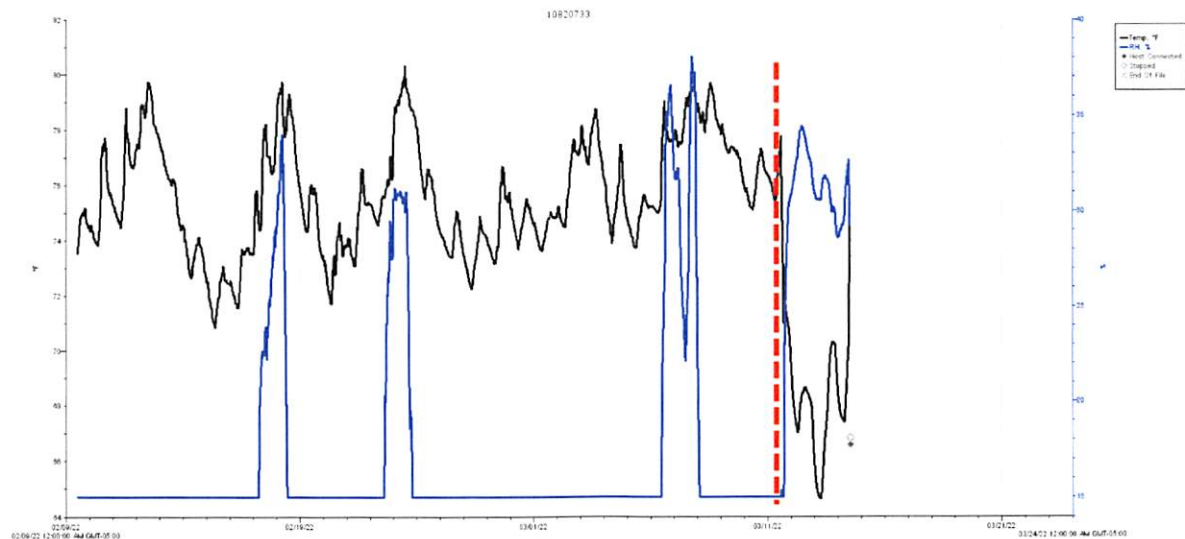
Second Floor Clerk's Office Main Room Temperature (Black) and RH (Blue)

EXHIBIT D-8
DATA LOGGING RESULTS

Public Library

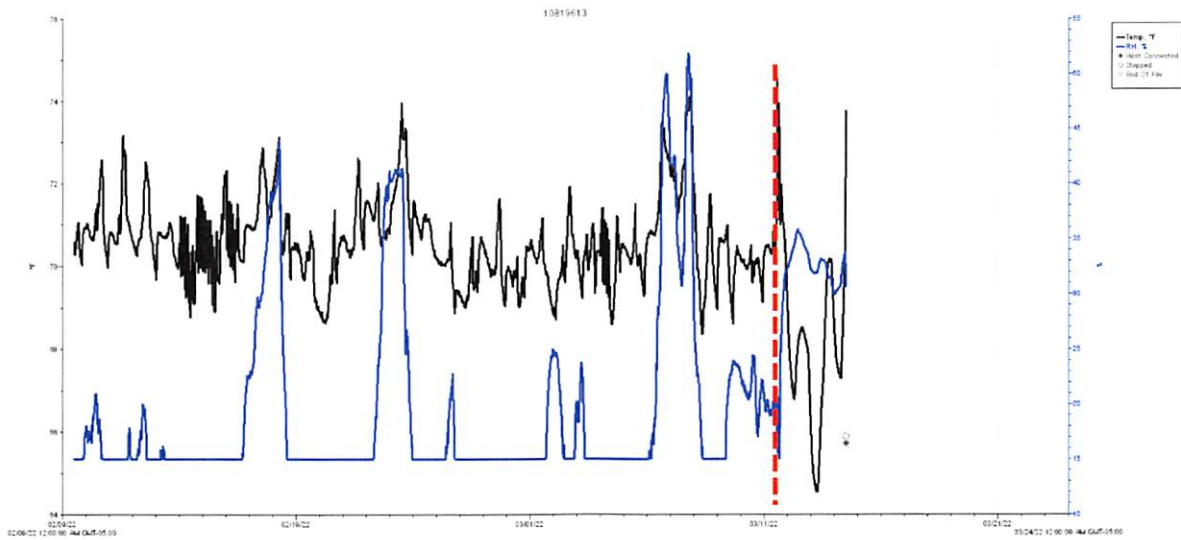


First Floor - New Books Area Temperature (Black) and RH (Blue)



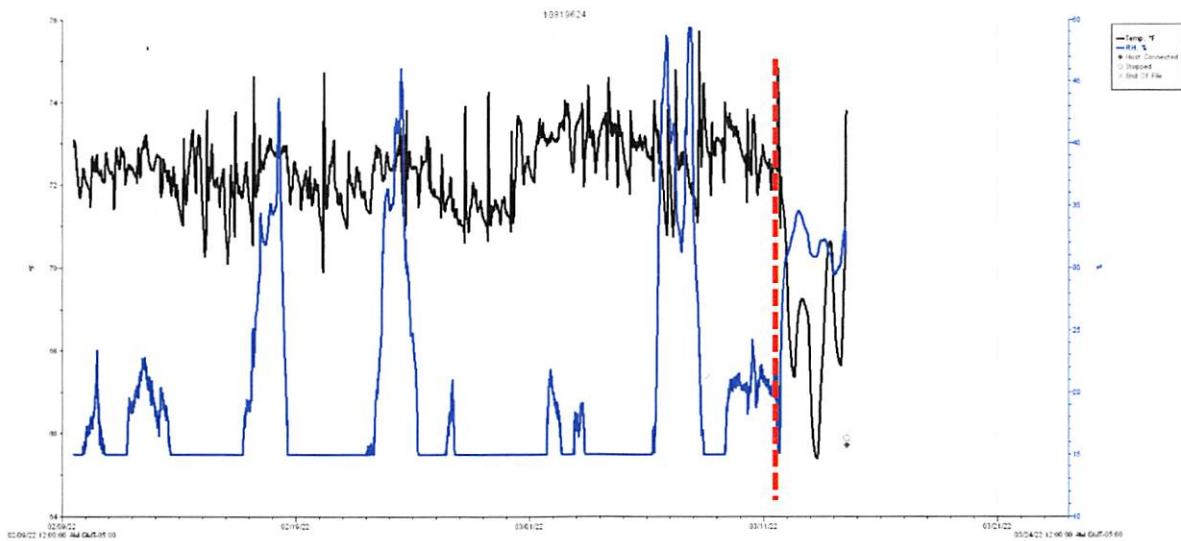
First Floor - Children's Books Area Temperature (Black) and RH (Blue)

EXHIBIT D-8 DATA LOGGING RESULTS



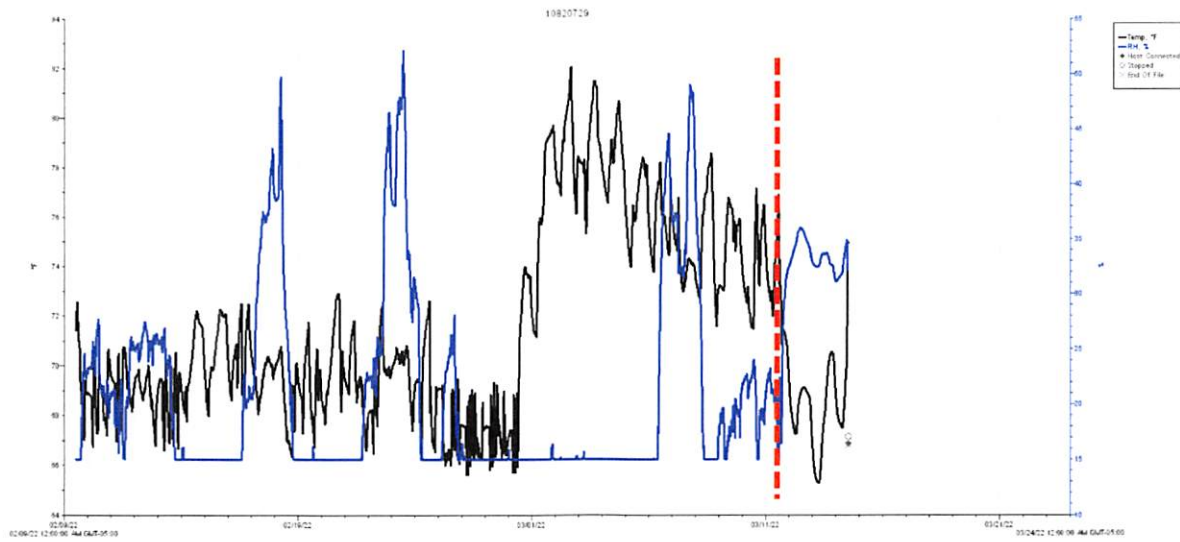
Second Floor – Fiction Area Temperature (Black) and RH (Blue)

Embassy Club

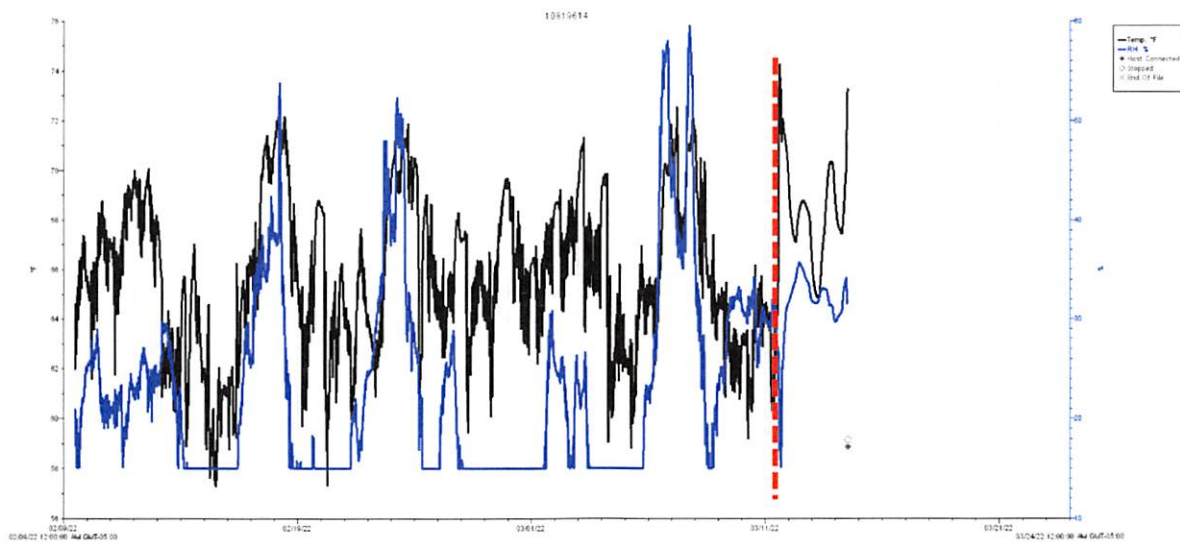


Conference Room Area Temperature (Black) and RH (Blue)

EXHIBIT D-8
DATA LOGGING RESULTS



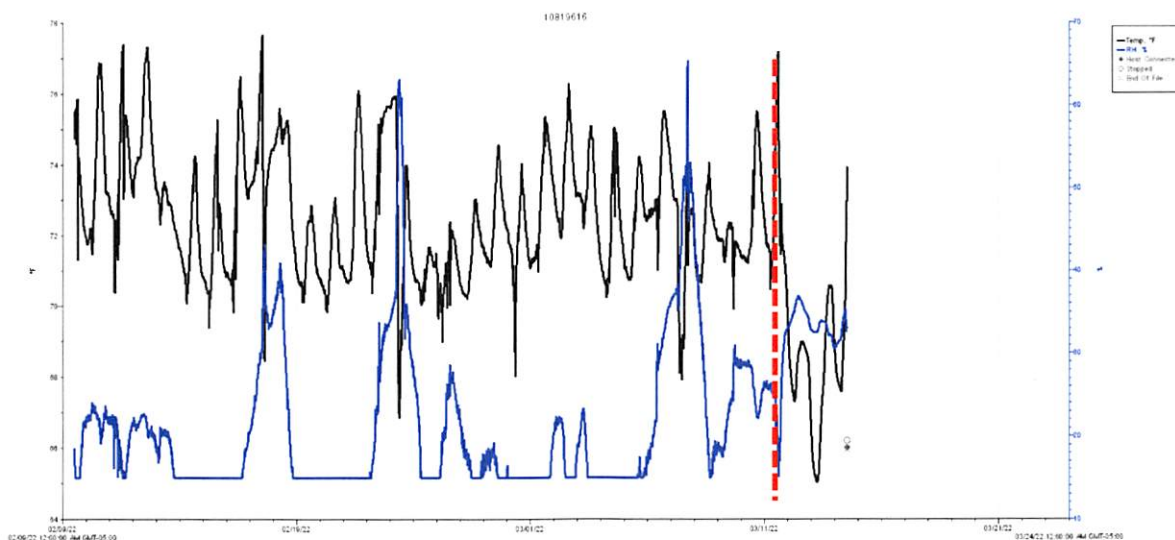
Front Office Area Temperature (Black) and RH (Blue)



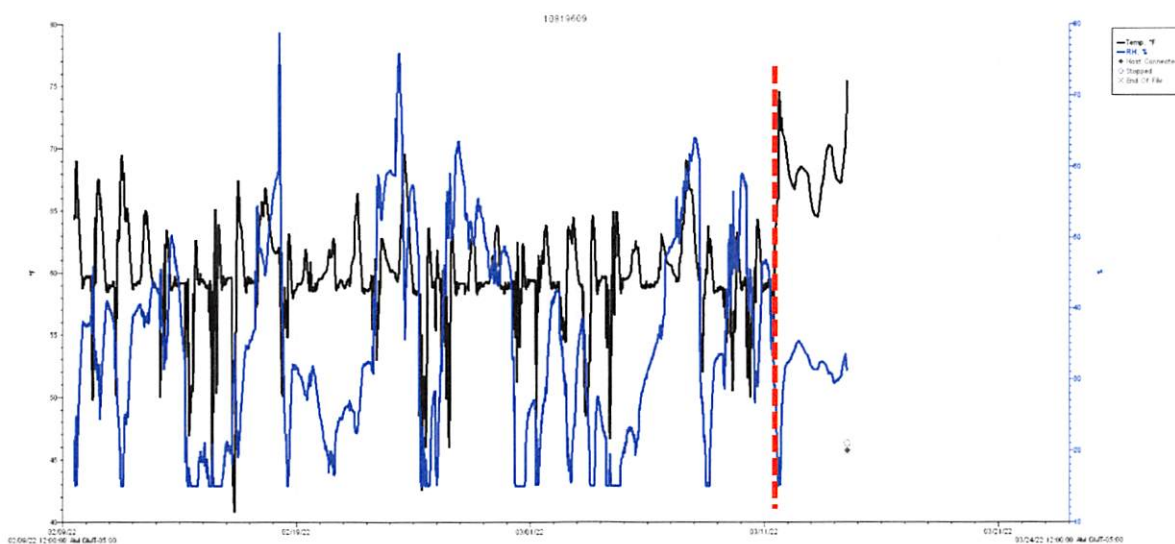
Kitchen Temperature (Black) and RH (Blue)

EXHIBIT D-8 DATA LOGGING RESULTS

DPW



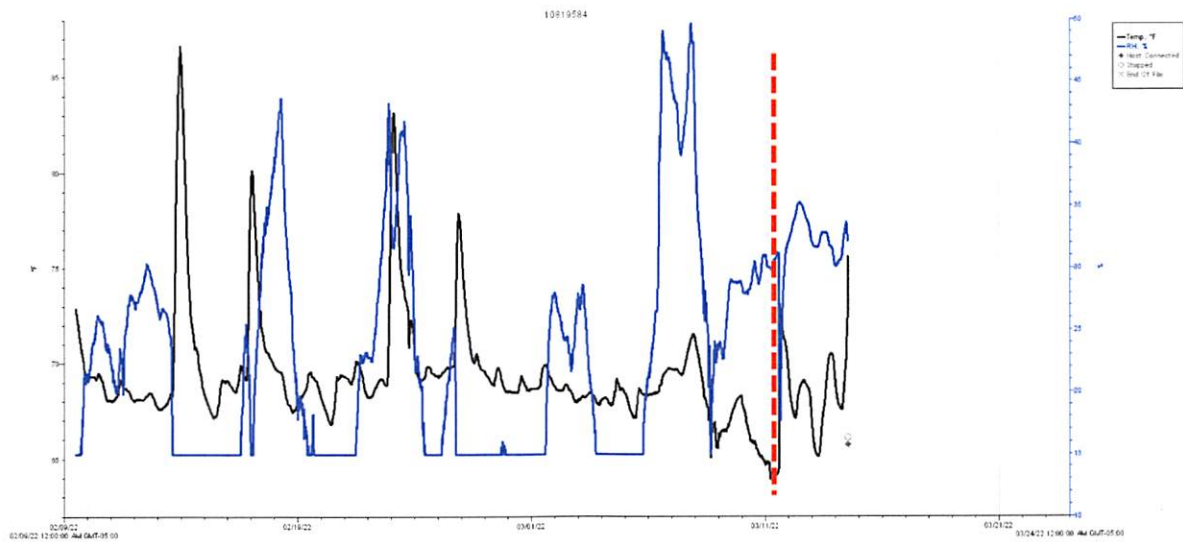
Mechanic Bay Temperature (Black) and RH (Blue)



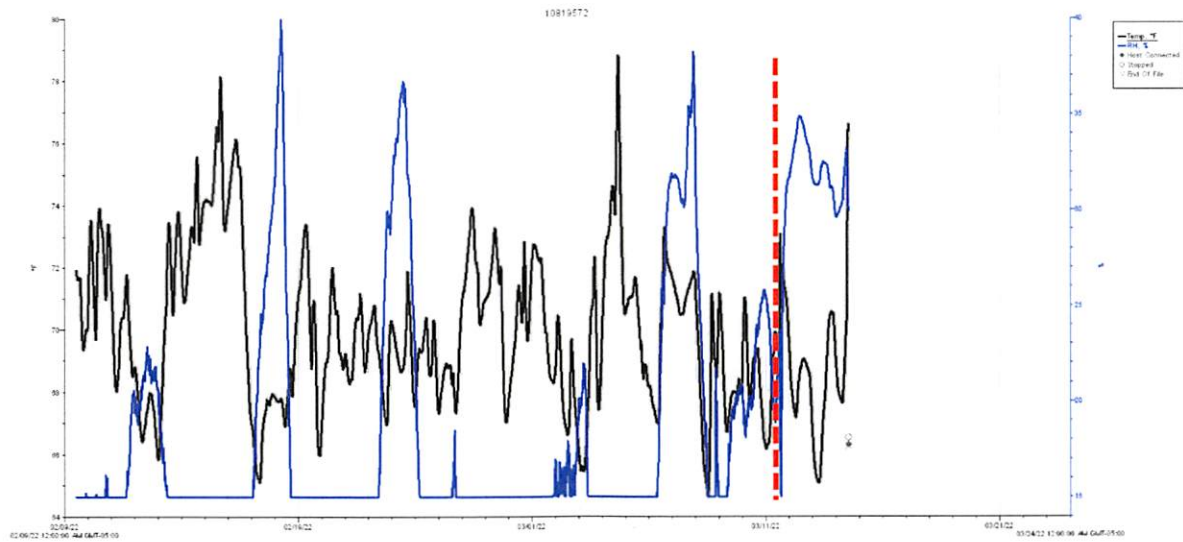
Rear Garage Temperature (Black) and RH (Blue)

EXHIBIT D-8
DATA LOGGING RESULTS

Ogden Engine Company



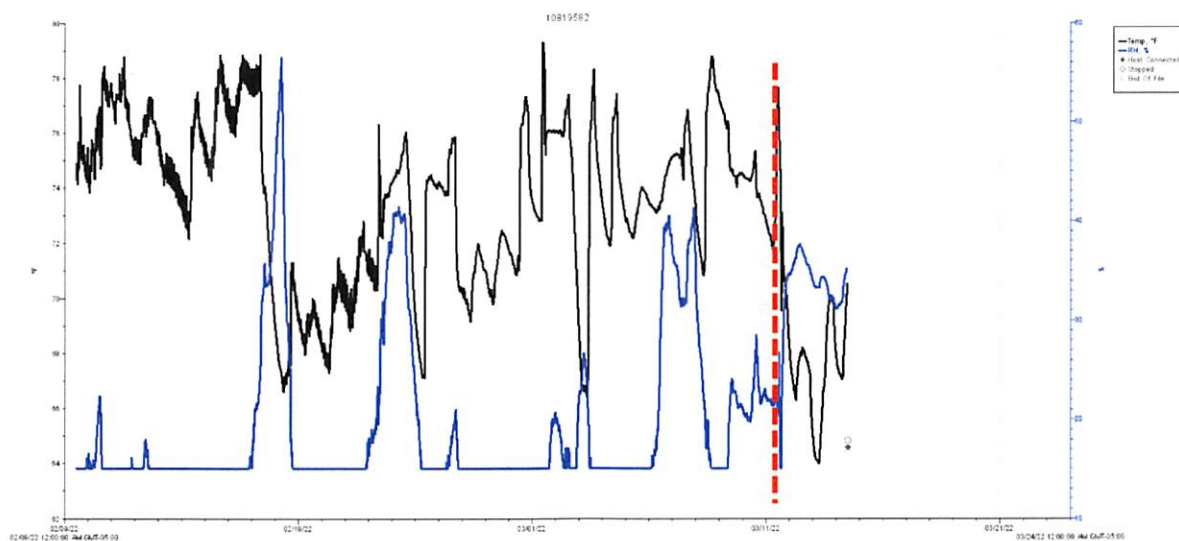
Bar Area Temperature (Black) and RH (Blue)



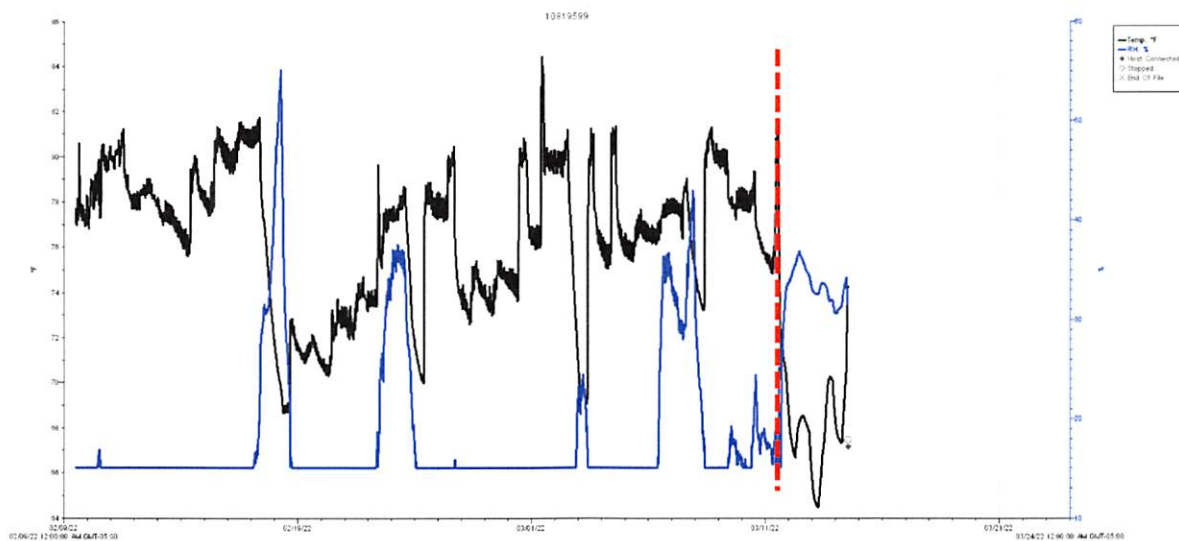
Upstairs Museum Area Temperature (Black) and RH (Blue)

EXHIBIT D-8
DATA LOGGING RESULTS

Memorial Park Building



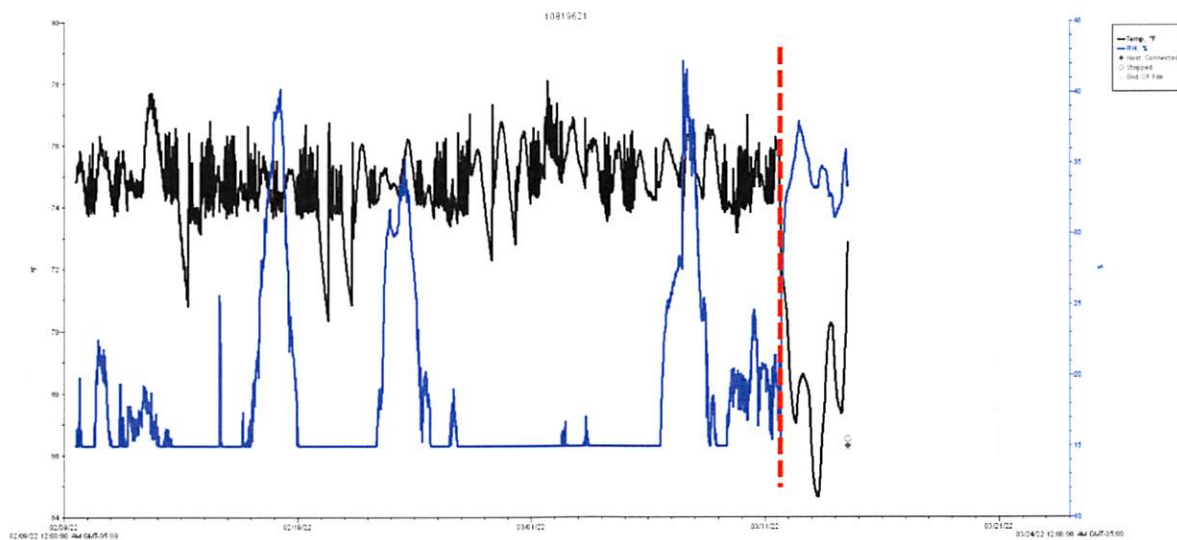
Snack Room Temperature (Black) and RH (Blue)



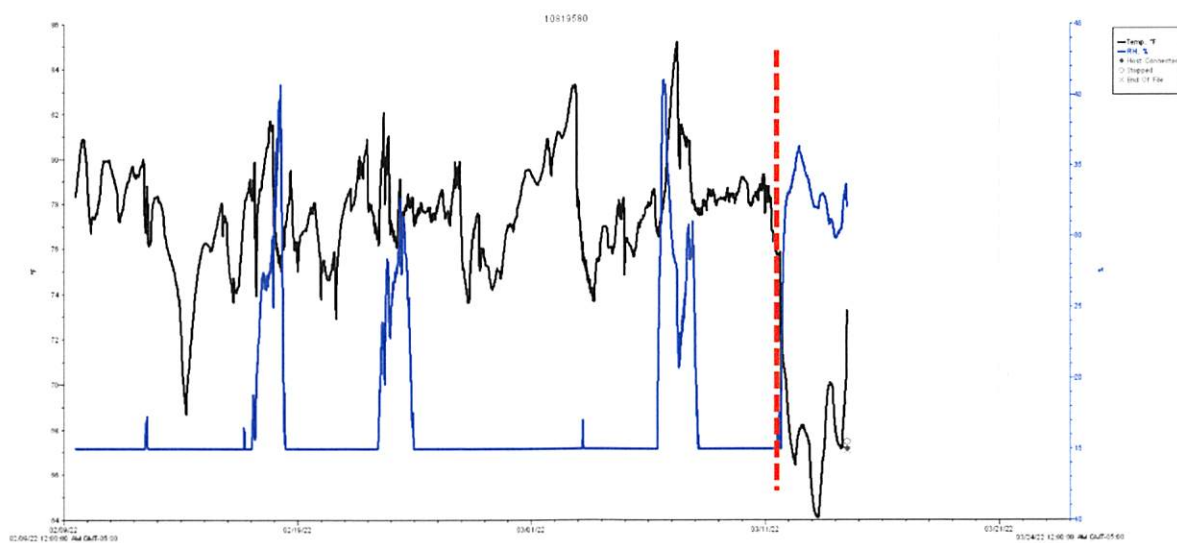
Main Room Temperature (Black) and RH (Blue)

EXHIBIT D-8
DATA LOGGING RESULTS

Ambulance Corps. Building



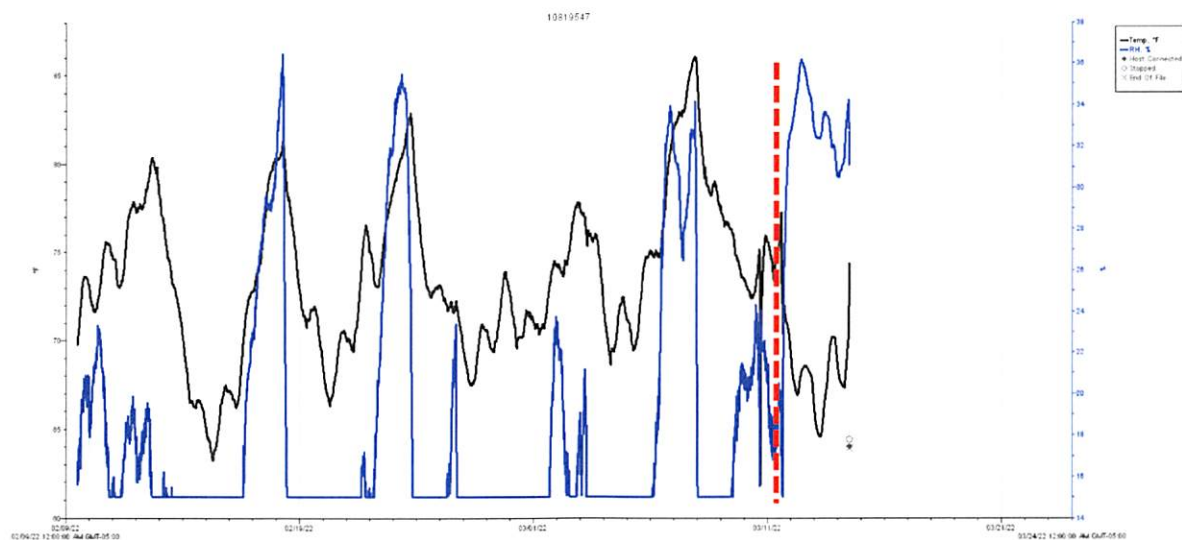
Garage Temperature (Black) and RH (Blue)



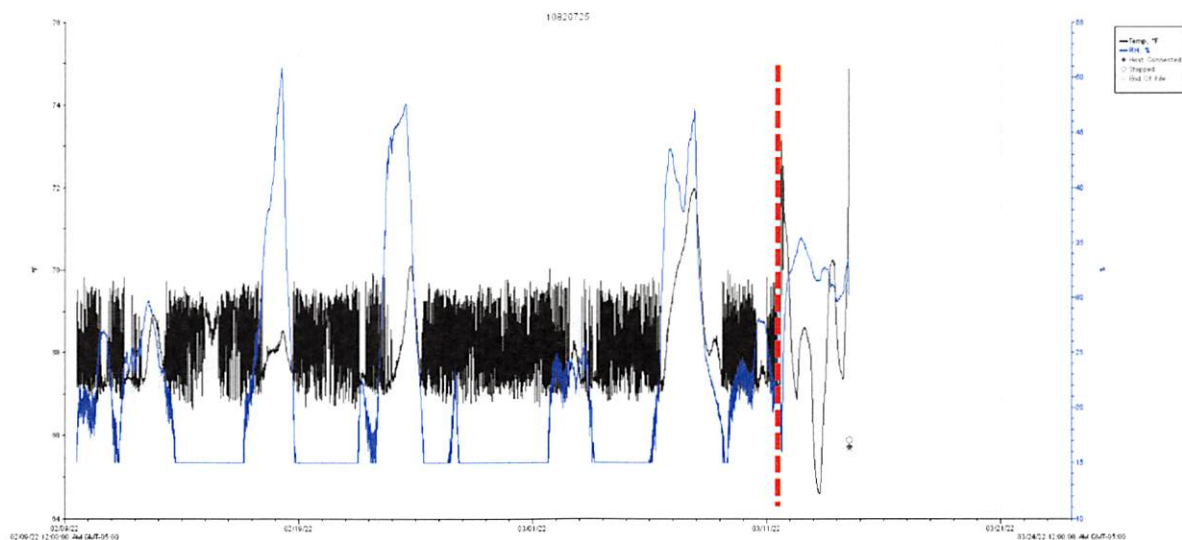
Break Room Temperature (Black) and RH (Blue)

EXHIBIT D-8 DATA LOGGING RESULTS

Pool House and Offices at Gould Park



Main Room Temperature (Black) and RH (Blue)



Bathroom Temperature (Black) and RH (Blue)