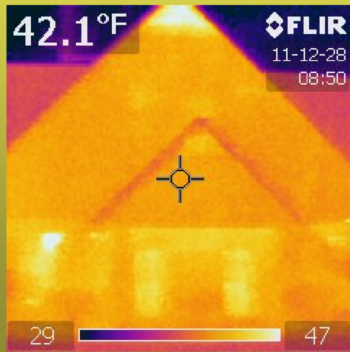

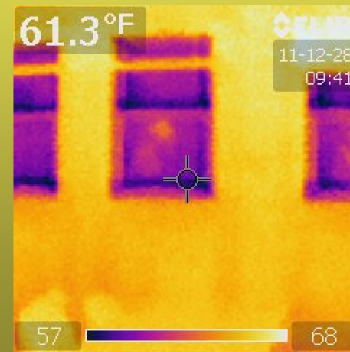

Facility Audit Report
Town of Hollis Police Department

FINAL

May 2012

Prepared for:
Town of Hollis
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A. EXECUTIVE SUMMARY

Program Introduction

The Town of Hollis requested investment grade audits for seven (7) municipal buildings and five (5) school buildings located within the Town. Funding was provided by the United States Department of Energy (DOE) through the New Hampshire Office of Energy and Planning (NHOEP) Energy Efficiency Conservation Block Grant (EECBG) program.

Figure 1: Hollis Police Department

Phase one of the evaluation process involves site assessment planning including evaluating utility bills, benchmarking, reviewing available building and mechanical plans, and coordinating site visits. Phase two involves conducting a comprehensive and holistic facility evaluation to gather relevant information and data. Analyzing the collected data and developing recommendations for energy efficiency measures is completed in Phase three. This information is presented to the Town within this report.

The objective of the building evaluation completed at the Hollis Police Department (HPD) (Figure 1) is to identify measures that reduce the net energy consumption thereby reducing operating costs and the consumption of non-renewable fossil fuel energies. In addition to energy conservation, the evaluations and recommendations presented herein consider occupant comfort and holistic building performance consistent with its intended use and function. The information obtained as part of this evaluation has been used to develop the recommended Energy Efficiency Measures (EEMs). These EEMs provide the basis for future building improvements and modifying the manner in which the building systems are operated.

Procedure

Facility audits or evaluations identify all appropriate EEMs and a financial analysis that considers implementation costs, operating costs, and attainable savings. The objective is to identify the predicted energy savings, the amount the measure will cost, and the estimated payback period for each EEM. The evaluation also identifies any changes to operations and maintenance procedures that will reduce energy consumption. A comprehensive field survey of the facility is completed to evaluate the following:

- *Building Characteristics*
- *Building Use and Function*
- *Envelope Systems*
- *Heating and Cooling Systems*
- *Ventilation Systems*
- *Electrical and Lighting Systems*
- *Domestic Hot Water Systems*
- *Plug Loads*

Following completion of the field evaluation, the data and information are reviewed to develop proposed recommendations for the facility. All information, data, and recommendations are then compiled into a comprehensive report. The final report is then distributed to the municipality or school to assist with implementation and budgeting of the proposed EEMs. The information provided in the reports will assist the owner with determining the best value EEMs for their facilities. The reports also identify potential financial resources available to help fund the EEMs.

On December 28th, 2011 AEC personnel completed building site reviews at the HPD to obtain the information necessary to complete an assessment of overall building performance. All building systems that impact energy consumption were evaluated including the building envelope, heating and cooling, ventilation, electrical, plumbing, and mechanical. Secondary observations are also reported herein and include building code compliance, life safety, structural systems, and roofing systems. This evaluation also considers whole building performance that measures how well the integrated building systems in the HPD function as a composite system.

AEC completed a desktop review of the data provided by the HPD including historical energy consumption data. The field review included an evaluation of all building systems and data collection including an infra-red thermal imaging survey, indoor air quality measurements, lighting density measurements, and metering of lighting fixtures and HVAC equipment. The HPD building was modeled using a building energy modeling computer program (eQUEST®) and calibrated to historical energy data. A series of energy efficiency measures (EEMs) were then simulated in the 3-D building model to measure their effect on energy consumption. Capital investment costs for each EEM were developed, and based upon the predicted cost savings associated with the energy efficiency measure, the payback term is calculated. A savings to investment ratio (SIR) for each EEM is then calculated based on the cost of implementation, the predicted energy cost savings, and the predicted service life of the measure/equipment. The higher SIR indicates a stronger savings to the investment made thereby making the EEM more attractive. Other noted recommendations relate to indoor air quality, occupant comfort, code compliance, accessibility, and life safety.

Summary of Findings

The building performance evaluation at the HPD revealed that the building consumes more energy than expected. Factors attributing to this include:

1. The energy consumed at the HPD is higher than comparable facilities.
2. The installed HVAC equipment and systems are inefficient.
3. Operation, integration, and control of the HVAC equipment is inefficient.

Notable Observations

The following notable observations were made during the desktop data review and/or the building evaluation. Notable observations may be related to data that is outside the normal or expected range, irregularities in building use or function, or problematic systems.

- Energy use intensities (EUI) for the building are higher than expected for a public safety facility. ENERGY STAR® does not certify public safety facilities however compared to facilities entered in the database, the site EUI is 30% higher than the national average.
- The quantity of HVAC equipment is excessive considering the gross area of the facility.
- Recorded heating temperatures throughout the facility exceeded recommended setpoint values.
- The proportion of electric used for plug-load for electronic devices (e.g., computers, monitors, radios) is very high. Unattended equipment remains continuously operating.
- A water softening system is used to reduce mineral content of the domestic water supply. As evidenced by corroded distribution piping and equipment and mineral staining where leaks have occurred, the system may not be reducing mineral concentrations to recommended levels. High mineral concentrations reduce the expected service life of hydronic equipment and piping systems.

- Air conditioning condensers were observed to be operating during winter months of December through February) when the outdoor temperature was 20°F to 35°F. Some of the units appear to be original to the construction of the building (1987) and are inefficient relative to modern technology.
- Air handler units supply 100% outdoor air and there is no economizer control. Based on observations and indoor air quality data the building is over-ventilated.
- The Sallyport garage space is heated with two large (2) gas-fired air convection units. Recorded temperatures are higher than recommended for a garage space.
- The gas-fired boiler has a low combustion efficiency and it is approaching the end of its expected service life.
- Domestic hot water (DHW) equipment and capacity exceed the expected demand.
- Snow accumulates over the rear entry door of the building thereby reducing emergency egress.
- A fire detection device (D11) has been removed from the second floor of the building.

Summary of Recommendations

Following is a summary table identifying the proposed recommendations, EEM costs, predicted annual energy cost savings, simple payback period and savings to investment ratio. Part G provides a more detailed explanation of these recommendations.

Table 1: Energy Efficiency Measure Summary

EEM No.	EEM Description	Capital Cost	Annual Cost Savings	Payback (yrs.)	SIR
T1-1	Power down AC condensers in winter months.	$0	$360	-	-
T1-2	Disconnect condensers for water coolers (2) and water fountain (1).	$0	$280	-	-
T1-3	Power down office equipment when not in use.	$0	$210	-	-
T1-4	Reduce heating setpoint in Sallyport (60°F).	$0	$100	-	-
T1-5	Replace standard size refrigerator in kitchen with ENERGY STAR® model and remove two (2) compact units.	$500	$410	1.2	12.3
T1-6	Air seal envelope. Install weather-stripping on entry door jambs and sweeps, adjust window seals or install new weather-stripping, caulk interior and exterior moldings, seal all wall and roof penetrations.	$550	$400	1.4	5.0
T1-7	Consolidate computer equipment in dispatch office.	$300	$120	2.5	4.8
T1-8	Augment overhead lighting with low-wattage task lighting including floor, table, and desk lamps (www.nhsaves.com).	$1,200	$380	3.2	4.8
T1-9	Retrofit halogen recessed can fixtures in communications room with LED downlights (www.nhsaves.com)	$200	$40	5.0	3.0
T2-1	Install occupancy sensing (ultrasonic) lighting controls in offices, common spaces, and corridors.	$850	$270	3.1	3.2
T2-2	Replace existing domestic hot water heater with a tankless propane gas unit.	$1,400	$144	9.7	1.5
T2-3	Replace exterior lighting fixtures with dark-sky 20w LED units (15).	$6,600	$728	9.0	1.4
T3-1	Replace nine (9) air conditioning units with energy efficient units	$22,500	$1,784	12.6	1.3
T3-2	Install economizers on air handing units (6).	$7,500	$500	15	1.3
T3-3	Replace existing boiler with ultra-efficient condensing gas-fired modulating boiler. Replace circulation pumps with VFD NEMA rated models and insulate all hydronic piping.	$36,000	$1,930	18.7	1.1
T3-4	Install energy recovery ventilation (ERV) units on the seven (7) air handling units.	$19,000	$915	20.8	1.0
T3-5	Replace existing boiler, air-conditioning units, and AHUs with a high-efficiency electric air-source heat pump system with energy recovery.	$125,000	$4,380	28.5	0.8

The energy cost savings, resulting payback and SIR are based upon each independent measure implemented for the building in its current condition and function. There are interdependencies among measures that will affect the net composite energy savings. Interdependent measures are parametrically related therefore the net energy savings from two dependent measures do not equal the resulting savings determined by the addition of the two measures considered independent of each other. Capital costs are provided for budgetary planning only. They are estimated based on current industry pricing. A detailed cost estimate should be developed prior to appropriating capital funds for the more costly measures.

The following table summarizes the renewable energy technologies that were considered for the Hollis Police Department. Scores are determined based upon the feasibility of the technology for the facility. A more focused feasibility study should be completed prior to considering any renewable energy system(s).

Table 2: Renewable Energy Technology Feasibility Scoring Results

Renewable Energy Technology	Grade
Geothermal Heating/Cooling	84%
Biomass Heating	78%
Roof Photovoltaic	76%
Ground Photovoltaic	74%
Solar DHW	73%
Solar Thermal	67%
Wind Turbine Generator	62%
Combined Heat & Power	61%

Insulation resistance values (R-values) were determined based on given information, time of construction and visual observations. The industry standard *International Energy Conservation Code (IECC), 2009* for Commercial Buildings in Climate Zone 5 required values are provided along with the installed values in Table 3. The IECC values are for new construction only, however provide a guide as to how this facilities insulation compares with new construction.

Table 3: Facility Insulation Summary

	Insulation Values		
Space	Required (IECC, 2009)	Recommended	Installed
Basement Floor	NA	10	1.1
Concrete Wall	13.0 +3.8 ci	13.0 +3.8 ci	0.8
Timber Framed Wall	13.0 +3.8 ci	13.0 +3.8 ci	19.5
Roof	38	38	22.2

B. PROCEDURES & METHODOLOGY

Standards and Protocol

The American Society for Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) has developed the most widely accepted process for completing energy audits at commercial facilities. ASHRAE document RP-669, SP-56, *Procedures for Commercial Building Energy Audits* defines several levels of audits. The appropriate level of audit for a particular facility depends on the availability of existing data and information, owner objectives, and owner budget. Levels range from simple benchmarking to a comprehensive review of all building systems. The most comprehensive audit is a Level III audit which was conducted at the Hollis Police Department. Level III audits are commonly referred to as "Investment Grade Audits".

Basic elements of a Level III Investment Grade Audit include the following:

- A review of existing facility data including energy usage.
- Benchmarking the facilities energy usage relative to similar use facilities.
- An on-site inspection and survey of all facility systems.
- On-site measurements and data collection.
- Informal owner and occupant interviews.
- Energy use analysis and development of efficiency measures.
- Developing a simple payback cost estimate for each recommended measure.
- Development of a comprehensive report that clearly presents all findings and provides recommended energy conservation measures and the associated costs.

In addition to the ASHRAE standard for commercial audits, there are industry and code-based standards that must be considered when analyzing building systems and evaluating energy conservation measures. All recommendations must be consistent with the intent of these standards. For example, the US Environmental Protection Agency (EPA) has established a recommended carbon dioxide (CO_2) threshold concentration of 1,000 parts per million (ppm) to promote a healthy indoor air environment. ASHRAE defines recommended temperatures, relative humidity levels, minimum ventilation rates, and energy standards. The Illuminating Engineering Society of North America (IESNA) prescribes recommended lighting densities based on the designated space use. The International Code Council (ICC) is the adopted standard for all building and energy codes (2009) in the state of New Hampshire. By inclusion, New Hampshire has also adopted ASHRAE Standards 62.1 and 90.1.

Table 4: Relevant Industry Codes and Standards

Standard	Description
28 CFR Part 36	ADA Standards for Accessible Design
ANSI/ASHRAE Standard 55	Thermal Environmental Conditions for Occupancy
ANSI/ASHRAE Standard 62.1	Ventilation for Acceptable Indoor Air Quality
ANSI/ASHRAE/IESNA Standard 90.1	Energy Standards for Buildings Except Low-Rise Residential Buildings
ICC 2009	International Building Code (IBC)
ICC 2009	International Existing Building Code (IEBC)
ICC 2009	International Energy Conservation Code (IECC)
ICC 2009	International Mechanical Code (IMC)
ICC 2009	International Fuel Gas Code (IFGC)
IESNA Lighting Handbook	Reference and Application
NFPA 70	National Electrical Code (NEC)

While the primary objective of an energy audit is identify energy conservation measures, such measures cannot adversely affect occupant comfort and indoor air quality. For example, if a building ventilation system is inadequate then it would be recommended that additional ventilation capacity be added. The electrical power required to operate the added ventilation equipment would increase energy consumption. Typically, the net energy usage incorporating the sum of the recommended conservation measures would still be less than the current usage even with the added ventilation equipment.

It is noted that although there is a prescriptive approach to commercial building audits, that every building is unique in many ways. Buildings should be evaluated consistent with the characteristics that define its need and appropriate function. This includes the following:

- *Use*: Current building use and occupant needs.
- *Systems*: Building system characteristics and how each system integrates within the composite facility ultimately determining building function and energy usage.
- *Control*: The manner in which the facility manager utilizes the existing controls for building systems.

Desktop Data Review

Ideally, the building owner provides all available information to the engineering firm prior to initiating the facility site review. Information such as utility bills, building plans, repair records, planned improvements, and occupant concerns will help the building engineer identify potential issues before initiating the site review. The Building Engineer can then focus the site review toward problematic and energy intensive building systems.

Facility Site Review

Following the desktop data review, the Engineer initiates the facility site review. This review includes all major building systems including the envelope, electrical, mechanical, heating, cooling, and ventilation. The Engineer not only determines the performance and operating characteristics of all building systems, they also evaluate how the users operate the systems and how they perceive building performance. Photographs of representative systems, major equipment, and any identified issues are obtained to help document existing conditions. Field notes are maintained by the Engineer to further document building and user characteristics.

Data Measurements

In addition to collecting equipment information, several data measurements are obtained as part of the facility site review. This data is necessary to identify potential building issues and to collect the information needed to develop an accurate energy analysis. Measurements include:

- Infra-red thermal imaging survey of the building envelope.
- Indoor air quality (IAQ) measurements (temperature, relative humidity, and CO_2).
- Lighting metering to determine energy use and operating schedules.
- Lighting output density.
- Metering of energy intensive electrical equipment (e.g., motors, compressors, heaters) to determine energy use and operating schedules.
- Metering of energy intensive plug-loads to determine energy use and operating schedules.

Data Gap Review

Once the facility site review and data measurements are substantially complete, the Engineer begins reviewing and processing all of the collected data. Any data gaps discovered during this process are addressed prior to completing the audit report.

Energy Modeling and Conservation Measures

To identify the best value ECMs and ensure that the calculated energy and cost savings are relatively accurate, a DOE approved energy modeling software program is utilized. A three-dimensional model of the building is created using the simulation program. This includes all characteristic envelope systems, HVACR systems, domestic hot water systems, and mechanical systems. The geographic position and orientation of the building is input and regional climatic data is imported from the program database.

After the building is accurately modeled, the program simulates building performance and provides the estimated energy use for electric and heating fuel(s). The Engineer then compares the energy data to actual building data. The cause for any significant differences is determined and the building is re-simulated until the model closely matches the actual data. AEC utilizes eQUEST© for all building simulations and energy modeling.

With the base model complete, the Engineer then implements various energy reducing measures and simulates the performance of the building with the new measure. The resulting energy consumption is then compared to the baseline model and predicted energy savings are analyzed.

Cost Estimating and Payback

The cost for implementing each evaluated ECM is then estimated by the Engineer. This provides a net estimated energy savings per dollar invested. Simple payback calculations determine the number of years required for the capital investment cost to equal the present day cost savings realized from energy reductions. The savings to investment ratio (SIR) is the accumulated annual cost savings (as determined by the expected service life of the material or equipment associated with the EEM) divided by the cost of investment. A SIR equal to 1.0 indicates that the EEM has a "break-even" or net-zero cost. The higher the SIR, the more favorable the return on investment is.

C. FACILITY BACKGROUND & ENERGY CONSUMPTION

Setting

The Hollis Police Department (HPD) is located in Hollis, NH within a light commercial setting (Figure 2). The building and facilities are located on a land parcel owned by the Town of Hollis and is within the Hollis Historic District. The Department is located on Silver Lake Road (State Route 122) immediately north of State Route 130. Silver Lake road defines the western boundary of the parcel and small commercial building bounds the parcel to the east. To the south lies open space and additional commercial buildings and to the north there is a residential building. Parking for visitors is provided in the front of the building and a paved parking area located on the east side of the building provides parking for department vehicles. The gross area of the HPD is 9,918 square feet.

Figure 2: Aerial Photograph of HPD (2011)

History

According to archive records and information found on site the HPD facility was constructed in 1987. Prior to the construction of the current station, the Police Department operated out of the Always Ready Fire House (since 1974). Before 1974, the local officer would work either at his house or in a residential building on Broad Street. In 2005 the building was renovated and expanded to its current configuration. The Town has maintained a full-time police officer since 1970 and the Department has provided the community with 24-hour protection since 1974.

Use, Function & Occupancy Schedule

The HPD and the land it occupies are owned by the Town of Hollis. The building is a two-story structure with a large Sallyport (garage) on the east side of the building. Spatial configuration and functional use of the building is typical of a police department. Spaces include a dispatch center, meeting rooms, offices, locker rooms, holding cells, garage, mechanical rooms, and several storage closets. The building is staffed 24 hours a day, 365 days a year.

Anecdotal Information

Anecdotal information includes all relevant information collected during the desktop review, as part of occupant interviews, or general observations noted during the site evaluation. Generally, anecdotal information corresponds to issues or concerns that may not be apparent during the building evaluation. It includes complaints about seasonal occupant comfort, maintenance issues, systems or equipment performance issues, recent improvements or changes in use, and previous reports prepared by others. Anecdotal information obtained during the HPD evaluation includes the following:

- Air conditioning units run consistently throughout the year. Contributing factors to this include the high heat load due to computers and other energy intensive equipment and a high temperature setpoint which results in the facility calling for cooling. The disconnect switch can be flipped to manually shut these down.
- The domestic water supply (on-site well) has a high mineral concentration (hard water). A water softening system is located on the second floor of the building requiring occupants to carry heavy bags of media to the system weekly.
- The roof design causes large amounts of snow to accumulate in the rear of the building blocking egress and causing slipping hazards.

- The asphalt roof was recently replaced.
- The on-site septic system requires frequent maintenance (filter cleaning).

Utility Data

Utility data for the Hollis Police Department (HPD) were provided by the Town. Table 5 summarizes the total energy consumption for the year including electric and propane gas usage (2010 and 2011). Energy consumption and cost for electricity per pay period is shown in Table 6 and Figure 3. The regional electric utility supplier is Public Service Company of New Hampshire (PSNH) and liquefied propane (LP) is provided by a local supplier.

Table 5: Annual Energy Consumption (2011)

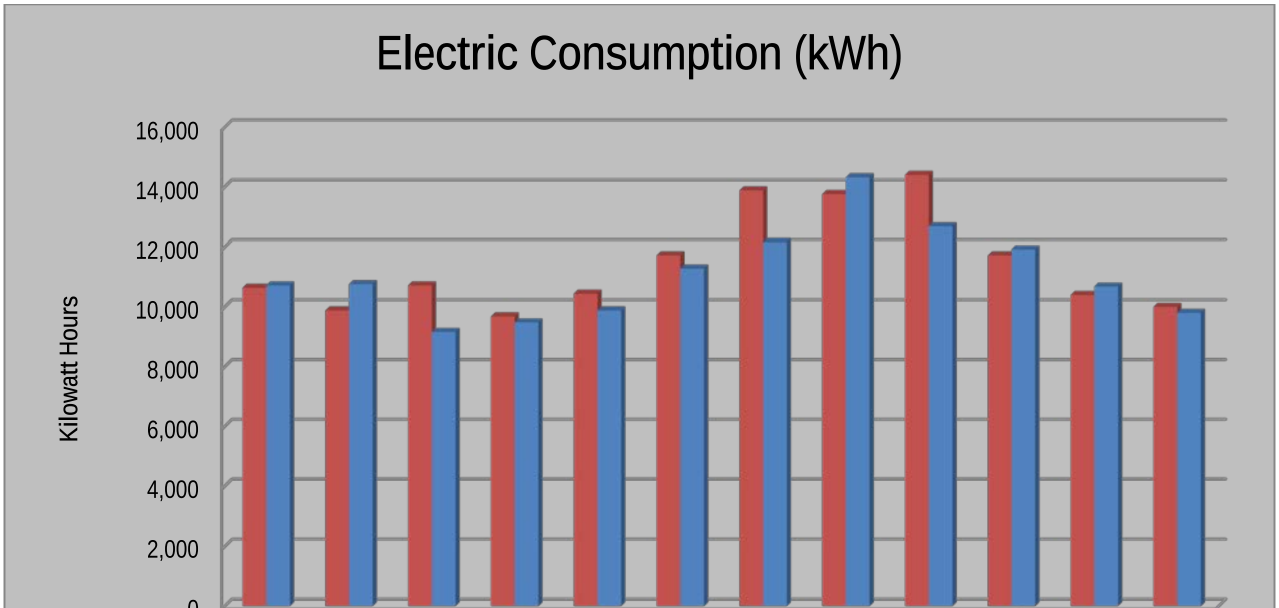
Energy	Period	Consumption	Units	Cost
Electric	January 2010 – December 2010	137,240	Kilowatt hours	$18,669
Liquefied Propane	January 2010 – December 2010	4,803	Gallons	$9,426
			Total Annual Energy Cost (2010):	$28,095
Electric	January 2011 – December 2011	132,840	Kilowatt hours	$17,881
Liquefied Propane	January 2011 – December 2011	3,992	Gallons	$6,961
			Total Annual Energy Cost (2011):	$24,842

The monthly electrical usage (Figure 3) reveals that demand peaks during the summer months indicating a significant amount of energy is consumed for cooling of the facility. Over the twelve (12) month period (2010), September was the peak demand month, consuming 14,400 kilowatt-hours (kWh) of electricity. Over the 12 month period (2011), August is the peak demand month, consuming 14,320 kWh of electricity.

Table 6: Monthly Electric Consumption (2011)

Month	Year	Electric Consumption (kWh)	Electric Cost
Jan	2010	10,640	$1,400
Feb	2010	9,880	$1,309
Mar	2010	10,720	$1,385
Apr	2010	9,680	$1,296
May	2010	10,440	$1,406
June	2010	11,720	$1,617
July	2010	13,880	$1,925
Aug	2010	13,760	$1,894
Sep	2010	14,400	$2,016
Oct	2010	11,720	$1,617
Nov	2010	10,400	$1,430
Dec	2010	10,000	$1,374
Totals:	2010	137,240	$18,669
Jan	2011	10,720	$1,433
Feb	2011	10,760	$1,465
Mar	2011	9,160	$1,233
Apr	2011	9,480	$1,273
May	2011	9,880	$1,348
June	2011	11,280	$1,552
July	2011	12,160	$1,664
Aug	2011	14,320	$1,924
Sep	2011	12,680	$1,696
Oct	2011	11,920	$1,583
Nov	2011	10,680	$1,413
Dec	2011	9,800	$1,298
Totals:	2011	132,840	$17,881

Average annual electric usage for the HPD based on the most recent data provided by Town (January 2010 through December 2011) is 135,040 kWh at a cost of $18,275. Based on the building size and function, this usage is relatively high compared to similar use Fire/Police facilities.



	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
2010 Electric	10,640	9,880	10,720	9,680	10,440	11,720	13,880	13,760	14,400	11,720	10,400	10,000
2011 Electric	10,720	10,760	9,160	9,480	9,880	11,280	12,160	14,320	12,680	11,920	10,680	9,800

Figure 3: Electric Consumption (2011)

To determine the most accurate predictions of energy reduction, the energy consumption according to end use was determined. Table 7 presents the estimated electrical usage by category including lighting, plug loads, and mechanical. Mechanical equipment includes all hard-wired, permanently installed equipment including ventilation, exhaust, heating, cooling, pumps, etc. These values were determined based on an equipment inventory and electric consumption. A more detailed accounting of all electrical equipment by end-use is presented in Part C of this Report.

Table 7: Categorized Electrical Consumption (2011)

Equipment Type	Annual Consumption (kWh/yr)	% of Total Consumption	Annual Cost
Mechanical Equipment	49,552	38%	$6,670
Plug Loads	48,569	37%	$6,538
Lighting Fixtures	33,524	25%	$4,512
Totals	131,645	100%	$17,720

Accounting for 38% of electrical energy, mechanical loads consume the greatest amount of electricity at the HPD. This is due in part to numerous air conditioning condensers which account for a significant amount of electrical consumption in the building. At 48,569 kWh per year, plug loads account for 37% of the electrical demand in the building. Lighting systems represent 25% of the annual electrical energy or 33,524 kWh. Figure 4 presents the relative energy use for each of the three categories.

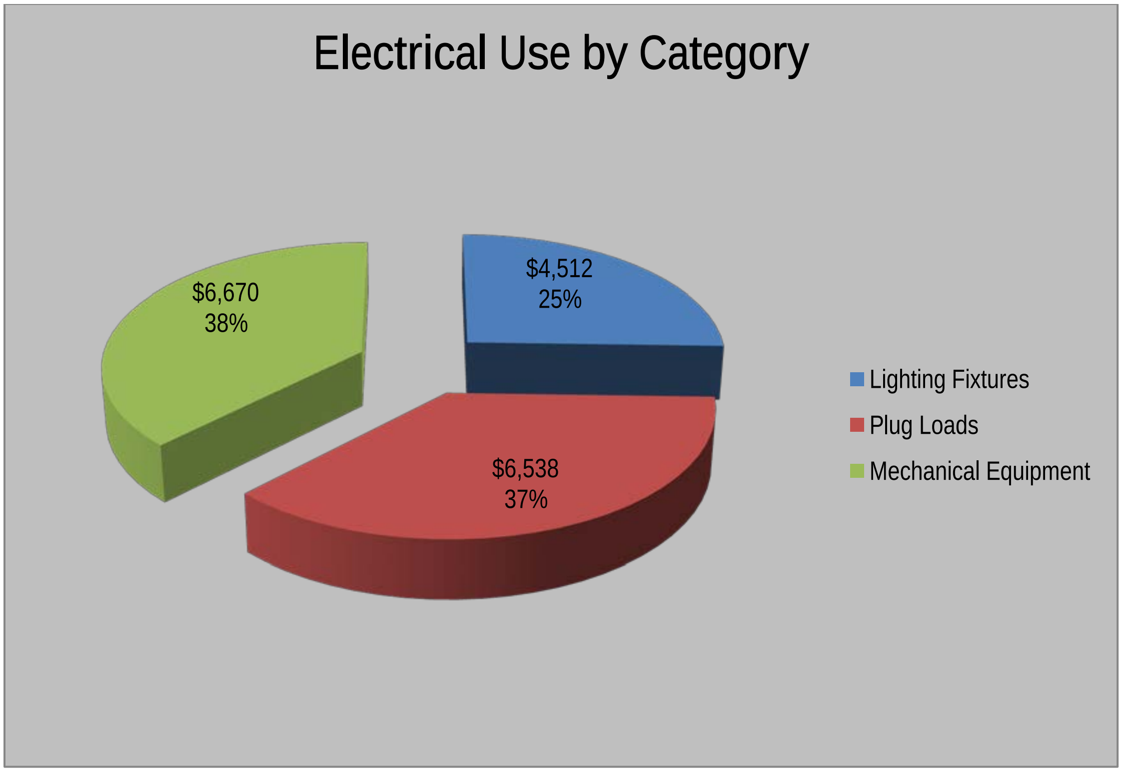


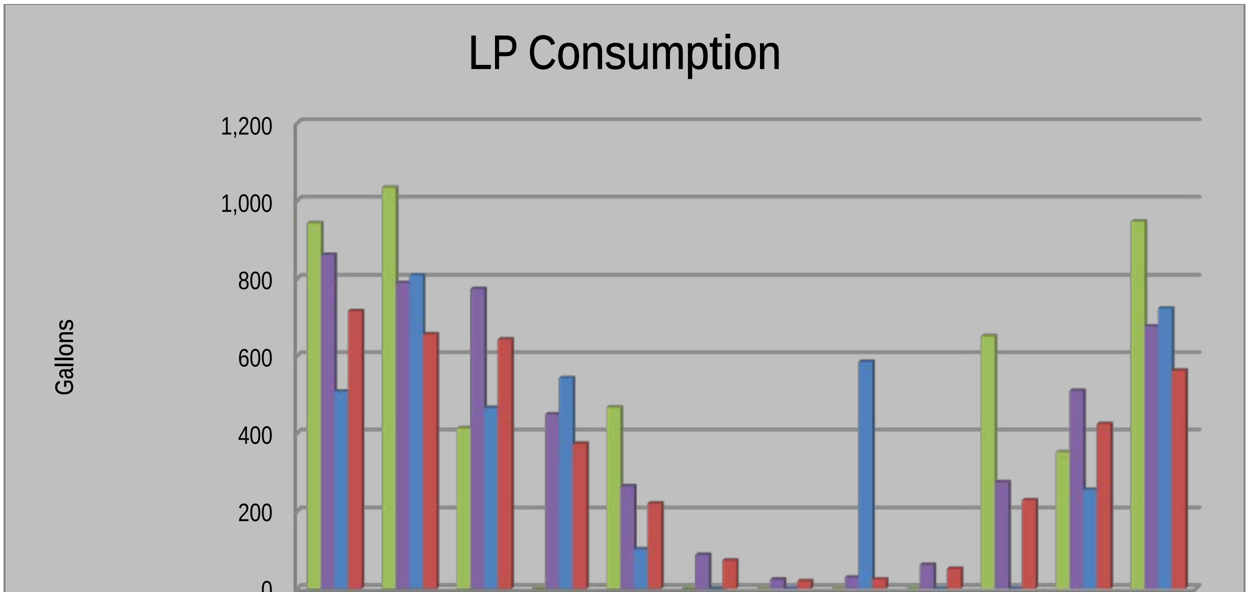
Figure 4: Hollis Police Department Electrical Cost by Category (2011)

The annual electrical cost for mechanical equipment is $6,670 (2011). This higher than expected usage is attributable to the inefficient configuration and operation of HVAC systems. Plug loads are also higher than expected and include office equipment, computers, electronics (communication devices battery tenders), and appliances. Lighting fixtures consume a moderate amount of electricity accounting for $4,512 annually. It is noted that a lighting retrofit project was recently completed (2011) for the building.

Table 8: Monthly Heating Fuel Consumption (2011)

Month	Year	Propane Purchased (gallons)	Est. Propane Consumption (Gallons)	Cost of Purchase	Est. Cost Consumed
Jan	2010	942	862	$2,031	$1,691
Feb	2010	1,034	789	$2,276	$1,549
Mar	2010	413	774	$919	$1,518
Apr	2010	0	449	$0	$882
May	2010	467	265	$1,037	$520
June	2010	0	88	$0	$172
July	2010	0	24	$0	$46
Aug	2010	0	29	$0	$57
Sep	2010	0	62	$0	$121
Oct	2010	651	276	$1,053	$541
Nov	2010	351	510	$570	$1,002
Dec	2010	946	677	$1,540	$1,328
Totals:	2010	4,803	4,803	$9,426	$9,426
Jan	2011	508	716	$827	$1,165
Feb	2011	809	656	$1,313	$1,064
Mar	2011	466	643	$750	$1,035
Apr	2011	543	373	$874	$601
May	2011	102	220	$165	$356
June	2011	0	73	$0	$145
July	2011	0	20	$0	$39
Aug	2011	585	24	$1,116	$46
Sep	2011	0	51	$0	$102
Oct	2011	0	229	$0	$453
Nov	2011	256	424	$528	$874
Dec	2011	723	562	$1,388	$1,080
Totals:	2011	3,992	3,992	$6,961	$6,961

Heating fuel for space heating and domestic hot water heating at the HPD is provided by a local supplier (Table 8, Figure 5). The building consumed an annual total of 4,803 gallons of liquefied propane (2010) and 3,992 gallons of LP (2011) with an average consumption of 4,398 gallons. The total annual heating fuel cost for the HPD is $9,426 (2010) and $6,961 (2011) with an average cost of $8,314. Since actual fuel consumption cannot be tracked, fuel consumption is estimated based on how much fuel was purchased over the given year and modeled in eQUEST® which accounts for predicted usage based on building type and weather data.



	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
LP Purchased (2010)	942	1,034	413	0	467	0	0	0	0	651	351	946
LP Consumed (2010)	862	789	774	449	265	88	24	29	62	276	510	677
LP Purchased (2011)	508	809	466	543	102	0	0	585	0	0	256	723
LP Consumed (2011)	716	656	643	373	220	73	20	24	51	229	424	562

Figure 5: Heating Fuel Consumption (2011)

Considering the HPD building systems including the envelope integrity (insulation and air leakage), mechanical equipment, and use of the facility, the heating fuel usage is higher than expected. This is mostly attributable to uncontrolled air exhaust and ventilation systems resulting in increased exchange of interior conditioned air and outdoor air. The boiler has a relatively low combustion efficiency and when installed had a maximum efficiency (AFUE) of 82% which decreases over the life of the system. Based on the unit condition and age (18 years) the de-rated efficiency is 79% or less. New commercial gas-fired condensing boilers can operate at efficiencies as high as 97%.

Other explanations for the high usage include heating setpoints that are higher than recommended and poor heating distribution throughout the building. For example, fifteen (16) of the nineteen (19) representative locations recorded temperatures exceeding 69°F and the average recorded temperature was 71.0°F. Recommended heating setpoints for a Public Safety Complex range between 67°F and 69°F.

D. FACILITY SYSTEMS

Building Envelope

The following sections present the building envelope systems and insulation values for each assembly. Assembly values are compared to the *International Energy Conservation Code (IECC), 2009* for commercial buildings located in Climate Zone 5. The IECC code is used as a standard of comparison only and existing buildings are not required to comply with the code unless it undergoes a substantial renovation. Building additions or new construction are required to comply with current energy codes. A complete set of building design plans (2003) were available and used to verify the building envelope sections.

Floor Systems

The concrete slab-on-grade floor in the basement is four (4) inches in thickness with a laminate floor covering or carpeting. The floor system has an installed assembly insulation resistance (R) value of 1.1 (Table 9). Although the IECC does not specify an insulation requirement for an unheated slab-on-grade floor in Climate Zone 5, a minimum value of R-10 to 24 inches below grade is generally recommended.

Table 9: Floor Insulation Values

Material	Thickness (in.)	R-value	Integrity Factor	Installed R-value
Concrete slab	4.0	0.3	1.0	0.3
Floor Tile	0.1	0.1	1.0	0.1
Interior air film	NA	0.7	NA	0.7
			Installed Assembly	1.1
			2009 IECC Requirement:	NR
			Best Practice Recommendation	10.0

Wall Systems

The building is a two-story timber framed structure. The below grade foundation walls are cast-in-place concrete. Portions of the concrete wall extend above grade and a significant amount thermal transfer was observed during the thermal imaging survey. It is assumed that no foundation wall insulation exists below grade. The exterior walls consist of 5/8 inch plywood sheathing clad in vinyl clapboard. Wall members are comprised of 2 inch by 6 inch timber studs and the bays are filled with fiberglass batt insulation.

Table 10: Wall Assembly Insulation Values

Wall Type 1 (mass concrete wall)				
Material	Thickness (in.)	R-value	Integrity Factor	Installed R-value
Exterior Air Film	NA	0.2	NA	0.2
Cast-in-place concrete	8	0.6	1.0	0.6
			Installed Assembly:	0.8
			2009 IECC Requirement:	NR
Wall Type 2 (timber framed)				
Material	Thickness (in.)	R-value	Integrity Factor	Installed R-value
Exterior Air Film	NA	0.2	NA	0.2
Vinyl Clapboard	NA	0.6	1.0	0.6
Plywood Sheathing	5/8	0.8	1.0	0.8
Fiberglass Batt Insulation	5.5	21.0	0.8	16.8
Gypsum board	0.5	0.4	1.0	0.4
Interior air film	NA	0.7	NA	0.7
			Installed Assembly:	19.5
			2009 IECC Requirement:	13 + 3.8 ci
			Code Compliant?	NO

The wall systems do not comply with current energy code standards (*IECC 2009*) however they are presumed to comply with the building code in effect at the time of construction (2004). Inspection of the walls with an infra-red (IR) thermal imaging camera did not reveal any notable issues and overall thermal integrity is consistent with the construction methods at the time of construction.

Ceiling Systems

Ceilings throughout the first floor of the building are suspended acoustical tile (SAT) systems. The above ceiling plenum space is used for routing of ducting, piping, conduit, and electrical cable. The second floor of the building is composed of a gypsum covered ceiling. Ceilings do not provide a thermal barrier in the HPD.

Roofing Systems

The roofing system on the HPD consists of pitched timber framed members covered in asphalt shingles. Roofing insulation values are presented in Table 11. The insulation does not comply with current code standards.

Table 11: Roof Systems Insulation

Material	Thickness (in.)	R-value	Integrity Factor	Installed R-value
Exterior Air Film	NA	0.2	NA	0.2
Asphalt singles	NA	0.3	1.0	0.3
Plywood Sheathing	½	0.6	0.9	0.5
Fiberglass-batt insulation	8.0	25.0	0.8	20.0
Gypsum board	1/2	0.5	1.0	0.5
Interior Air Film	NA	0.7	NA	0.7
			Installed Assembly:	22.2
			2009 IECC Requirement (roof):	38.0
			Code Compliant?	NO

Fenestration Systems

Fenestration systems on the HPD building include operable windows, fixed window units, glazed entry doors, and fixed storefront entry units. Window units in the building are wood and vinyl framed units with double-pane glass. Some units are covered with additional blast and bullet resistant glass. Consistent with IECC requirements, fenestration performance is measured by the U-factor, the solar heat gain coefficient (SHGC), and air leakage as determined by the unit manufacturer. No manufacturer information was available for the windows or doors in the HPD and therefore compliance with IECC standards for commercial buildings located in Climate Zone 5 cannot be established.

In general, the glazed units perform reasonably well based on visual inspection and survey with the infra-red thermal camera. Typical of modern units, most thermal transfer and air leakage occurs at the seals of operable windows and the interface between the window and the wall opening. Recommendations include exterior and interior inspection and re-caulking of window jambs, headers, and sills as needed. If the operable double-hung and sliding window units have adjustable jambs, they should be inspected and adjusted as necessary to maintain a complete air seal.

Doors

The door units in HPD are hollow metal units with thermal breaks. Units include full glazed sections (front entry doors), solid doors (utility areas and rear doors) and retractable garage doors with no windows. Glazed door units appear to be uninsulated providing high thermal transfer through the frame. Solid doors appear be insulated. Based on visual observations and thermal imaging, the seals on door jambs, partings, and thresholds are incomplete allowing substantial air leakage (Figure 6). Daylight can be seen through many door thresholds and double-door partings.

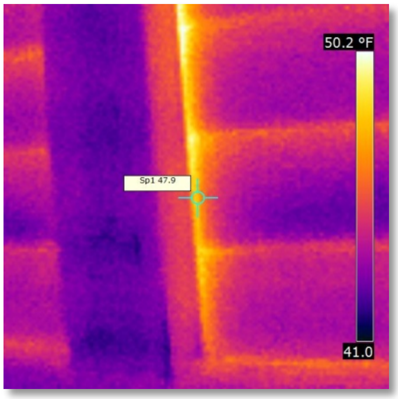


Figure 6: Poor Seal Around Garage Door

Air Sealing

Based on the thermal imaging survey and visual observations, air leakage occurs through windows and entry doors. Although this is typical even for a modern building, simple measures can significantly reduce air leakage. Recommended measures for windows include: 1) adjusting jamb seals on operating windows; 2) adding weather-stripping; 3) caulking interior frames and moldings; and 4) locking/clasping windows to maintain a complete seal. Air sealing of all door units can be improved with weather-stripping. All door and window units should be regularly inspected (every 2 to 3 years) to ensure proper operation, identify faulty seals, and to identify any deteriorated caulking requiring replacement.

All wall and roof penetrations should be inspected and entirely sealed with a fire-rated sealant/caulking.

Other air sealing recommendations include inspecting all exhaust and ventilation ducts to determine if they have a positive pressure actuated damper. Dampers are recommended on all exterior ducting to prevent passive air leakage.

Thermal Imaging Survey

The thermal imaging survey was completed on the morning of December 28th, 2011. Outdoor ambient temperature was 28°F. The survey was conducted using a FLIR© B-CAM infra-red (IR) camera. The building exterior and interior envelope and major mechanical and electrical equipment were surveyed with the IR camera. IR camera surveys not only identify heat transfer through building envelopes, they also identify trapped moisture, electrical system overloading, heat loss through ducting and piping, high energy lighting fixtures, and energy intensive plug load equipment. Appendix B presents the survey report.

The IR surveys revealed the following notable observations at the HPD:

- The thermal integrity of the envelope (walls and roof) is relatively good. However, there are locations where insulation can be improved (second floor dormers) (Figure 7).
- Poorly sealed windows and doors provide a significant amount of thermal transfer and air leakage.
- The concrete foundation wall extending above grade provides substantial thermal transfer.
- Electronic equipment including photocopiers and computers/monitors operate at high temperatures and increase heat loading of the building interior.

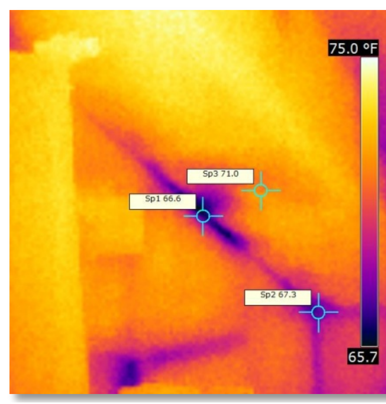


Figure 7: Interior of Dormer in Administration Office

Electrical Systems

Supply & Distribution

Grid electricity is supplied to HPD to the main electrical room located on the north side by underground service. The room is accessed from the training room. There is a gas-fired generator that supplies the building with emergency power during outages. Several sub-distribution electrical rooms are located in the building. Minor code compliance issues noted during the inspection include limited access to electrical panels (rooms used as storage).

Lighting Systems

Most lights throughout the facility were upgraded as part of the 2011 lighting upgrade project throughout the town. As presented in Table 12, there are a variety of lighting fixtures and lamp types in the HPD. Lighting fixtures in the building consist mainly of recessed mounted high performance T8 fluorescent fixtures and surface mounted compact fluorescent lighting (CFL) fixtures. All exterior lights are high pressure sodium (HPS). Exit signs are LED units.

Table 12: Lighting Fixture Schedule

Fixture Lamp Type	Location(s)	Control	No. Lamps	Watts	Qty.	Total Watts
T8	Throughout	Switch	2, 4, 8	32	157	8,736
HPS	Exterior	Time Clock	1	465	11	1,370
CFL	Throughout	Switch	1	17	27	459
Incandescent	Sign spot light, task lighting	Switch	1	60-75	3	210
Halogen	Dispatch	Switch	1	54	2	108
LED	Exit Signs	Constant on	1	5	12	48
				Totals:	212	10,931

Table 13 presents the energy consumption by lighting fixture type. The high performance T8 fluorescent fixtures are the main source of lighting and account for 79% of all lighting energy consumption annually. High pressure sodium fixtures on the exterior are the other main light consumption sources, accounting for 14% of lighting energy consumption. CFL, incandescent, and halogen lamps each account for 2% of the lighting consumption. LED lamps in exit signs account for an estimated 1% of usage.

Table 13: Lighting Fixture Energy Consumption

Fixture Lamp Type	Location(s)	Est. Usage (kWh/year)	% of Total
T8	Throughout	26,397	79%
HPS	Exterior	4,786	14%
CFL	Throughout	824	2%
Incandescent	Sign spot light, task lighting	593	2%
Halogen	Dispatch	505	2%
LED	Exit Signs	419	1%
	Totals:	33,524	100%

Lighting density measurements in HPD were obtained to establish if building illumination is consistent with the *Illuminating Engineer Society of North America* (IESNA) standards for the prescribed use. These measurements were obtained during normal operating conditions on December 28th, 2011 between the hours of 0919 and 0941. Table 14 presents the lighting density measurements obtained in units of foot-candles (FCs).

The T-8 lamp fixtures are relatively efficient units. Adding controls to reduce the frequency of operation is recommended, especially in common spaces such as corridors. Recommended controllers include occupancy sensing controls.

Lighting Densities

In general, lighting densities are consistent with IESNA recommended standards in most spaces. Methods to reduce lighting densities include reducing the quantity of fixtures and installing lower wattage bulbs in the existing fixtures. Other methods to reduce lighting density include replacing overhead lighting with task lighting, adding multiple control zones, adding daylight controls and adding dimming controls. Complete lighting density data is included in Appendix C.

Table 14: Illumination Densities

Location	Lighting Density (FC)	Recommended Density (FC) (1)
Interview Room	28	30
Men's Locker Room	33	30
Central Corridor	29	10
Interview	51	50
Sergeant Office	45	50
Kitchen	52	30
Squad Room	29	30
Training Room	41	30
Holding Room	37	30
South Sallyport	38	30
North Sallyport	14	30
Communications	17	30
Chiefs Office	46	50
Secretary Office	68	50
Upstairs hall	22	5
IT Room	47	30
Animal Control Office	27	50
Fitness Room	10	30

(1) Based upon IESNA standards and AEC recommendations.

Plug Loads

Plug loads for the HPD were determined based on equipment nameplate information. The operating time for each item is based on observations, occupant loading, schedule, and typical operating time for the equipment. Plug loads are categorized as appliances, electronics and office equipment. Table 15 presents a summary of plug loads by category and Appendix F presents an inventory of all plug load equipment.

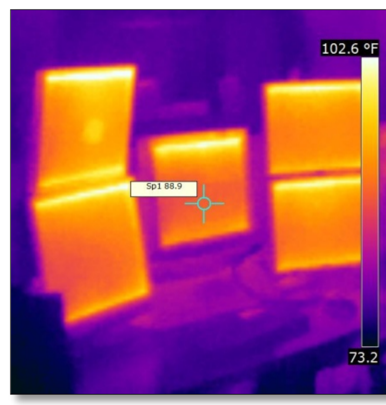


Figure 8: Computer Monitors in the Dispatch Room

Based on this analysis, the total annual plug load is 48,569 kWh. Office equipment, computers and electronics account for the majority of plug load energy consumption (60%). Appliances account for an estimated 23% of total energy consumption and electronics and other items account for 17% of consumption.

Table 15: Plug Load Energy Consumption

Category	Location(s)	Est. Usage (kWh/year)	% of Total
Office Equipment, Computers,	Throughout	29,216	60%
Appliances	Throughout	11,062	23%
Electronics, Others	Throughout	8,290	17%
	Totals:	48,569	100%

Many computers and electrical devices were observed to be powered on when not in use. There is a radio room on the second floor where four (4) unoccupied radios remained powered on. There are a large number of computers (13) and monitors (18) in the dispatch room (Figure 8). It is recommended that these systems be evaluated and consolidated if appropriate.

Motors

Electrical motors are used for the elevator, air handling units (AHUs), well pumps, and garage door openers. It is recommended that all replacement motors over 5 horsepower have variable frequency drives (VFDs) and are premium efficiency NEMA rated motors.

Emergency Power Systems

An on-site gas powered generator supplies the building with electricity during grid outages. It is tested quarterly and appears to be in good operating condition.

Plumbing Systems

Domestic Water Supply

Domestic water supply for the HPD is provided by the two (2) onsite drilled wells. Water demand for the building is expected to be limited and includes lavatory facilities (toilets and sinks). Shower facilities in the locker rooms do not appear to be frequently used.

Domestic Water Pump Systems

There are two (2) well pumps located on the grounds that are one (1) horsepower each. It is assumed that domestic water usage is limited at the facility.

Domestic Water Treatment Systems

Figure 9: Domestic Hot Water System

A water softening system reduces mineral content in the well supplied water. According to facility personnel, the system consumes a significant amount of sodium chloride (3,600 lbs annually).

Domestic Hot Water Systems

Domestic hot water is provided by one (1) 40-gallon gas-fired tank heating unit (Figure 9). Distribution piping in the boiler room was observed to be uninsulated. The system capacity appears to exceed occupant demand requirements. Recommendations include replacing the unit with a tankless gas unit and insulating all piping.

Hydronic Systems

Space conditioning is provided by hot water coils connected to a hydronic loop. Water is circulated by two (2) 1 horsepower circulation pumps located in the mechanical room on the second floor. Sections of piping insulation in the boiler room and second floor mechanical room are missing. Recommendations include replacing the missing insulation. Heat losses from the hydronic system into the attic space increase heating fuel consumption and contribute to ice damming by warming the roof and melting accumulated snow. The system contains glycol to prevent freezing. Pumps and piping were observed to be in poor condition. It is recommended that the pumps be reconditioned or replaced.

Mechanical Systems

Heating Systems

Figure 10: Burnham® LP Boiler

Heating is provided to the building by a single (1) LP fired boiler (Figure 10). The boiler was rated at 82% combustion efficiency when new and considering the age of the unit, the de-rated combustion efficiency is less than 79%. Modern propane fired condensing boiler units can achieve efficiencies up to 96%. Recommendations include replacing the boiler with an ultra-efficient condensing modulating unit and replacing the circulation pumps with NEMA premium efficiency rated units and VFD controls, or, a high-efficiency electric air-source heat pump system. The Sallyport is heated by two (2) suspended gas-fired air convention heaters.

Table 16: Heating Supply Systems

Heating Unit	Unit Description	Area(s) Served	Output (MBH)	Age (yrs.)	AFUE (new)	Control Type
Boiler No. 1	Burnham	Office Spaces	500 (est.)	9	82%	Outdoor reset
Gas Furnace No. 1	Cleaver-Brooks 150 LE	North Sallyport	184	7	80%	Thermostat
Gas Furnace No. 2	Cleaver-Brooks 150 LE	South Sallyport	184	7	80%	Thermostat

Cooling Systems

Figure 11: Original AC Condensing Units (c. 1987)

With exception of the Sallyport garage, cooling is provided to the building by nine (9) air condensing units. Two of the nine (9) units appear to be original (1987). Total cooling capacity for the building exceeds 37 tons which appears excessive for the served spaces. Condensers are charged with R-22 refrigerant. It is noted that the use of R-22 is no longer permitted for use as a refrigerant in new equipment based on its high ozone depletion potential (per USEPA).

The Energy Efficiency Ratio (EER) for the larger condensing units is 10 or less. The smaller mini-split units are rated at a Seasonal Energy Efficiency Ratio (SEER) of 11 or less. Operating efficiency tends to decrease with system age. As cooling condensing units fail, they should be replaced with the highest rated equipment available.

As prescribed by the 2009 IECC, the current minimum SEER for smaller cooling systems is 13 and larger units are rated at a minimum EER of 11.2. Modern cooling systems can achieve SEERs up to 24. As example, replacing a unit with a SEER rating of 8 with a new unit rated at 16 would reduce energy consumption by 50% and provide an equivalent cooling capacity.

Pumps

Two (2) water circulation pumps are located in the second floor mechanical room to circulate heated water through the hydronic loop. It was noted that the pumps are in poor condition. It is recommended that the pumps be replaced with NEMA premium efficiency rated motors. Adding variable frequency drives (VFD) is also recommended to reduce energy consumption and to extend the service life of the pumps.

Figure 12: Heating and Cooling Controls

Controls Systems

Heating and cooling system in the building are controlled by programmable and clock faced thermostats (Figure 12). The schedules on all programmable thermostats should be reviewed and optimized according to occupancy schedules. The setpoint temperature in the Sallyport (68°F) was much warmer than recommended for a garage space (50°F). According to facility personnel the temperature is required to be 60°F for prisoners. It is recommended that the setpoint be reduced to between 50°F and 60°F.

Mechanical Equipment Energy Consumption

The electrical energy consumption for mechanical equipment was determined according to equipment nameplate information and building function and occupancy schedules. Table 17 presents a summary of the mechanical equipment and annual energy usage. Appendix E presents the detailed inventory and the associated energy consumption for each piece of mechanical equipment. Mechanical equipment represents the highest usage among the three categories including lighting and plug loads. Total mechanical consumption is 49,552 kWh per year compared to 48,569 kWh for plug loads and 33,524 kWh for lighting.

Table 17: Mechanical Equipment Energy Consumption

Equipment Type	Qty.	Item Manufacturer(s)	Consumption (kWh/yr)	% of Total
Air Cooled Condensing Units	9	York®, American Standard®, Mitsubishi®	28,080	57%
Air Handling Units	8	First Co®, Snyder General®	15,200	31%
Pumps	4	Gould	5,205	10%
Other (boiler, overhead door lift, elevator etc.)	NA	NA	1,067	2%
		Totals:	49,552	100%

Ventilation Systems

Exhaust Ventilation Systems

Exhaust ventilation systems in the HPD is limited to lavatory exhaust fans and an exhaust fan for the second floor radio room (Figure 13). The exhaust fan for the radio room is controlled thermostatically.

Exhaust fan units provide several functions including humidity control, odor control, venting of VOC containing materials (e.g., cleaning solvents), chemical gas venting in laboratories, and venting of cooking fumes. Operation frequency and schedules for the fans units should be consistent with the use type and intensity of the vented space. For example, lavatories may be demand ventilated (interlocked with light switch) or they may operate constantly at a low rate during occupied periods.

Figure 13: Radio Room Exhaust Ventilation Fan Controls

Spaces equipped with exhaust fans are commonly over-ventilated resulting in increased energy consumption. All exhaust controls and rates should be consistent with ASHRAE Standard 62.1. Fan ducting should have pressure actuated dampers to restrict air flow and heat loss when the units are not operating.

Exchange Air Ventilation Systems

Exchange air ventilation is provided to interior spaces by eight (8) air handler units (AHUs). The AHUs are equipped with heating coils and condensing units to provide conditioned air to interior spaces. The quantity of AHUs is excessive for the building area and consolidation of equipment would reduce capital costs and O&M costs. None of the AHUs are equipped with energy recovery systems.

Energy Recovery Ventilation Systems

There are no energy recovery ventilation systems installed on the AHUs or exhaust ventilation units. This results in the direct exhaust of conditioned air during heating and cooling periods resulting in increased equipment operation, reduced equipment service life, and increased energy consumption. It is recommended that energy recovery systems be installed on all exhaust and exchange air ventilation systems.

Indoor Air Quality

Indoor air quality (IAQ) is measured based upon temperature (°F), relative humidity (%), and carbon dioxide (CO_2) concentrations (parts per million) or (ppm). This data provides the best representation of building conditioning, ventilation performance, and total occupant comfort. The data is also indicative of conditions that are detrimental to building systems including moisture and the potential for fungi growth (mold and mildew) and related damage of building materials.

Recommended temperatures vary based on the season, occupant activity, and relative humidity levels. Generally, recommended setpoint heating temperatures in northern New England range between 67°F and 69°F and recommended cooling setpoint temperatures range between 74°F and 76°F. Relative humidity (RH) levels fluctuate consistent with seasonal atmospheric conditions. A range between 30% and 65% is recommended (ASHRAE). While there are no known adverse health effects related to elevated CO_2 concentrations, it can cause acute illness including headaches, drowsiness, lethargy, and nausea. For this reason, the U.S. Environmental Protection Agency (EPA) has established a recommended threshold concentration of 1,000 ppm.

The IAQ in the HPD was measured on December 28th, 2011 between the hours of 0819 and 0941. The building was normally occupied when the measurements were obtained. Seventeen (17) IAQ measurements were obtained at representative locations throughout the building. Appendix C presents all of the measurements. Results of the IAQ measurements are summarized as follows:

- Temperatures in the building ranged from 64.5°F in the interview room, to 75.5°F in the IT room. The average recorded temperature was 71.0°F.
- Relative humidity levels varied substantially throughout the building from 26.4% on the second floor to 45.1% in the Sallyport. The average relative humidity was 33.4%.
- CO_2 concentrations were relatively consistent ranging from 538 ppm in the Sallyport to 774 ppm in the interview room with an average of 655 ppm. No levels exceeded the EPA recommended threshold of 1,000 ppm.

Table 18: Summary of IAQ Data

IAQ Metric	Low	High	Avg.	Range of Variance	Recommended Values
Temperature (°F)	64.5	75.5	71.0	11.0	67 – 69
Relative Humidity (%)	26.4	45.1	33.4	18.7	30 - 65
Carbon Dioxide (ppm)	538	774	655	236	<1,000

Temperatures were slightly higher than recommended throughout most the building. Sixteen (16) of the nineteen (19) recorded temperatures were above 69°F, with the recommended setpoints between 67°F and 69°F. Since the building is occupied and conditioned continuously, this marginally higher setpoint adds up to an extensive amount of unnecessary fuel to be used. The consistently lower CO_2 concentrations indicate over ventilating of the building. This leads to increased use of mechanical equipment which leads to increased electricity use, wear on equipment and a shorter lifespan of the equipment. Figure 14 presents the data trending for the three IAQ parameters.

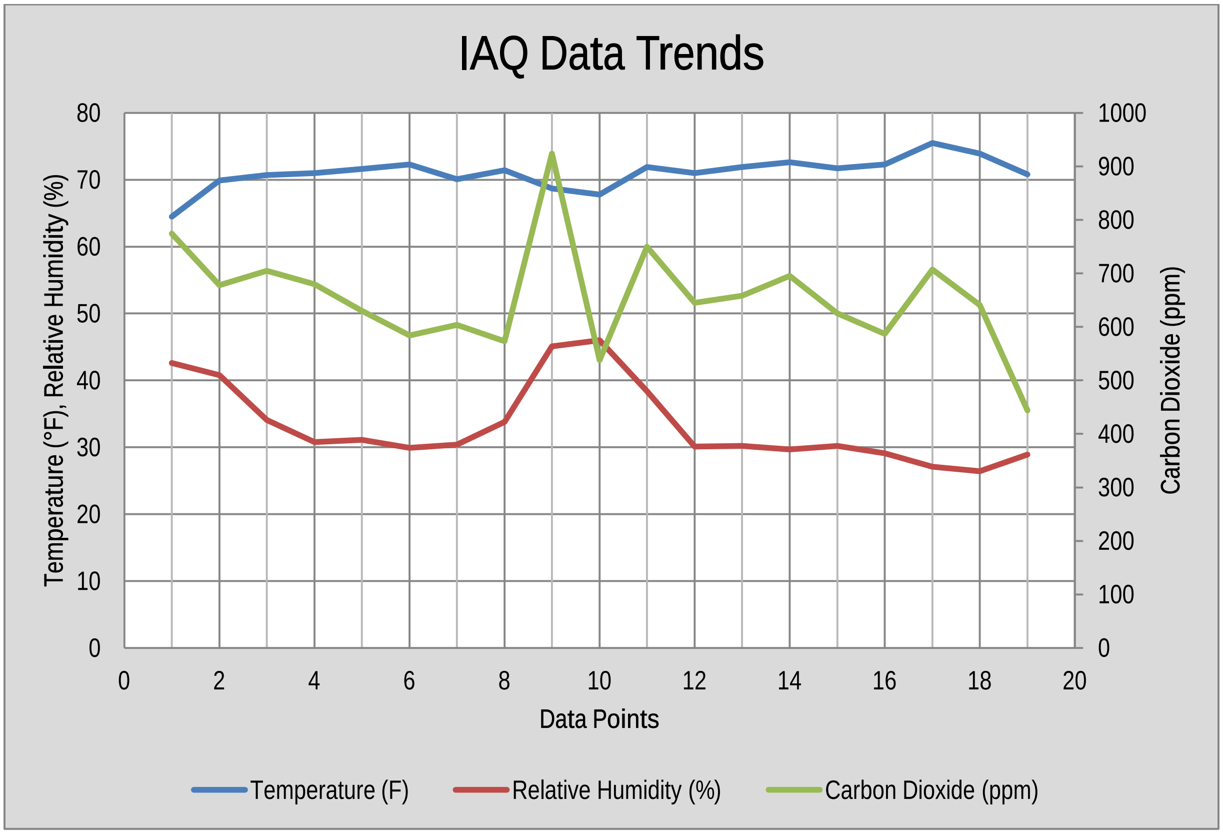


Figure 14: IAQ Data Trends

Secondary Observations

Observations noted herein are not directly related to the objective of the energy audit. Investigation of these items is beyond the defined scope of services and these observations are not intended to be inclusive of all building issues and code infractions. They are provided as anecdotal information for the Town's consideration and may warrant further investigation.

Structural Systems

No structural issues are noted.

Roofing Systems

There were no roofing system deficiencies noted during the inspection. Facility personnel indicated that the roof had been recently replaced within the past few years.

Building Code

There were no building code violations noted during the inspection.

Life Safety Code

No significant life safety code issues were noted during the evaluation. A smoke detection device was removed on the second floor of the building and should be replaced (Figure 15).

Figure 15: Removed smoke detection device

ADA Accessibility

No apparent ADA accessibility issues were identified during the building assessment.

Hazardous Building Materials

Based on the original building construction date (c. 1987) and the addition (c. 2005) it is presumed that there are no hazardous building materials present in those sections of the building.

E. BUILDING ENERGY MODELING

Source Data

Required source data input for the eQUEST© model includes geographical location, building use type(s), occupancy schedules, building dimensions, envelope systems, fenestration systems, lighting systems, and all mechanical systems (heating, cooling, ventilation domestic hot water). The building characteristics and systems data was obtained mainly from the building site review. Energy usage was provided by the Town for grid electricity and liquefied propane.

Model Calibration

The quality of the output data is a function of the accuracy of the input data. While eQUEST© is a sophisticated computer simulation program, like any program there are limitations resulting from unusual building characteristics and operating variables that cannot be discretely defined in the program. To ensure that the model simulates the building operation with high accuracy, an iterative model calibration process is completed where actual building energy usage data is checked against the model output values. This process is repeated until the deviation between the energy usage derived from the baseline building simulation and the actual energy consumption is within an acceptable range.

Summary of Model Results

The HPD facility was modeled using eQUEST© computer simulation program. Developing an accurate baseline model of the building presented certain challenges including a high quantity of HVAC equipment and a high occupancy schedule. Once the baseline calibration was completed, several major Energy Efficiency Measures (EEMs) were simulated within the model including:

- Replacing the boiler with a high-efficiency condensing gas unit.
- Replacing the boiler, condensing units, and ventilation systems with a air-source electric heat pump system.
- Replacing the condensing units with high efficiency units.
- Adding economizer units to the air handling units.
- Replace the DHW tank heater with a tankless unit.

The resulting energy savings and costs for these measures are presented in Section G (Recommendations) and the model output is provided in Appendix I. Tables 19 and 20 present a summary of the model predicted annual energy usage by category for electrical and heating fuel. The actual electrical consumption is slightly less than predicted by the model.

Table 19: Model Predicted Baseline Electrical Usage

Electric Category	Annual Usage (kWh x 1,000)
Space Cooling	21.84
Heat Rejection	6.24
Ventilation	15.26
Pumps & Aux.	4.98
Exterior Lighting	5.15
Misc. Equipment	50.61
Area Lights	28.92
Total Predicted:	133.00
Total Actual:	131.65

Actual heating fuel consumption (371.26 MBtu) is slightly higher than the model predicted value (369.40 MBtu) based on available data through December 2011. This variation is within the expected range of deviation.

Table 20: Model Predicted Heating Fuel Usage

Electric Category	Annual Usage (MBtu)
Space Heating	349.29
Hot Water	13.46
Pumps & Aux.	6.66
Total Predicted:	369.40
Total Actual:	371.26

The energy modeling results are depicted graphically by a monthly bar graph (Figure 16) which breaks down the energy consumption for electricity and gas consumption separately by category. For example, "Area Lighting" is relatively consistent throughout the year while "Space Cooling" consumes a variable amount of electricity depending on the time of year.

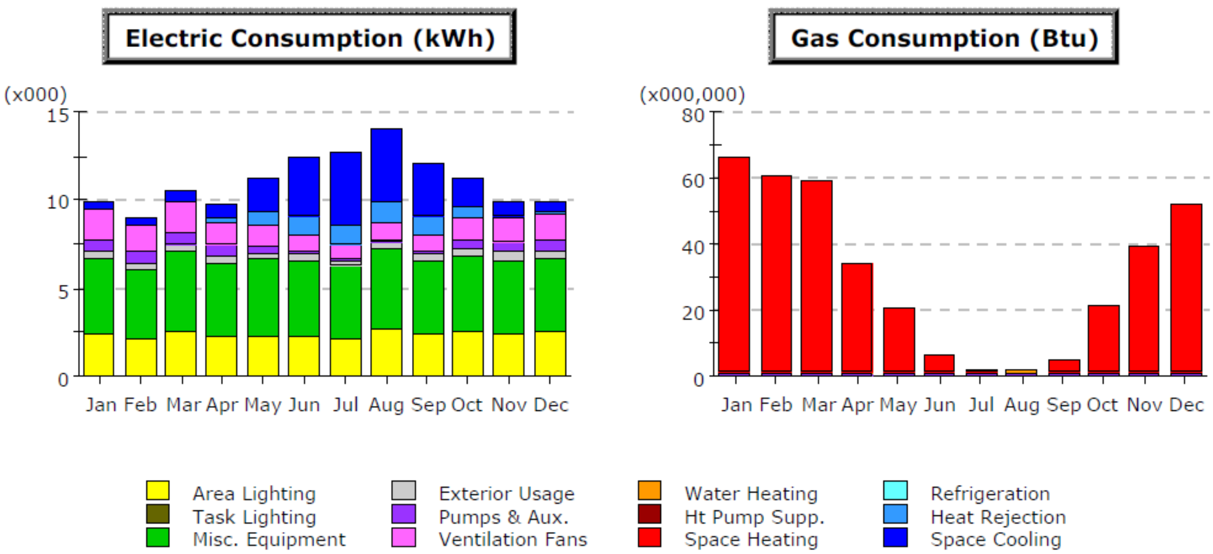


Figure 16: Monthly Energy Use by Category (Baseline)

Annual energy consumption by category is also graphed using eQUEST® (Figure 17). This information is depicted in a pie graph and helps determine the largest overall use categories. For the HPD the "Misc. Equipment" category is determined to use the most electrical energy (38%) while "Space Heating" consumes the most amount of gas (95%). "Misc. Equipment" includes all plug loads such as office equipment and appliances. A final comparison between the baseline and modeled energy efficiency measures is also provided in the appendices in bar graph format to illustrate changes in energy use with each measure. This provides an indication of where the EEM savings occur and any possible increased energy use from the new measure. That information is then used to formulate whether the EEM is economically sound for the particular application.

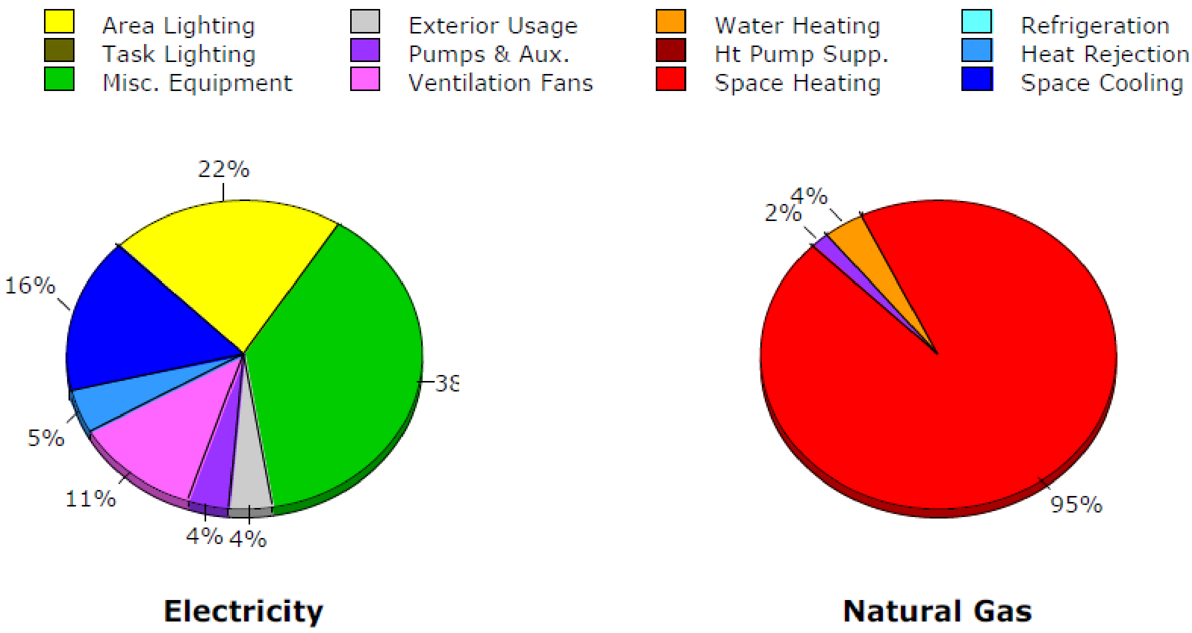


Figure 17: Annual Energy Use Graph by Category (Baseline)

F. FACILITY BENCHMARKING

ENERGY STAR for Commercial Buildings

The HPD was benchmarked using the EPA's ENERGY STAR® Portfolio Manager for Commercial Buildings. This benchmarking program accounts for building characteristics, regional climatic data, and user function. It then ranks a building within its defined category amongst all other buildings entered in the program to date. The defining metric is the building Energy Use Intensity (EUI). If a building scores at or above the 75th percentile within its category then it becomes eligible for ENERGY STAR® certification pending an on-site validation review by a licensed Professional Engineer.

Currently the program does not have categories for every commercial building type but they can still be entered into the program and checked against similar buildings to determine where the building ranks compared to the current national average. The average energy intensity for every building type category is constantly changing and theoretically is it reducing as more efficient buildings are constructed and existing buildings implement energy efficiency measures. Therefore, buildings that currently meet the eligibility requirements may not be eligible next year when they apply for annual re-certification.

The Hollis Police Department facility is defined as a "Station/Police Station". This category is currently not eligible for certification in the Commercial Building ENERGY STAR® program. Utility data for electric and heating fuel for the preceding twelve (12) months was input into the benchmarking program. Table 21 presents the annual energy use (through December 2011) and Table 22 presents a summary of the Statement of Energy Performance (SEP) benchmarking results. The SEP is presented in Appendix G.

Table 21: Annual Energy Consumption

Energy	Site Usage (kBtu)
Electric – Grid	453,250
LP	365,876
Total Energy:	819,126

Table 22: SEP Benchmarking Summary

Location	Site EUI (kBtu/ft^2/yr)	Source EUI (kBtu/ft^2/yr)
Hollis Police Department	83	190
National Median	82	146
	% Difference:	30%
	Portfolio Manager Score:	NA

Compared to the police/fire stations that have entered data into Portfolio Manager to date, the HPD energy use is above the national average. The source EUI for the HPD is 190 kBtu/ft^2/yr while the national average is 146 kBtu/ft^2/yr, meaning the HPD uses 30% more energy than the average Police Department. Considering that the median age of police stations in the national database is much older than the HPD, a lower than average EUI is expected.

G. RECOMMENDATIONS

Energy Conservation Measures

Based on the observations and measurements of the HPD, several energy conservation measures (EEMs) are proposed for consideration (Tables 23 to 24). These recommendations are grouped into three tiers based on the cost and effort required to implement the EEM. EEMs are ranked within each tier based on the cost investment for implementation versus the net estimated energy cost savings.

Tier I EEMs are measures that can be quickly implemented with little effort for no or little cost. They include routine maintenance items that can often be completed by facility maintenance personnel and changes in occupant behavior or building operation. Tier II items generally require contracted tradesmen to complete but can generally be implemented at low cost and within operating building maintenance budgets. EEMs that require large capital expenditure and budgetary planning (one year or greater) are categorized as Tier III measures.

Simple payback is calculated for the proposed EEMs. The cost to implement the measure is estimated based on current industry labor and equipment costs and the annual cost savings represents the reduced costs for energy savings. The net energy and cost savings for smaller EEMs is based on the estimated reduction of the associated energy consumption as defined in the model and equipment inventory. Using these costs, the payback period is then calculated as the number of years at which the capital cost of implementation equals the accumulated energy cost savings.

The savings to investment ratio (SIR) is the accumulated annual cost savings (as determined by the expected service life of the material or equipment associated with the EEM) divided by the cost of investment. A SIR equal to 1.0 indicates that the EEM has a "break-even" or net-zero cost. The higher the SIR, the more favorable the return on investment is.

Other qualitative considerations that do not influence the Simple Payback Method calculation but should be considered by the owner during the decision-making process include:

- Occupant comfort.
- Relative operation and maintenance requirements.
- Remaining useful life of equipment and systems to be replaced.
- Future plans for facility modifications (improvements or renovations) or changes in facility use.

Energy cost savings are based on the current net electric utility charge of $0.14 per kWh (PSNH) and a heating fuel cost of $3.39 per gallon. (NHOEP January 30, 2012)

Tier I Energy Efficiency Measures

Tier I EEMs are measures that can be quickly implemented with little effort for zero or little cost (Table 23). They include routine maintenance items that can often be completed by facility maintenance personnel, and changes to occupant behavior or building operation. Nine (9) Tier I EEMs are recommended. Four (4) of the Tier I EEMs are zero cost items.

Table 23: Tier I Energy Efficiency Measures

No.	EEM Description	Investment	Annual Cost Savings	Payback (yrs.)	SIR
T1-1	Power down AC condensers in winter months.	$0	$360	-	-
T1-2	Disconnect condensers for water coolers (2) and water fountain (1).	$0	$280	-	-
T1-3	Power down office equipment when not in use.	$0	$210	-	-
T1-4	Reduce heating setpoint in Sallyport (60°F).	$0	$100	-	-
T1-5	Replace standard size refrigerator in kitchen with ENERGY STAR® model and remove two (2) compact units.	$500	$410	1.2	12.3
T1-6	Air seal envelope. Install weather-stripping on entry door jambs and sweeps, adjust window seals or install new weather-stripping, caulk interior and exterior moldings, seal all wall and roof penetrations.	$550	$400	1.4	5.0
T1-7	Consolidate computer equipment in dispatch office.	$300	$120	2.5	4.8
T1-8	Augment overhead lighting with low-wattage task lighting including floor, table, and desk lamps (www.nhsaves.com).	$1,200	$380	3.2	4.8
T1-9	Retrofit halogen recessed can fixtures in communications room with LED downlights (www.nhsaves.com)	$200	$40	5.0	3.0

Water coolers and fountains consume a moderate amount of electricity to condition the water. Disconnecting the condensers while still being able to supply water is estimated to save $320 annually. Multiple AC units, including the dedicated data room unit, were observed to be operating in the winter –manual shutoff of the units is recommended. A dedicated wall-mount split AC unit services the data room however based on the quantity of electronic equipment in the room the unit may not be necessary. A significant amount of office equipment is located throughout the department which runs continuously. It is estimated that $280 can be saved annually by shutting down all equipment not critical to the police department when unoccupied. The Sallyport was observed to be 68°F which is high for a mostly unused space. The recommended setpoint is 60°F.

Figure 18: R38 LED Lamps (MaxLite®)

Replacing the refrigerator in the kitchen and removing the two (2) compact units in the building is estimated to save $410 a year with a payback of 1.2 years. Compact refrigerators generally cost just over $100 to run each unit. The dispatch office contains thirteen (13) LCD monitors and eighteen (18) desktop computers. Consolidation of this equipment will save $250 annually as well as be easier to work with. Air sealing of the building envelope will provide substantial savings. This includes simple measures such as new weather-stripping on doors, windows, and sealing all wall and roof penetrations.

Although the building recently underwent a lighting systems retrofit (2011), there are low-cost measures to further reduce lighting energy consumption. These include augmenting overhead lighting with task lighting with table, desk, and floor lamps. When natural lighting is present, the task light fixtures would provide sufficient lighting and the overhead units could be turned off (this could be facilitated with daylighting controllers). Also, there are two recessed can lighting fixtures (R38) in the communications room that contain high-wattage halogen lamps. These could be easily retrofitted with screw-in LED downlights (Figure 18).

Tier II Energy Efficiency Measures

Tier II items generally require contracted tradesmen to complete but can be implemented at low cost and within operating building maintenance budgets. Three (3) Tier II EEMs are provided in Table 24 for the HPD facility.

Table 24: Tier II Energy Efficiency Measures

No.	EEM Description	Investment	Annual Cost Savings	Payback (yrs.)	SIR
T2-1	Install occupancy sensing (ultrasonic) lighting controls in offices, common spaces, and corridors.	$850	$270	3.1	3.2
T2-2	Replace existing domestic hot water heater with a tankless propane gas unit.	$1,400	$144	9.7	1.5
T2-3	Replace exterior lighting fixtures with dark-sky 20w LED units (15).	$6,600	$728	9.0	1.4

Installing dual-sensing occupancy controllers in the building will reduce lighting operation and energy costs. Domestic hot water demand in the building is expected to be significantly lower than what is currently supplied. Replacing the existing hot water heater with a mini-tank or tankless gas-fired unit is expected to save $144 a year with a 1.5 savings to investment ratio. If a conventional tank unit is desired then a gas fired condensing unit is recommended as an alternative. The exterior metal halide lights are high wattage fixtures (70w) that operate a significant number of hours annually. Replacing these with 20w LED units (Figure 19) has a savings to investment ratio of 1.4 indicating that they are economically feasible. Additional benefits of the LED fixtures include improved lighting quality, longer lamp service life, and reduced lighting pollution. Discounted fixtures are available through the nhsaves® program (www.nhsaves.com).

Figure 19: LED Wall Pack (MaxLite®)

Tier III Energy Efficiency Measures

EEMs that require large capital expenditure and budgetary planning (one year or greater) are categorized as Tier III measures. Three (3) Tier III EEMs are provided in Table 25 for the Hollis Police Department. The costs assume a phased approach including a comprehensive engineering evaluation, developing a list of corrective actions that reduce energy consumption and improve occupant comfort, and implementation of the corrective actions.

Table 25: Tier III Energy Efficiency Measures

No.	EEM Description	Investment	Annual Cost Savings	Payback (yrs.)	SIR
T3-1	Replace nine (9) air conditioning units with energy efficient units	$22,500	$1,784	12.6	1.3
T3-2	Install economizers on air handing units (6).	$7,500	$500	15	1.3
T3-3	Replace existing boiler with ultra-efficient condensing gas-fired modulating boiler. Replace circulation pumps with VFD NEMA rated models and insulate all hydronic piping.	$36,000	$1,930	18.7	1.1
T3-4	Install energy recovery ventilation (ERV) units on the seven (7) air handling units.	$19,000	$915	20.8	1.0
T3-5	Replace existing boiler, air-conditioning units, and AHUs with a high-efficiency electric air-source heat pump system with energy recovery.	$125,000	$4,380	28.5	0.8

The nine (9) air conditioning units have rated SEER's at or below the current 2009 IECC standard of 13. Replacing these with high efficiency units is estimated to save $1,784 annually. Installing economizers on six (6) of the air handling units to optimize heating, cooling and ventilation is estimated to save $500 annually with a savings to investment ratio of 1.3. The current boilers are low-efficiency models and replacing them with high-efficient condensing boilers as well as installing a variable frequency drive and insulation is estimated to save $1,930 annually with a breakeven savings-to-investment ratio of 1.0. Since the boiler is approaching the end of its expected service life, the payback will be greatly reduced to the difference between low and high-efficiency models which is marginally insignificant; and, the SIR will increase. Energy recovery ventilation is another method of increasing efficiency of the AHUs and is estimated to save $915 annually. The Sallyport garages are each heated with a convection heater which is not recommended practice for the size and space use.

Replacing the existing boiler, air conditioning units, and AHUs with a high efficiency air-source heat pump system with energy recovery was evaluated. While this system would provide substantial annual energy savings ($4,380) the investment cost is high ($125,000). With a predicted savings to investment ratio (0.8) less than 1.0, this does not appear to be an economically practical measure. However, advantages to this approach include reduced maintenance and repair of the existing HVAC equipment. In addition to the existing boiler unit, the heat pump system would replace the seven (7) AHUs, the nine (9) air-conditioning units, and the hydronic distribution system including pumps and piping. Much of this equipment is approaching the end of its expected service life and will require replacement in the near future. The expected cost savings of deferred maintenance and repair is $1,200 per year. Factoring this into the cost analysis provides a SIR that approaches 1.0.

The energy cost savings and resulting payback are based upon each independent measure implemented for the building in its current condition and function. There are interdependencies among measures that will affect the realized energy savings. For example, replacing lighting fixtures with lower energy units reduces heat load to the building thereby requiring more heating fuel to compensate for the loss in heat from the inefficient light fixtures. Also, many of the larger capital Tier III EEM projects may include some of the smaller dependent EEMs.

Investment costs are provided for budgetary planning only. They are estimated based on current industry pricing for materials and labor. A detailed cost estimate should be developed prior to appropriating capital funds for the more costly measures.

EEMs Considered but not Recommended

The following measures were considered as part of the building evaluation but are not recommended as best-value EEMs. Considerations include the cost practicality and payback term and occupant comfort concerns.

1. The existing building envelope (walls and roof) does not comply with current energy conservation standards (IECC). Substantially improving the envelope in a relatively modern building is a costly undertaking that provides a very long payback. However, any future major renovations should consider improving the existing envelope systems.
2. As evidenced in the thermal imaging survey, the exposed concrete foundation walls have very low thermal performance resulting in significant heat loss. Typical methods to improve thermal integrity of foundation walls include adding rigid foam insulation to the wall. Because there are no below grade walls, insulation would have to installed on the exterior walls. Adding insulation would be a costly measure with a long payback term.

O&M Considerations

O&M and considerations are provided for existing systems and for proposed EEMs. They are intended to provide best-value practices for the building manager and to identify any O&M requirements for the proposed EEMs.

1. The quantity of HVAC equipment in the HPD facility is much higher than expected. Repair and maintenance costs are expected to be substantial considering the quantity and age of the equipment. Consolidating HVAC equipment would reduce annual maintenance and repair costs.

Indoor Air Quality Measures

Based upon the measured indoor air quality in the Hollis Police Department, no area exceeds the EPA recommended threshold of 1,000 ppm for CO_2. CO_2 concentrations ranged between 444 in the unoccupied fitness room to 924 in the unoccupied south Sallyport with an overall average of 655 ppm. This value is well below the recommended threshold indicating the building may be over-ventilated. Over-ventilation can result in: 1) reduced service life of mechanical equipment; 2) inefficient operation and increased energy consumption; 3) reduced reliability of equipment; and 4) increased repair frequency and costs. Periodic monitoring of IAQ conditions including temperature, relative humidity, and CO_2 concentrations is recommended to ensure that minimum IAQ standards are maintained as EEMs are implemented and the building systems are optimized. IAQ data also directly correlates to the performance efficiency of building conditioning and ventilation systems.

Renewable Energy Considerations

While renewable energy systems generally require a higher capital investment, they provide a significant reduction in the consumption of non-renewable fossil fuel energies. Other obvious benefits include a reduction in ozone depleting gas emissions (as measured by CO_2 equivalency), otherwise referred to as the “carbon footprint”. Renewable energy systems also reduce the reliance upon fossil fuels derived from foreign nations and mitigate pricing fluctuations in a volatile and unpredictable market.

Evaluating the technical and economic practicality of a renewable energy system for a specific facility should consider several facility specific variables including:

- Geographical location.
- Building orientation.
- Adjacent and abutting land features.
- Site footprint and open space.
- Building systems configuration and condition.
- Local zoning or permitting restrictions.
- Currently available financial resources (grants, utility provider rebates, tax incentives).

Qualitative considerations for renewable energies include owner initiatives and public awareness and education.

Table 26 provides a summary description of the more common and proven renewable energy technologies. The Table also provides a preliminary feasibility assessment for implementing each technology at the HPD facility. Additionally, each renewable energy technology is scored and graded based on technology and facility specific characteristics. Appendix H presents the criteria used to develop the score and grade for each renewable energy technology. A more rigorous engineering evaluation should be completed if the Town is considering implementing any renewable energy system.

Table 26: Renewable Energy Considerations

Renewable Energy System	System Description & Site Feasibility
Geothermal Heating & Cooling	System Description: Geothermal heating systems utilize solar energy residing in the upper crust of the earth. Cooling is provided by transferring heat from the building to the ground. There are a variety of heating/cooling transfer systems but the most common consists of a deep well and piping loop network. All systems include a compressor and pumps which require electrical energy. Geothermal systems are a proven and accepted technology in the New England region. Site constraints and building HVAC characteristics define the practicality.
Score: 84%	***Site Feasibility:*** *A geothermal heating and cooling system is a practical consideration for the building. The parcel provides adequate area for a well and piping network. Considering the existing hydronic heating and cooling equipment is compatible with a ground-source water heat pump system, it is a practical technology for the building. Considering the high heating and cooling costs for the building, payback for the system would be relatively low.*
Biomass Heating Systems	System Description: Biomass heating systems include wood chip fueled furnaces and wood pellet fueled furnaces. For several reasons, wood chip systems are generally practical only in large scale applications. Wood pellet systems can be practical in any size. Wood chip systems are maintenance intensive based on the market availability and procurement of woodchip feedstock and variability of woodchip characteristics (specie, size, moisture content, bark content, Btu value) which affect the operating efficiency of the furnace and heating output. They require a constant feed via a hopper and conveyor system and feed rates must vary according to feedstock Btu value and heating demand. For these reasons they typically require full-time maintenance and are practical only in large scale applications. Wood pellet systems are much less maintenance intensive and feedstock availability and consistency is less of an issue. Both systems reduce the dependency on fossil-fuels and feedstock can be harvested locally.
Score: 78%	*Site Feasibility:* *A conventional pellet boiler unit is a practical heating system for the building however this requires additional effort for procurement of pellets, storing pellets, periodic filling the pellet hopper during the heating season, and emptying the ash. However, there are new systems with automated feed and ash removal systems that would be a practical application at the HPD facility.*
Roof-Mounted Solar Photovoltaic Systems	System Description: Photovoltaic (PV) systems are composed of solar energy collector panels that are electrically connected to DC/AC inverter(s). The inverter(s) then distributes the AC current to the building electrical distribution system. Surplus energy is sent into the utility grid via net metering and reimbursed by the utility at a discounted rate. The capital investment cost for PV systems is high but the technology is becoming increasingly more efficient thereby lowering initial costs.
Score: 76%	*Site Feasibility:* *Based on the amount of southern facing roof space and the condition of the roof, a small roof-mounted system (5kW-10kW) could be installed on the building. This would require a design and permitting process with the local utility for a grid-tie connection. Current utility incentives and renewable energy grants would help offset the capital cost for the system. A structural evaluation of the roof framing system would be required to ensure that it could accommodate the increased loading.*
Ground-Mounted Solar Photovoltaic Systems	System Description: A ground-mounted PV system is composed of the same solar collector panels used for a roof-mount system. The collectors are mounted on a frame support system on the ground verses a roof structure. This is advantageous when roof framing cannot accommodate the increased load of the collector panel and the ease of installation and access for maintenance and repair.
Score: 74%	*Site Feasibility:* *Based on the limited southern facing land area at the Hollis Police Department, only a small sized PV system (5-10 kW) could be sited in the green space to the southeast of the building. This would require a design and permitting process with the local utility for a grid-tie connection. Current utility incentives and renewable energy grants would help offset the capital cost for the system.*
Solar Domestic Hot Water	System Description: Solar domestic hot water (DHW) systems include a solar energy collector system which transfers the thermal energy to domestic water thereby heating the water. These are typically used in conjunction with an existing conventional DHW system as a supplemental water heating source. Because of the high capital cost, solar DHW systems are only feasible for facilities that have a relatively high demand for DHW.

Score: 73%	*Site Feasibility:* Based on the low demand for domestic hot water, a solar hot-water system may be a practical consideration for the building. The capital cost could be offset with substantial utility rebates and incentives. The system could provide primary DHW during summer months when demand is low. In colder months, it would provide secondary heating.
Solar Thermal Systems	System Description: Similar to a roof-mounted solar PV system, solar thermal systems are most commonly installed on rooftops. These systems utilize solar energy for heating of outdoor air. The most common application is for pre-heating of outdoor air used for air exchanges systems in buildings. This reduces the heating fuel required to maintain setpoint temperatures in interior spaces.
Score: 67%	*Site Feasibility:* Considering the relatively small size of the HPD facility, the capital costs to install the system would not provide a reasonable payback unless substantial grant or incentive monies were obtained by the Town.
Wind Turbine Generator	System Description: Wind turbine generators (WTGs) simply convert wind energy into electrical energy via a turbine unit. WTGs may be pole mounted or rooftop mounted however system efficiency improves with increased elevation. Due to cost and site related constraints, WTG technology in New England is only practical for select sites. Constraints include local geographical and manmade features that alter wind direction, turbulence, or velocity. Other technology constraints include local variability of wind patterns and velocity. Additionally, WTGs require permitting (local, state, FAA) and local zoning that may restrict systems due to height limitations, and/or, visual detraction of the local landscape. Presently, WTG technology is not widely used in New England based on the relatively high capital cost compared to the energy savings.
Score: 62%	*Site Feasibility:* *Considering the small parcel that the building is sited on, a pole-mounted WTG unit may not be practical. However, a feasibility assessment should be completed as part of an evaluation. As described above, there are many constraints that determine if WTG is prudent for a particular site including:* • *Local zoning restrictions.* • *Detraction of the local landscape and abutter opinion.* • *Permitting requirements (local, state, FAA).* • *Local wind characteristics.* *Determining the local wind characteristics would require a wind study of the site.*
Combined Heat & Power (CHP)	System Description: Combined heat and power (CHP) systems are reliant on non-renewable energies. Systems are composed of a fossil-fuel powered combustion engine and electrical generator. Electrical current is distributed to the building distribution system to reduce reliance on grid supplied electricity. Byproduct thermal energy derived from the combustion engine is recovered and used to heat the building (this is generally considered to be renewable energy). Another benefit of CHP systems is that they provide electrical energy during power outages in buildings that do not have emergency power backup. Larger CHP units require a substantially large fuel supply and if natural gas is not available then a LPG tank must be sited.
Score: 61%	*Site Feasibility:* *Considering there is no natural gas on-site or within the Town, a CHP unit may not be practical. Additionally, costs associated with the infrastructure development may not be practical. CHP systems also require substantial maintenance and have a low expected service life.*

H. ENERGY EFFICIENCY INCENTIVE AND FUNDING OPPORTUNITIES

The State of New Hampshire along with the utility companies offer multiple programs designed to improve the energy efficiency of municipal and school buildings through financial incentives and technical support. Some of the currently available programs are presented herein however building managers are encouraged to explore all funding and incentive opportunities as some programs end and new programs are developed. For a current listing of advertised programs and initiatives, visit www.dsireusa.org.

New Hampshire Public Utilities Commission

New Hampshire Pay for Performance (P4P)

This program addresses the energy efficiency improvement needs of the commercial and industrial sector. The Program is implemented through a network of qualified Program Partners. Incentives will be paid out on the following three payment schedule: Incentive # 1: Is based on the area of conditioned space in square feet. Incentive #2: Per kWh saved and Per MMBTU saved based on projected savings and paid at construction completion. Incentive #3: Per kWh saved and Per MMBTU saved based on actual energy savings performance one year post construction. Total performance incentives (#2 and #3) will be capped at $300,000 or 50% of project cost on a per project basis. The total cap for a single entity is $750,000. For more information visit http://nhp4p.com.

New Hampshire Public Utilities Commission's Renewable Energy Rebates

The Sustainable Energy Division provides an incentive program for solar electric (photovoltaic or PV) arrays and solar thermal systems for domestic hot water, space and process heat, with a capacity of 100 kW or equivalent thermal output or less. The rebate for PV systems as follows: $1.00 per Watt, capped at 25% of the costs of the system or $50,000, whichever is less. For solar hot water (SHW) systems, the base rebate is $0.07 per rated or modeled kBtu/year, capped at 25% of the cost of the facility or $50,000, whichever is less, as a one-time incentive payment. http://www.puc.state.nh.us/Sustainable%20Energy/RenewableEnergyRebates-CI.html.

New Hampshire Community Development Finance Authority Revolving Loan Fund

The Enterprise Energy Fund is a low-interest loan and grant program available to businesses and nonprofit organizations to help finance energy improvements and renewable energy projects in their buildings. The loans will range from $10,000 to $500,000. Larger amounts will be considered on a case by case basis. The program is available to finance improvements to the overall energy efficiency performance of buildings owned by businesses and nonprofits, thereby lowering their overall energy costs and the associated carbon emissions. More information about the program can be found on their website www.nhcdfa.org. These activities may include:

- Improvements to the building's envelope, including air sealing and insulation in the walls, attics and foundations;
- Improvements to HVAC equipment and air exchange;
- Installation of renewable energy systems;
- Improvements to lighting, equipment, and other electrical systems; and
- Conduction of comprehensive, fuel-blind energy audits.

Public Service of New Hampshire (PSNH)

Commercial (Electric) Energy Efficiency Incentive Programs

This program targets any commercial/industrial member building a new facility, undergoing a major renovation, or replacing failed (end-of-life) equipment. The program offers prescriptive and custom rebates for lighting and lighting controls, motors, VFDs, HV AC systems, chillers and custom projects. http://www.psnh.com/SaveEnergyMoney/For-Business/Energy-Saving-Programsand-Incentives.aspx

SmartSTART

The SmartSTART (Savings Through Affordable Retrofit Technologies) advantage is simple – pay nothing out of pocket to have energy efficiency products and services installed in your building. The Smart Start program is limited to PSNH's municipal customers only and includes schools. The program is available on a first-come, first served basis to projects which have been pre-qualified by PSNH. The cost of the improvements is fronted by PSNH which is then repaid over time by the municipality or school using the savings generated by the products themselves. This program is for lighting and lighting controls, air sealing, insulation and other verifiable energy savings measures which have sufficient kilowatt-hour savings. For more information on this program visit: http://www.psnh.com/SaveEnergyMoney/For-BusinesslMunicipal-Smart-Start-Program.aspx

nhsaves

This program assists small commercial and industrial customers (with average monthly demands under 100 kW) by paying for a portion of the installed cost of electrical energy efficiency improvements. A qualified energy auditor will schedule a walk-through assessment to identify energy efficiency improvements for:

- Lighting
- Occupancy sensors
- Programmable thermostats
- Controls for walk-in coolers

Customers can then work with the auditors and decide when to move forward with and schedule the recommended equipment replacements (http://nhsaves.com/business/efficiency.html).

The nhsaves program also offers discounted lighting products (lamps, fixtures, controllers) and water saving products at http://catalog.nhsaves.com/.

Clean Air - Cool Planet

Community Energy Efficiency

CA-CP works with communities throughout the Northeast to find solutions to climate change and build constituencies for effective climate policies and actions. Much of their work focuses on successful models for energy efficiency and renewable energy planning. They advise and partner with citizens, educators, faith groups, small businesses, municipal governments, and other local leaders. They explore cost-effective opportunities that exist for communities to reduce their emissions as well as their vulnerability to climate impacts. One such example is CA-CP's partnership with the University of NH, NH Sustainable Energy Association and UNH Cooperative Extension to create www.myenergypian.net . A groundbreaking suite of web and outreach tools for individual action used by households, schools and community groups around the northeast. http://www.cleanair-coolplanet.orglfor_communities/index.php .

APPENDIX A

Photographs


SOUTH SIDE OF BUILDING


SOUTH SIDE OF BUILDING


SOUTH SIDE OF BUILDING


TOWN OF HOLLIS
POLICE DEPARTMENT
SOUTH SIDE OF BUILDING

SOUTH SIDE OF BUILDING


SOUTH SIDE OF BUILDING


AIR CONDENSERS ALONG SOUTH SIDE OF BUILDING


SOUTHWEST CORNER OF BUILDING


NORTHWEST CORNER OF BUILDING


NORTHWEST SIDE OF BUILDING

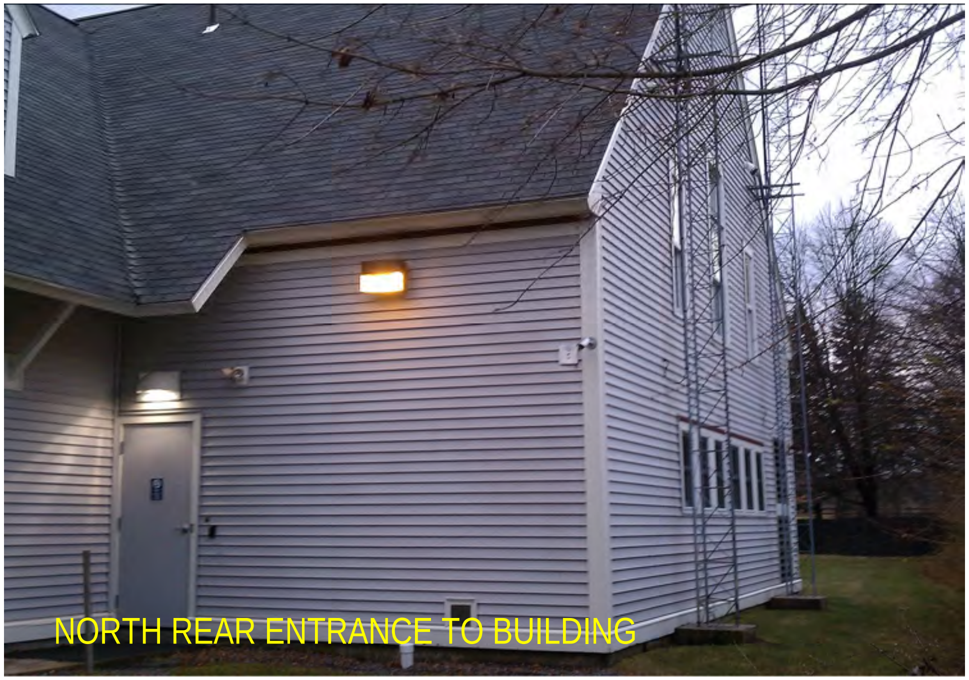

WEST (ROAD) SIDE OF BUILDING


NORTHWEST CORNER OF BUILDING


NORTH SIDE OF THE BUILDING


NORTH REAR ENTRANCE TO BULIDING


NORTH SIDE OF THE BUILDING


NORTH REAR ENTRANCE TO BUILDING


NORTH SIDE OF BUILDING


WEST WALL OF SALLYPORT


ROOF ALONG NORTH SIDE OF BUILDING


SALLYPORT REAR ENTRANCE


SALLYPORT GARAGE DOORS ALONG EAST SIDE


SALLYPORT GARAGE DOORS ALONG EAST SIDE


NORTH WALL OF SALLYPORT


SALLYPORT GARAGE DOORS ALONG EAST SIDE


SECOND FLOOR VENT ON EAST WALL OF FACILITY

SOUTH SIDE OF FACILITY


SOUTHEAST SIDE OF FACILITY

SOUTH ENTRANCE TO FACILITY

COMMEMORATIVE PLAQUE AT SOUTH MAIN ENTRANCE


HOT WATER HEATER WITH UNINSULATED PIPING

COMMEMORATIVE PLAQUE AT SOUTH MAIN ENTRANCE

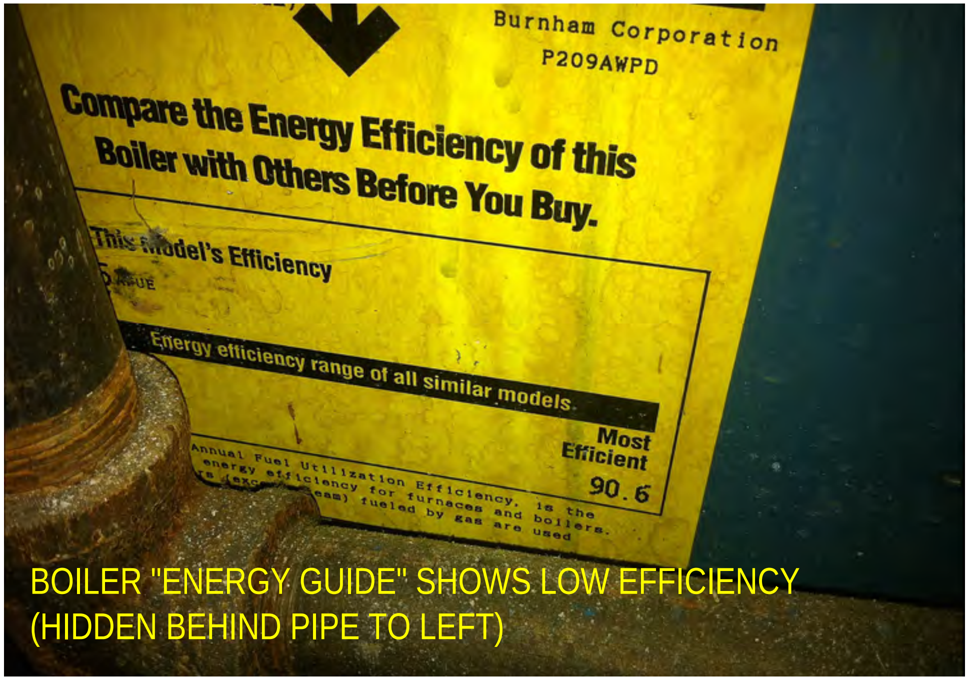
SOUTH MAIN ENTRANCE

UNINSULATED HOT WATER PIPES ALLOW THERMAL LOSS

HOT WATER HEATER INFORMATION TAG

HOT WATER HEATER

HOT WATER HEATER NAME TAG



BOILER "ENERGY GUIDE" SHOWS LOW EFFICIENCY (HIDDEN BEHIND PIPE TO LEFT)

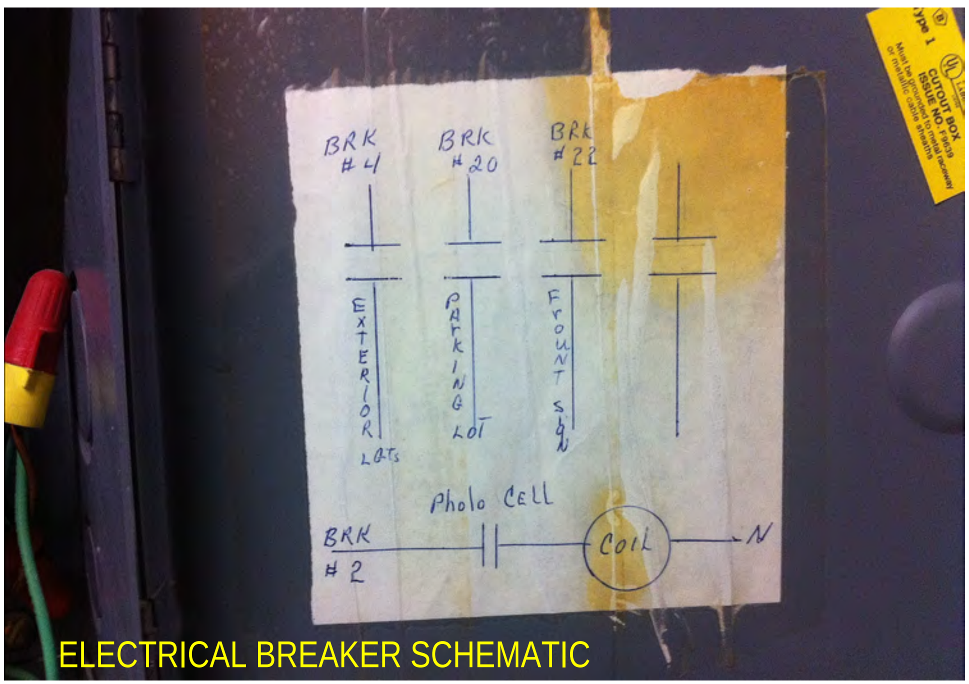
ELECTRICAL PANELS IN ELECTRICAL CLOSET

BOILER

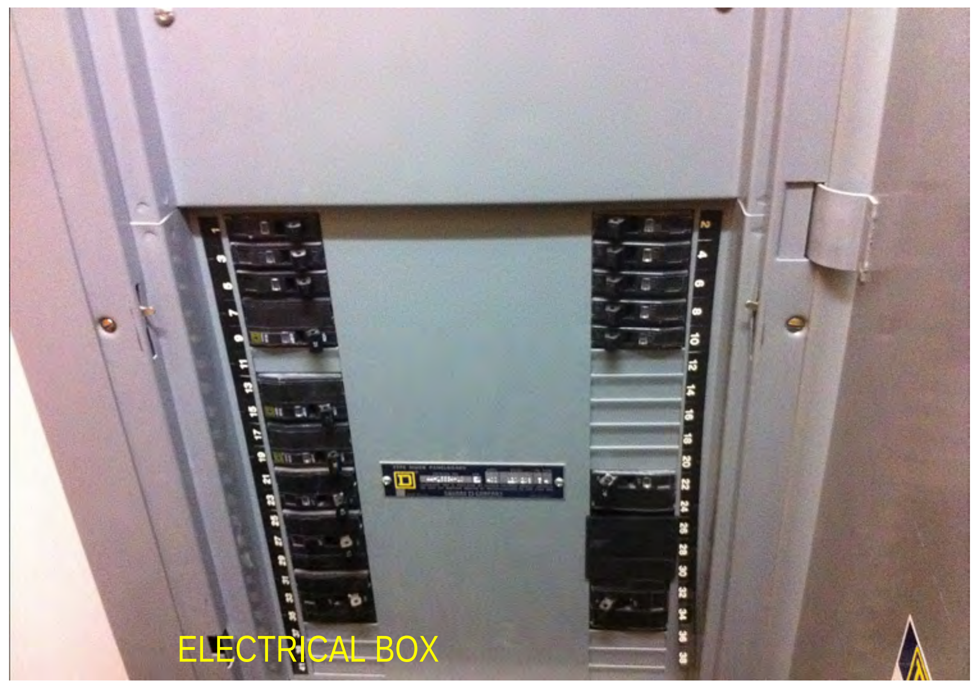
ELECTRICAL CLOSET USED AS STORAGE (BLOCKED ACCESS IS CODE VIOLATION)

ELECTRICAL PANEL NAME TAGS

ELECTRICAL NAME TAG



ELECTRICAL BREAKER SCHEMATIC



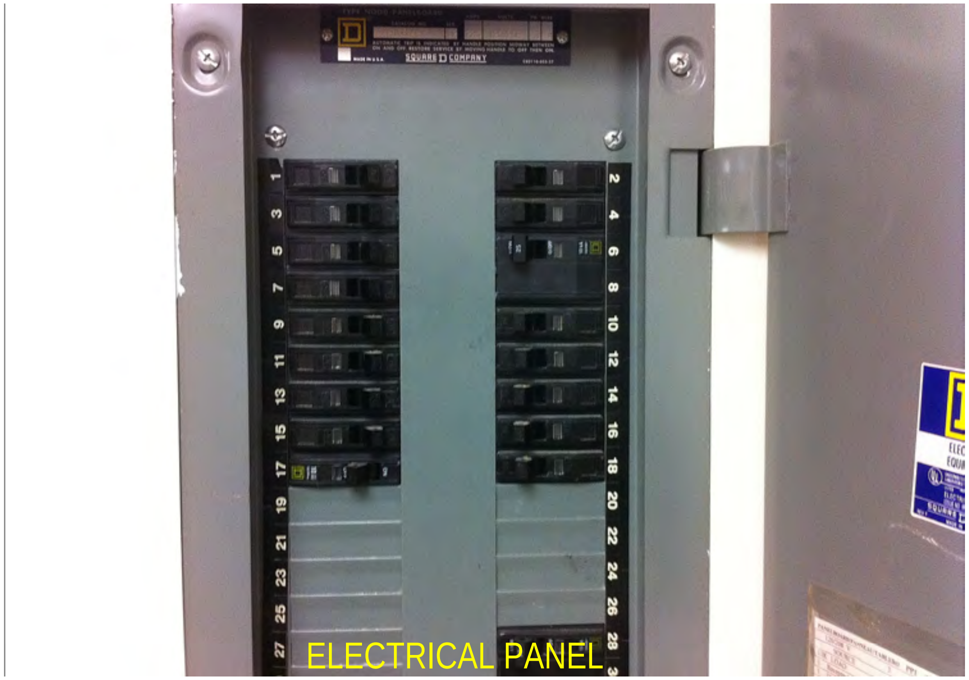
ELECTRICAL BOX


OFFICE WINDOW


WATER COOLER IN HALLWAY

DIGITAL THERMOSTAT TO CONTROL HEATING AND COOLING


WINDOW SEAL



ELECTRICAL PANEL


KITCHEN SPACE

ELECTRICAL PANEL BREAKER LIST


KITCHEN REFRIGERATOR

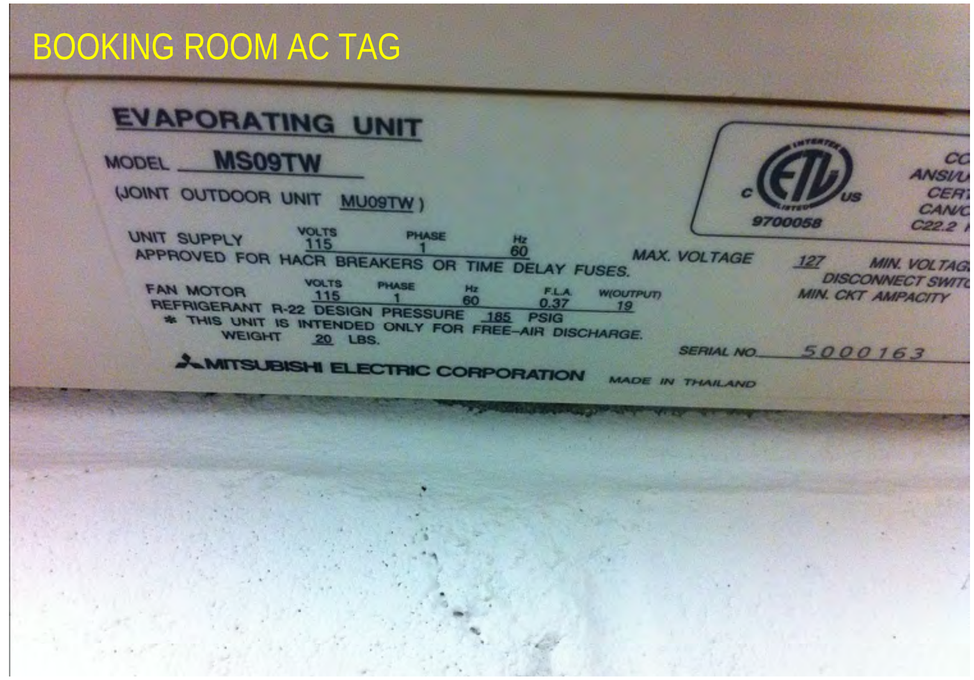
REFRIGERATOR TAG


ELECTRICAL PANEL


KITCHEN OVEN

BACKUP GENERATOR IN CLOSET OFF TRAINING ROOM

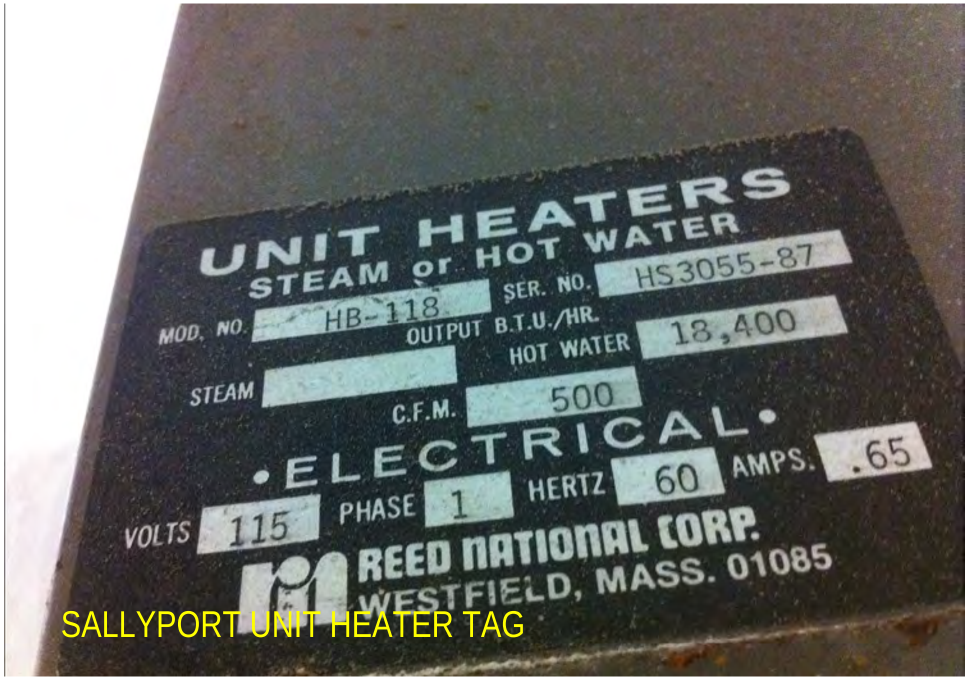

TRAINING ROOM SPACE



BOOKING ROOM AC TAG


TRAINING ROOM PROJECTOR


TRAINING ROOM SPACE



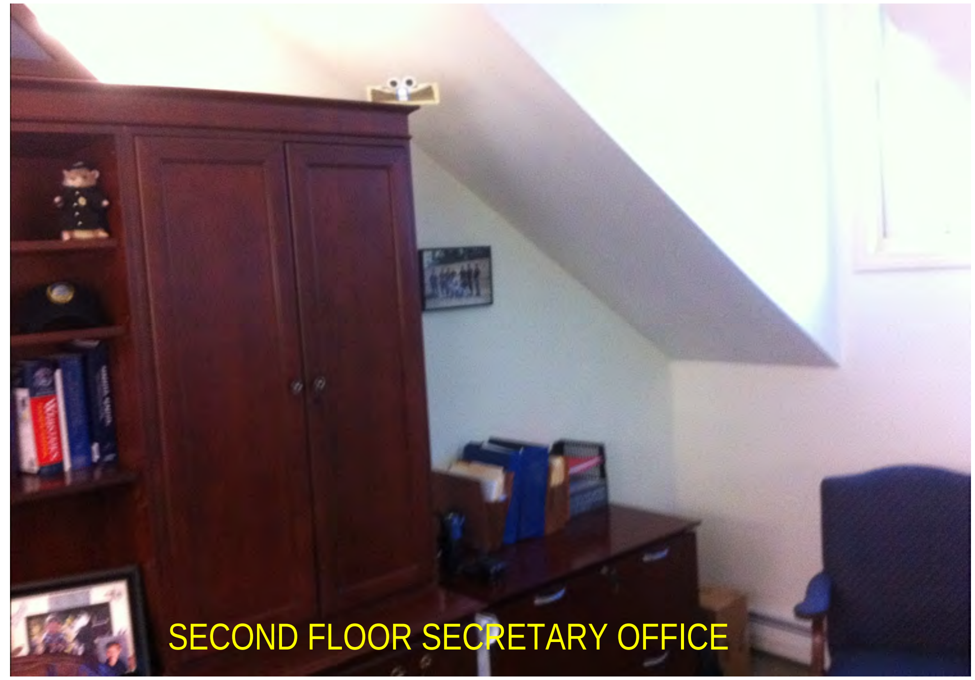
SALLYPORT UNIT HEATER TAG


SALLYPORT UNIT HEATER

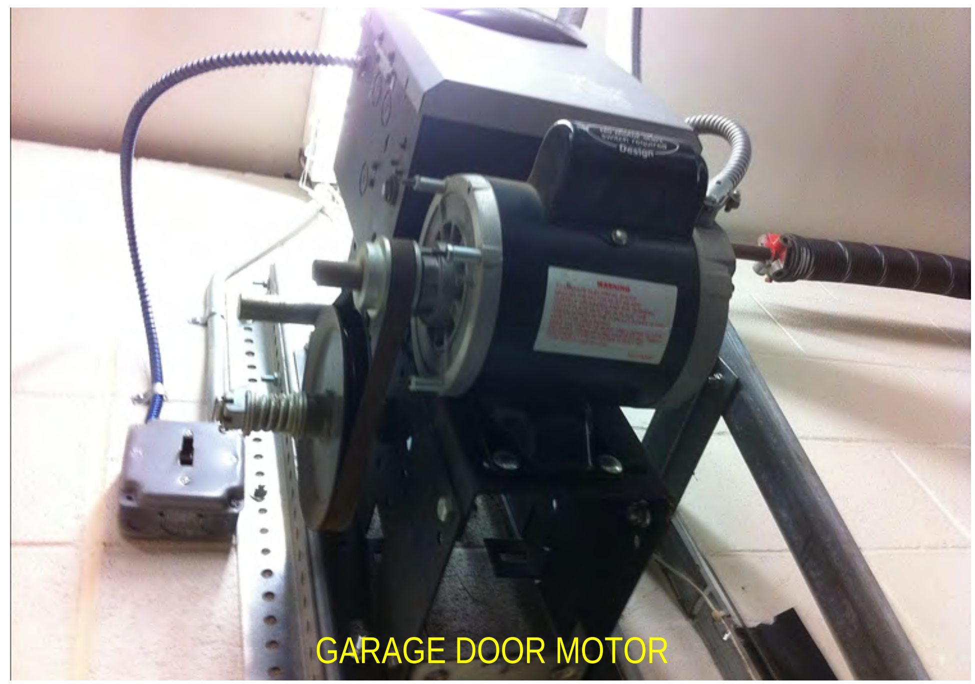

BOOKING ROOM AC UNIT

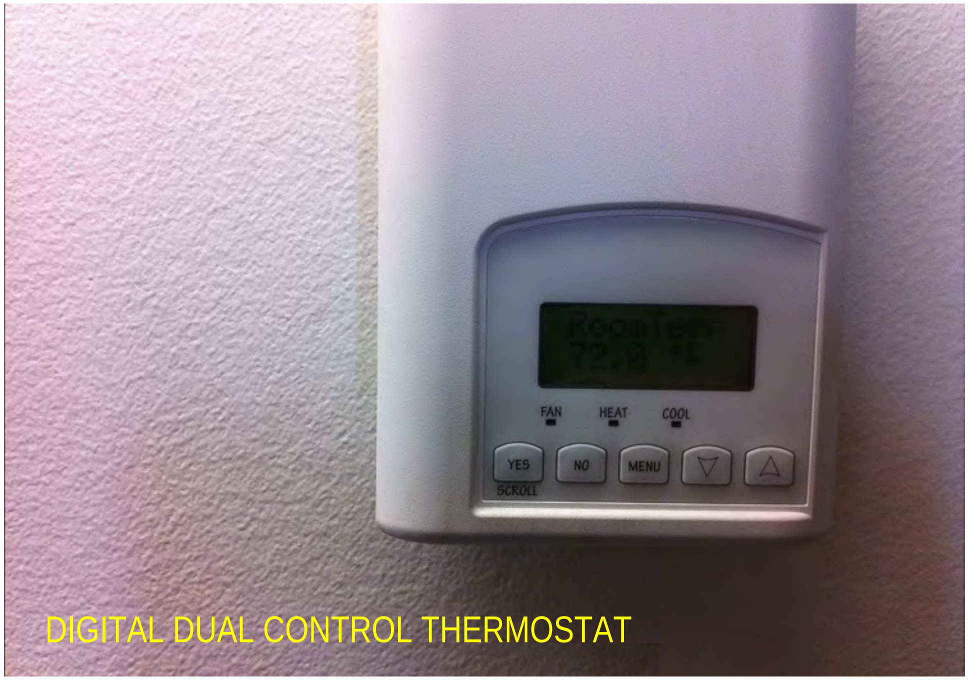
SALLYPORT UNIT HEATER


GARAGE DOOR MOTOR

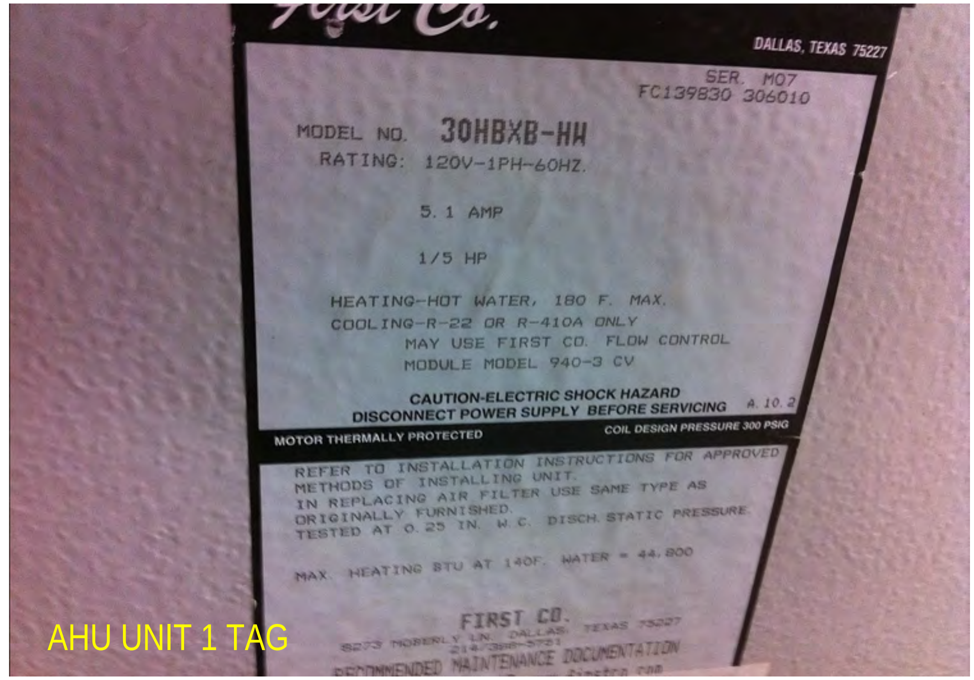

SECOND FLOOR SECRETARY OFFICE

UNIT HEATER IN SECOND SALLYPORT


GARAGE DOOR MOTOR



DIGITAL DUAL CONTROL THERMOSTAT



AHU UNIT 1 TAG


SECRETARY OFFICE WINDOW

AHU UNIT 1

AHU UNIT 3


BATTERY CHARGER FOR COMMUNICATIONS EQUIPMENT


AHU PIPING AND WALL INSULATION


AIR HANDLE UNIT IN ATTIC

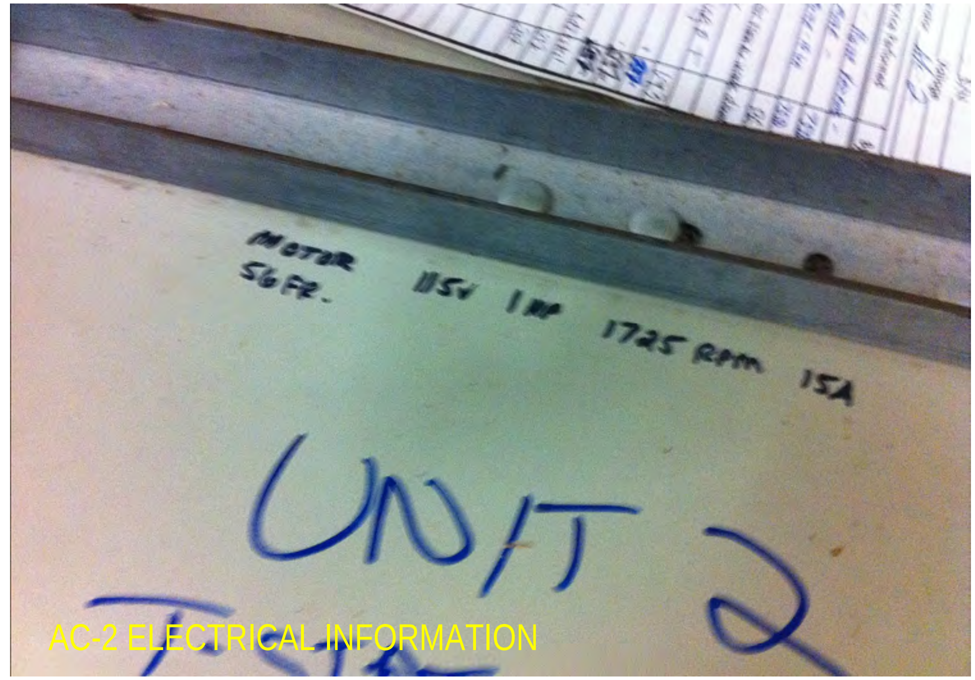
ATTIC UNIT HEATER

UNIT HEATER TAG INFORMATION

SERVER EQUIPMENT IN ATTIC

UNIT HEATER FAN

FAN COIL UNIT MANUAL



AC-2 ELECTRICAL INFORMATION

AIR CONDITIONER AC-2

AC-2 ELECTRICAL INFORMATION

AIR CONDITIONER AC-3

WELL PUMP CONTROLS


AC PIPING

AHU UNIT 3

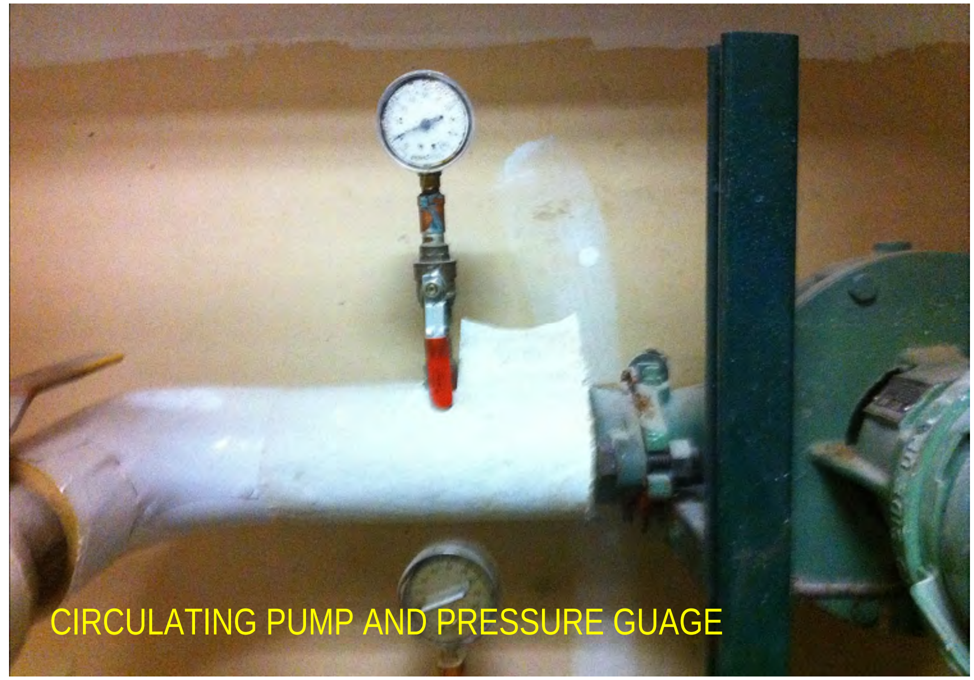

HOT WATER CIRCULATING PUMPS

AHU #1 INFORMATION

TACO PUMP FOR MECHANICAL SYSTEMS

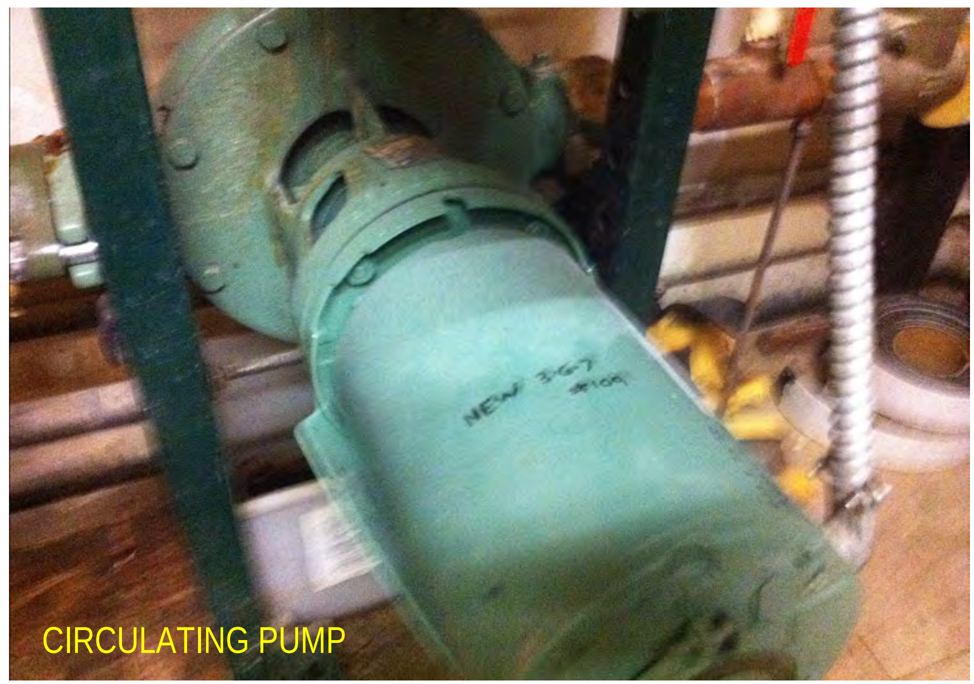
AHU #1

MANUAL PUMP DEMAND SWITH

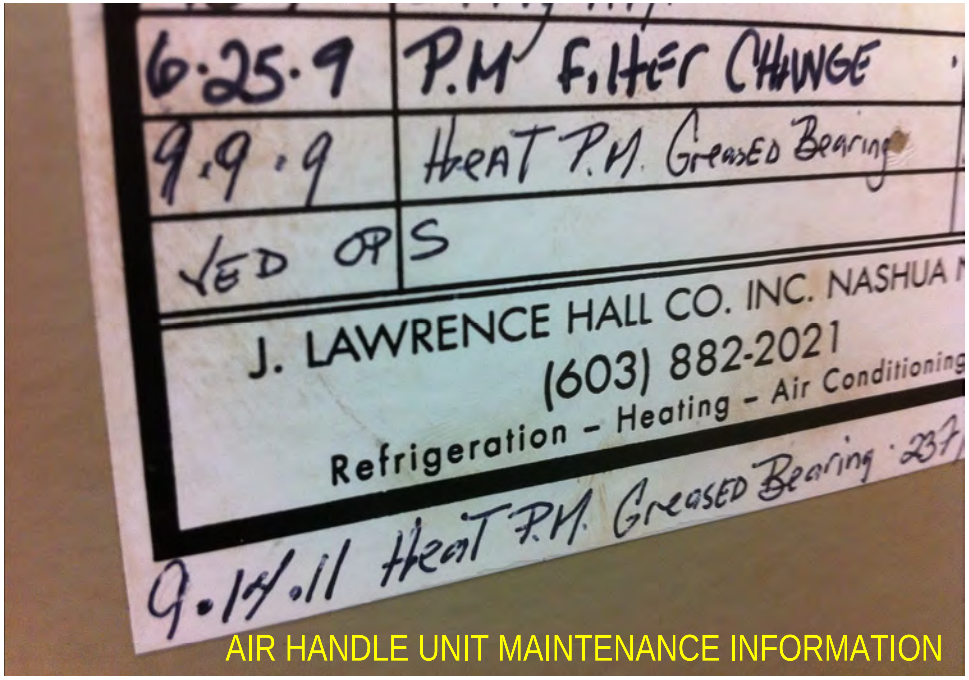


CIRCULATING PUMP AND PRESSURE GUAGE

MISSING COVER ON CONTROLS

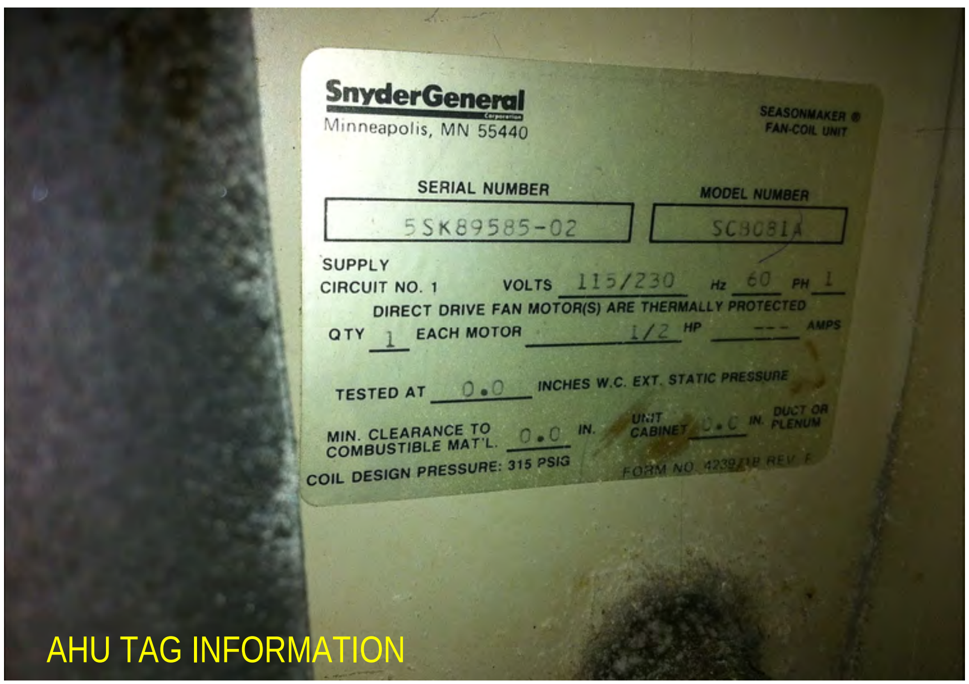


CIRCULATING PUMP



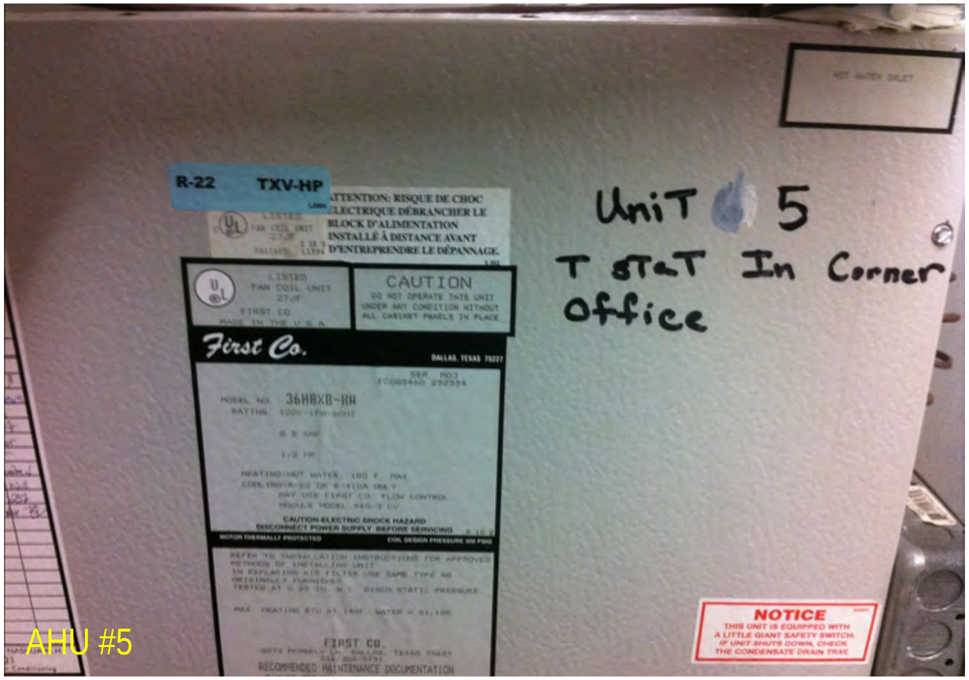
AIR HANDLE UNIT MAINTENANCE INFORMATION


OLD DESKTOP COMPUTERS



AHU TAG INFORMATION


VIDEO SURVEILLANCE EQUIPMENT



AHU #5


MISSING SMOKE ALARM


AIR CONDITIONER IN SURVEILLANCE ROOM

AHU #3

AHU #4 TAG INFORMATION

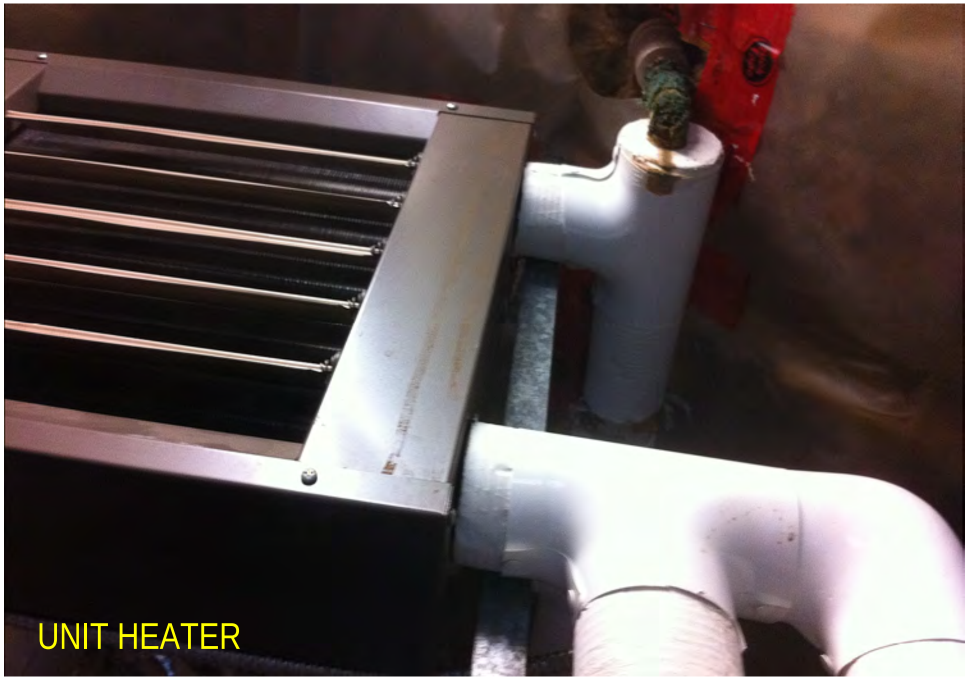
FCU #4 TAG INFORMATION

AHU #4

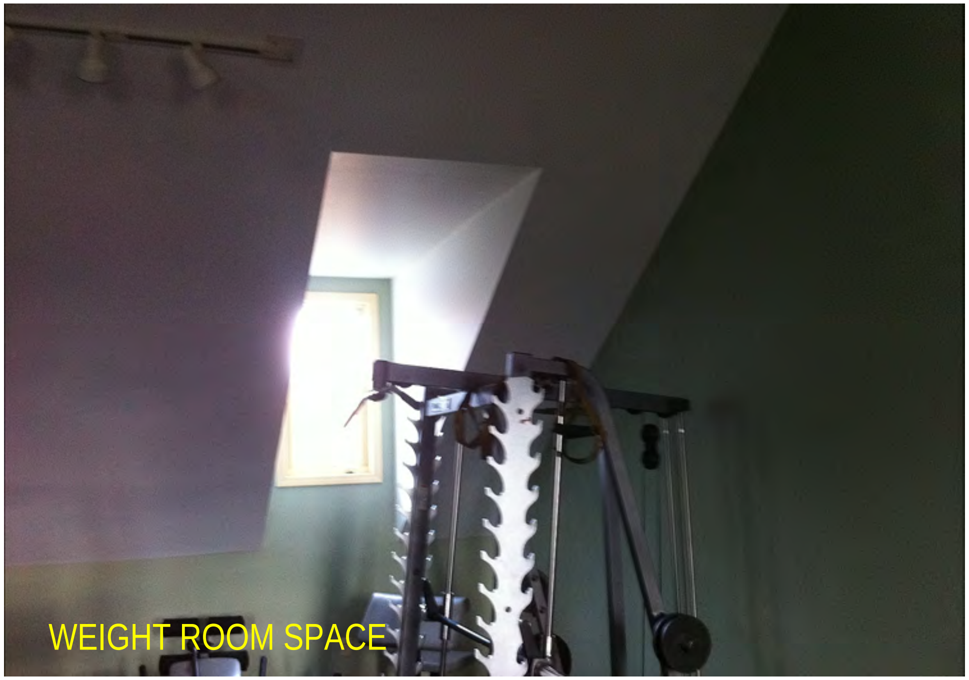
FAN COIL UNIT #4


CORRODING PIPE ON UNIT HEATER


SECOND FLOOR DATA ROOM


UNIT HEATER


DISPATCH EQUIPMENT IN 2ND FLOOR ROOM



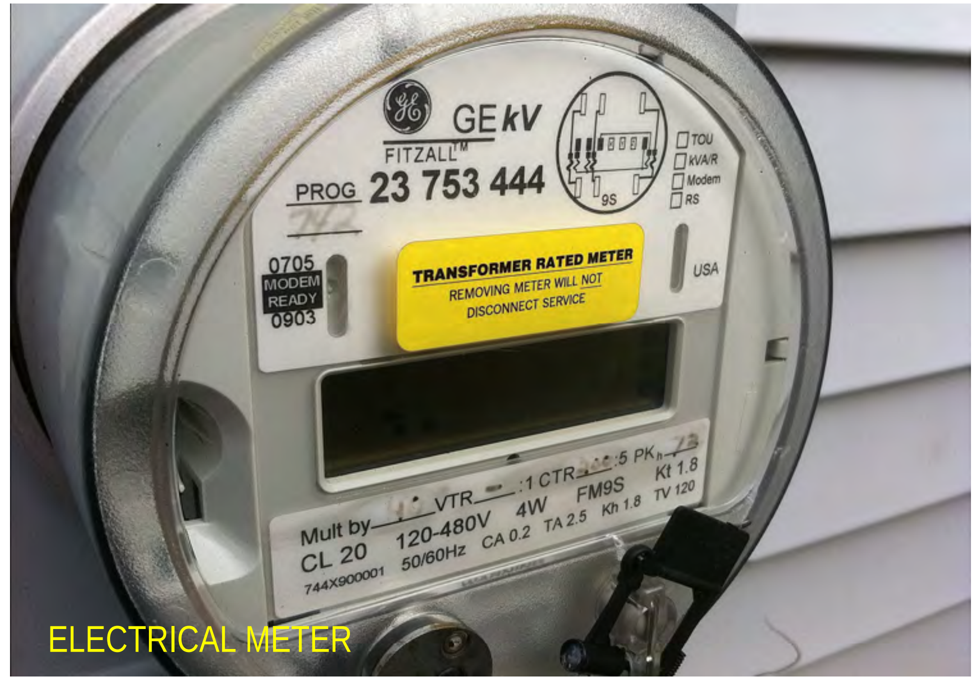
WEIGHT ROOM SPACE

OUTSIDE AIR CONDENSING TAG

MANUAL THERMOSTAT FOR THE RADIO ROOM EXHAUST FAN

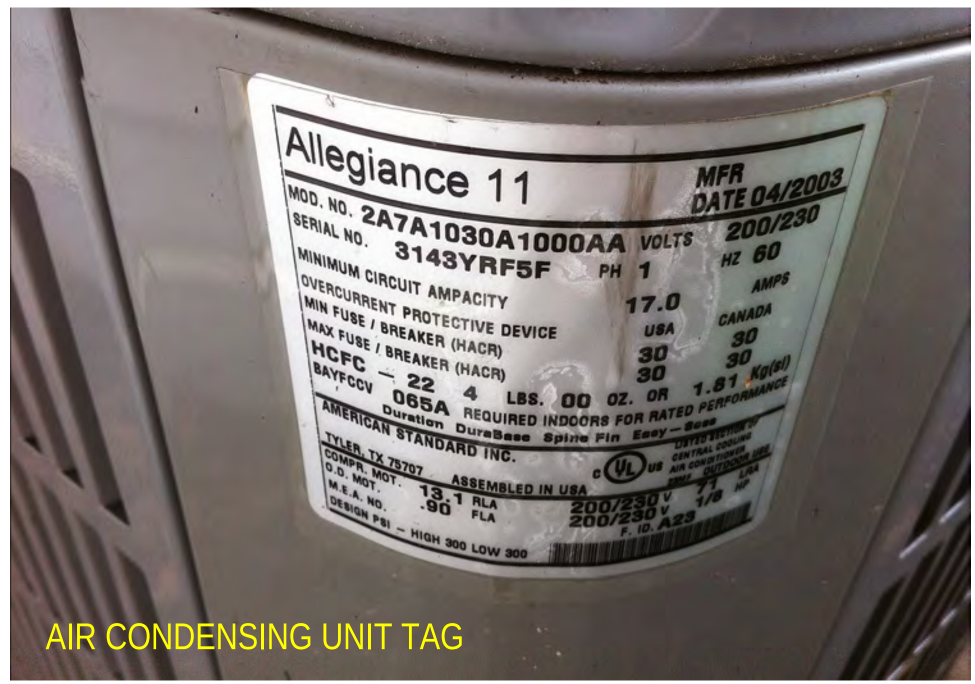
OUTDOOR AIR CONDENSING UNIT

UNIT #1 SAFETY BOX



ELECTRICAL METER


OUTDOOR AIR CONDENSING UNIT #1

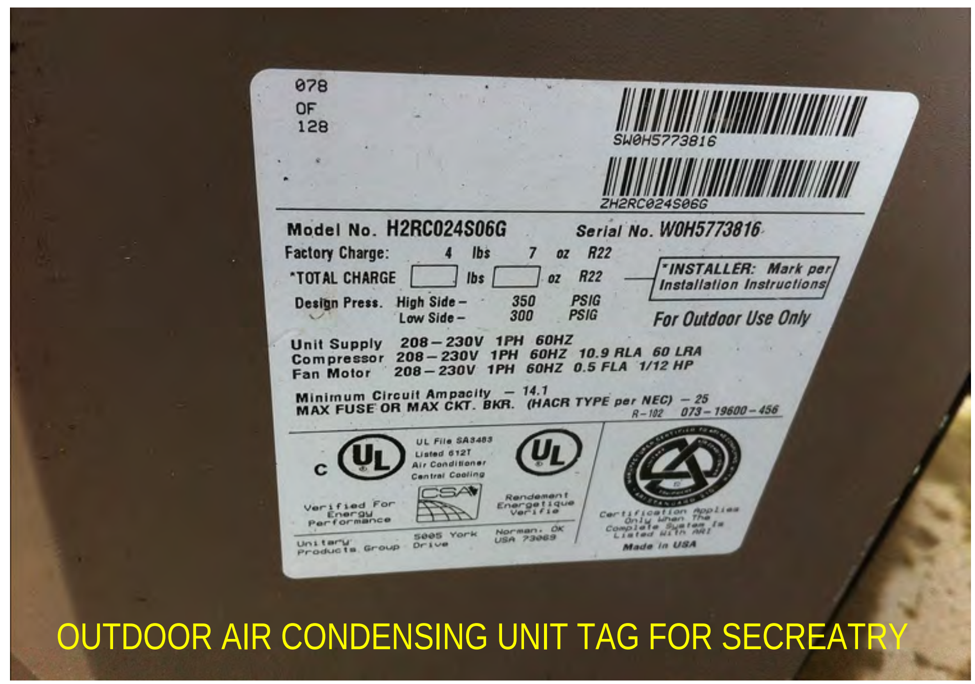


AIR CONDENSING UNIT TAG

SECRETARY AHU SAFETY BOX


OUTDOOR OLD AIR CONDENSING UNITS


OUTDOOR AIR CONDENSING UNIT FOR SECRETARY



OUTDOOR AIR CONDENSING UNIT TAG FOR SECREATRY

OLDER AIR CONDENSING UNIT #2

ELECTRICAL DISCONNECT FOR DATA ROOM UNIT

SAFETY BOX FOR ACU #2 AND #3

OUDOOR AIR CONDENSING UNIT #2 FOR DATA ROOM

ELECTRICAL DISCONNECT FOR ACU #5 FOR 2ND FL CORNER OFFICE

ACU#2 TAG INFOMRATION

ACU #5 TAG INFORMATION

APPENDIX B

Thermal Imaging Survey Reports

Inspection Report

Report Date	5/17/2012		
Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	

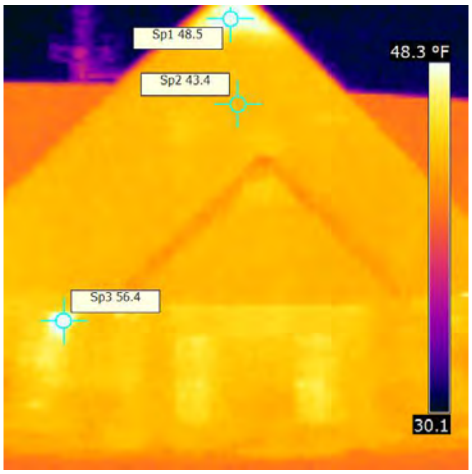


Image and Object Parameters

Camera Model	B-CAM Western S
Image Date	12/28/2011 8:50:48 AM
Image Name	IR_1901.jpg
Emissivity	0.96
Reflected apparent temperature	42.0 °F
Object Distance	25.0 ft

Text Comments

Description

Exterior IR reveals area of thermal transfer through vent at the top of the roof as well as through a light not illuminated during the picture.

Inspection Report

Report Date	5/17/2012

Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	

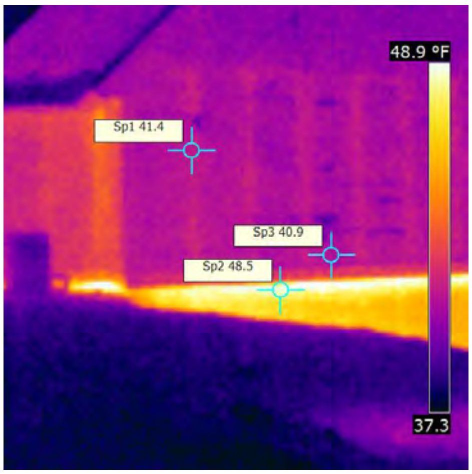


Image and Object Parameters

Text Comments

Camera Model	B-CAM Western S
Image Date	12/28/2011 8:51:33 AM
Image Name	IR_1904.jpg
Emissivity	0.96
Reflected apparent temperature	47.0 °F
Object Distance	25.0 ft

Description

Concrete foundation reveals thermal transfer. Wall studs also visible indicating a lack of constant insulation.

Inspection Report

Report Date	5/17/2012

Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	

Image and Object Parameters

Camera Model	B-CAM Western S
Image Date	12/28/2011 8:51:38 AM
Image Name	IR_1905.jpg
Emissivity	0.96
Reflected apparent temperature	45.0 °F
Object Distance	30.0 ft

Text Comments

Description

Exterior IR reveals some thermal transfer through the concrete foundation as well as from the illuminated exterior light.

Inspection Report

Report Date	5/17/2012		
Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	

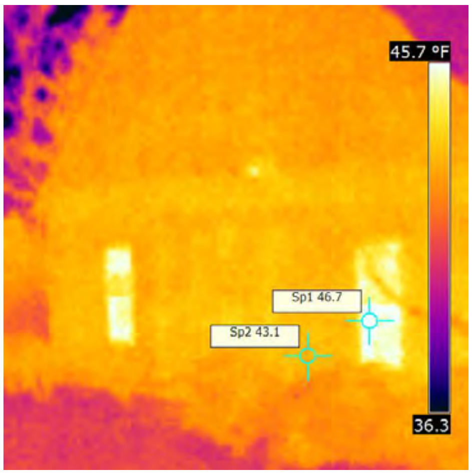


Image and Object Parameters

Camera Model	B-CAM Western S
Image Date	12/28/2011 8:53:25 AM
Image Name	IR_1909.jpg
Emissivity	0.96
Reflected apparent temperature	45.0 °F
Object Distance	25.0 ft

Text Comments

Description

IR of the side of the building reveals minimal thermal energy lost through the wall and window.

Inspection Report

Report Date	5/17/2012

Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	

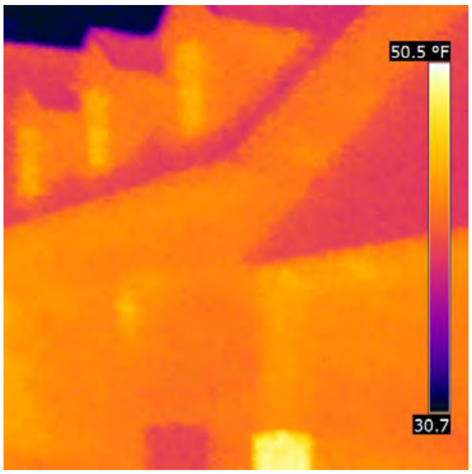


Image and Object Parameters

Camera Model	B-CAM Western S
Image Date	12/28/2011 8:53:51 AM
Image Name	IR_1910.jpg
Emissivity	0.96
Reflected apparent temperature	68.0 °F
Object Distance	6.6 ft

Text Comments

Description

Inspection Report

Report Date	5/17/2012		
Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	

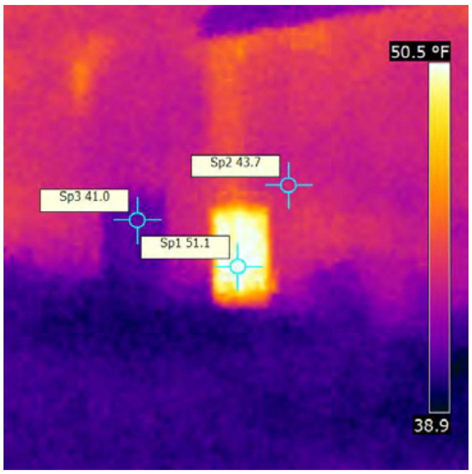


Image and Object Parameters

Camera Model	B-CAM Western S
Image Date	12/28/2011 8:53:57 AM
Image Name	IR_1911.jpg
Emissivity	0.96
Reflected apparent temperature	50.0 °F
Object Distance	10.0 ft

Text Comments

Description

IR of exterior AC unit (brigt spot) shows thermal transfer of running unit compared to unit not running (left dark spot).

Inspection Report

Report Date	5/17/2012

Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	

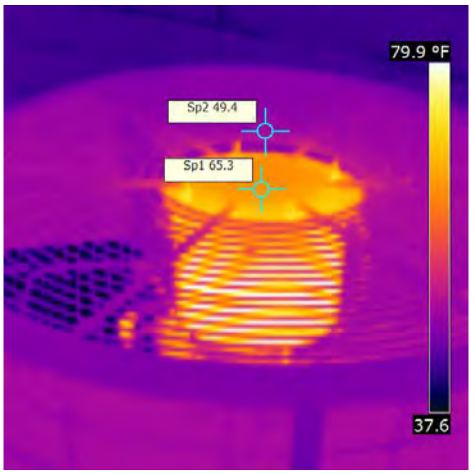


Image and Object Parameters

Camera Model	B-CAM Western S
Image Date	12/28/2011 8:54:17 AM
Image Name	IR_1912.jpg
Emissivity	0.96
Reflected apparent temperature	65.0 °F
Object Distance	2.0 ft

Text Comments

Description

IR of outdoor AC motor reveals thermal energy produced indicating low efficiency of older unit. Refer to EEM T3-1 and T3-5.

Inspection Report

Report Date	5/17/2012		
Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	

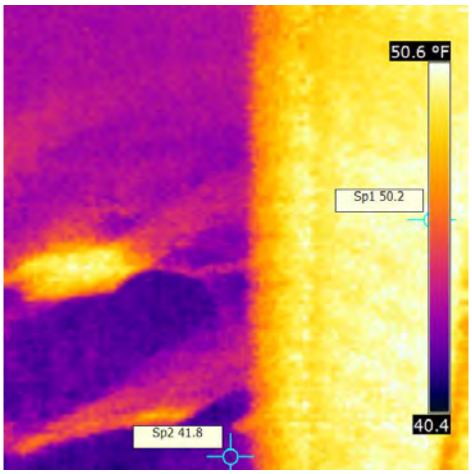


Image and Object Parameters

Camera Model	B-CAM Western S
Image Date	12/28/2011 8:54:27 AM
Image Name	IR_1913.jpg
Emissivity	0.96
Reflected apparent temperature	50.0 °F
Object Distance	2.0 ft

Text Comments

Description

AC unit produces thermal energy while in use indicating inefficiencies. Refer to T3-1 and T3-5 for replacement of unit.

Inspection Report

Report Date	5/17/2012		
Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	

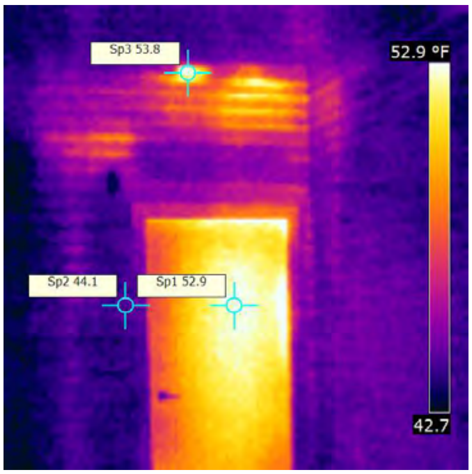


Image and Object Parameters

Camera Model	B-CAM Western S
Image Date	12/28/2011 8:54:37 AM
Image Name	IR_1914.jpg
Emissivity	0.96
Reflected apparent temperature	52.0 °F
Object Distance	2.0 ft

Text Comments

Description

IR of one of the rear entrances to the building reveals some thermal transfer through and around door as well as thermal transfer from exhaust vent above. Recommend spray foam injection into door.

Inspection Report

Report Date	5/17/2012

Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	

Image and Object Parameters

Camera Model	B-CAM Western S
Image Date	12/28/2011 8:55:24 AM
Image Name	IR_1918.jpg
Emissivity	0.96
Reflected apparent temperature	60.0 °F
Object Distance	20.0 ft

Text Comments

Description

IR of the rear of the building reveals thermal energy produced from illuminated lights and minimal thermal transfer through the door.

Inspection Report

Report Date	5/17/2012

Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	

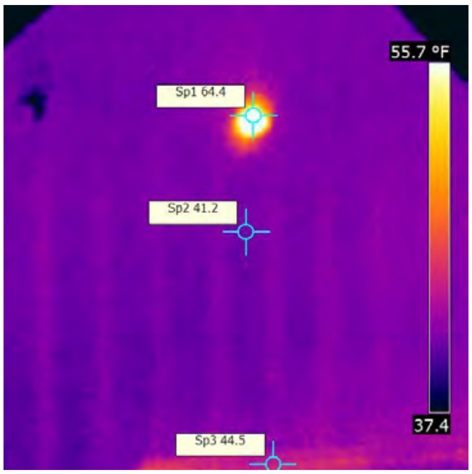


Image and Object Parameters

Camera Model	B-CAM Western S
Image Date	12/28/2011 8:56:01 AM
Image Name	IR_1921.jpg
Emissivity	0.96
Reflected apparent temperature	64.0 °F
Object Distance	15.0 ft

Text Comments

Description

Sallyport garage reveals thermal energy produced from illuminated light as well as studs visible, indicating thermal breaching. Concrete foundation below also shows signs of thermal transfer which can be addressed with spray or rigid insulation.

Inspection Report

Report Date	5/17/2012		
Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	

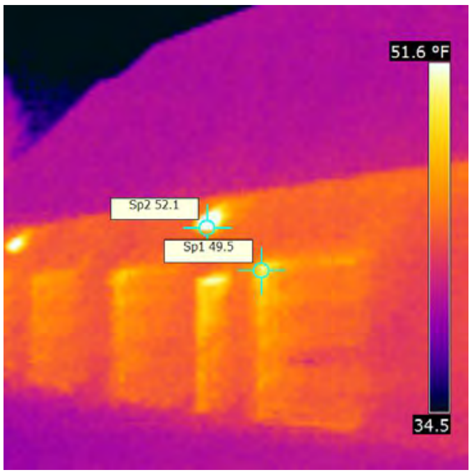


Image and Object Parameters

Camera Model	B-CAM Western S
Image Date	12/28/2011 8:56:17 AM
Image Name	IR_1923.jpg
Emissivity	0.96
Reflected apparent temperature	51.0 °F
Object Distance	20.0 ft

Text Comments

Description

Front of Sallyport garage reveals thermal energy produced by illuminated light as well as some thermal transfer around garage and entry doors. Refer to T2-3 for light fixture and T1-6 for air sealing.

Inspection Report

Report Date	5/17/2012		
Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	

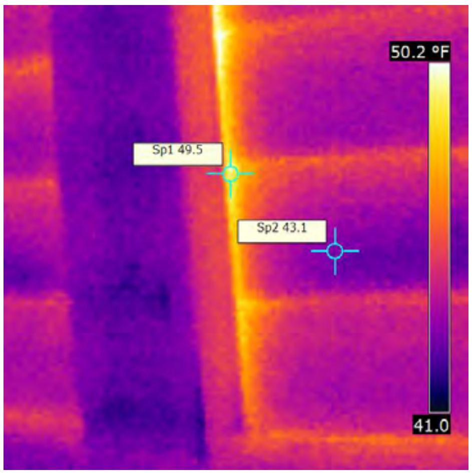


Image and Object Parameters

Camera Model	B-CAM Western S
Image Date	12/28/2011 8:56:38 AM
Image Name	IR_1924.jpg
Emissivity	0.96
Reflected apparent temperature	46.0 °F
Object Distance	3.0 ft

Text Comments

Description

IR of garage door reveals some thermal transfer at the seal of the door. Recommend weather stripping door (EEM T1-6).

Inspection Report

Report Date	5/17/2012

Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	

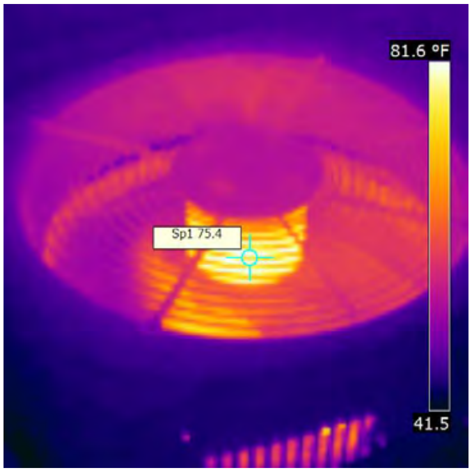


Image and Object Parameters

Camera Model	B-CAM Western S
Image Date	12/28/2011 8:58:49 AM
Image Name	IR_1925.jpg
Emissivity	0.96
Reflected apparent temperature	75.0 °F
Object Distance	3.0 ft

Text Comments

Description

IR of a second AC unit running reveals thermal energy produced by motor indicating poor efficiency. Refer to EEM T3-1 an T3-5.

Inspection Report

Report Date	5/17/2012		
Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	

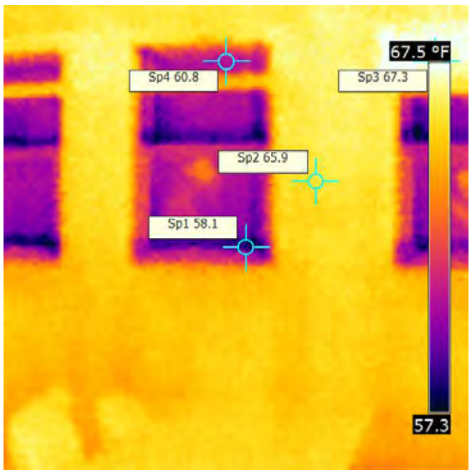


Image and Object Parameters

Camera Model	B-CAM Western S
Image Date	12/28/2011 9:41:40 AM
Image Name	IR_1933.jpg
Emissivity	0.96
Reflected apparent temperature	67.0 °F
Object Distance	8.0 ft

Text Comments

Description

IR of windows in training room reveal some thermal transfer around frames. Thermal transfer also limited by closed blinds (right) compared to open blinds (left) in windows. Recommend closing all shades at night.

Inspection Report

Report Date 5/17/2012

Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	

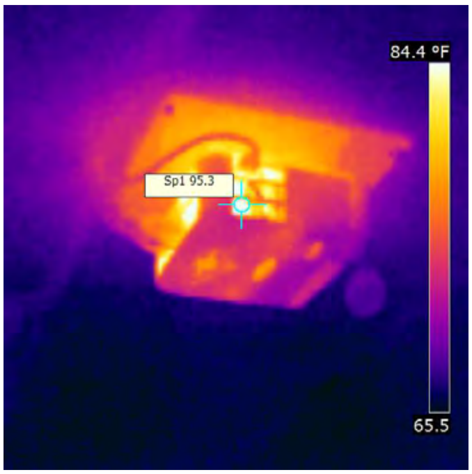


Image and Object Parameters

Camera Model	B-CAM Western S
Image Date	12/28/2011 9:41:49 AM
Image Name	IR_1934.jpg
Emissivity	0.96
Reflected apparent temperature	96.0 °F
Object Distance	10.0 ft

Text Comments

Description

IR of projector indicates the unit is either running or had been running recently as evident by thermal energy produced increasing heating load to building. Recommend powering down when not in use.

Inspection Report

Report Date	5/17/2012		
Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	

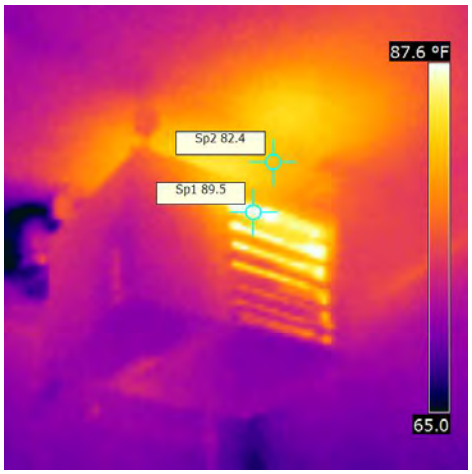


Image and Object Parameters

Text Comments

Camera Model	B-CAM Western S
Image Date	12/28/2011 9:54:29 AM
Image Name	IR_1935.jpg
Emissivity	0.96
Reflected apparent temperature	90.0 °F
Object Distance	10.0 ft

Description

Cabinet heater in the high bay emits thermal energy.

Inspection Report

Report Date	5/17/2012

Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	

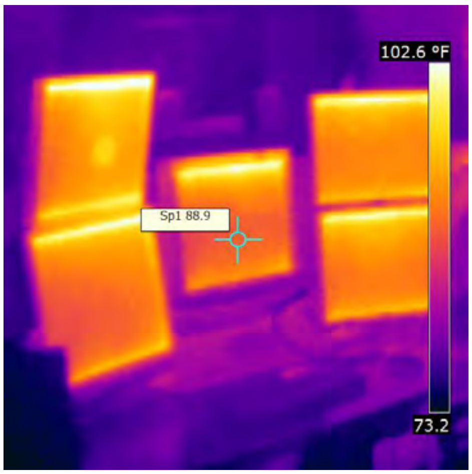


Image and Object Parameters

Camera Model	B-CAM Western S
Image Date	12/28/2011 10:03:10 AM
Image Name	IR_1936.jpg
Emissivity	0.96
Reflected apparent temperature	90.0 °F
Object Distance	7.0 ft

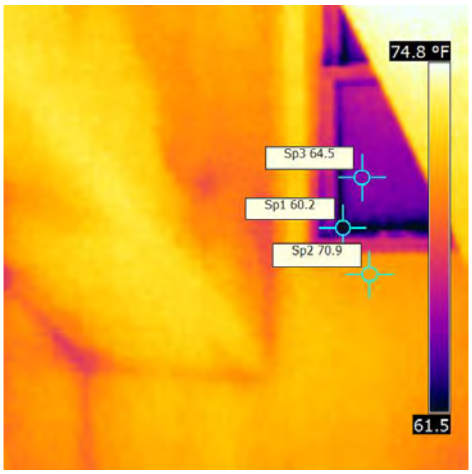
Text Comments

Description

Running computer monitors in the dispatch/communication room reveal thermal energy produced increasing heating load. Recommend powering down all equipment when not in use (EEM T1-3).

Inspection Report

Report Date	5/17/2012		
Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	



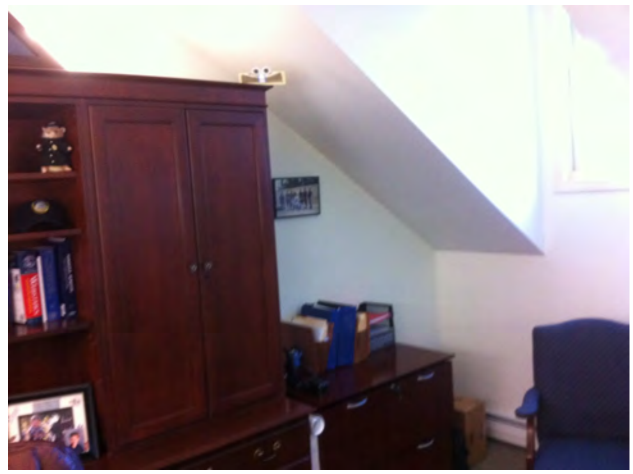


Image and Object Parameters

Camera Model	B-CAM Western S
Image Date	12/28/2011 10:06:49 AM
Image Name	IR_1940.jpg
Emissivity	0.96
Reflected apparent temperature	71.0 °F
Object Distance	8.0 ft

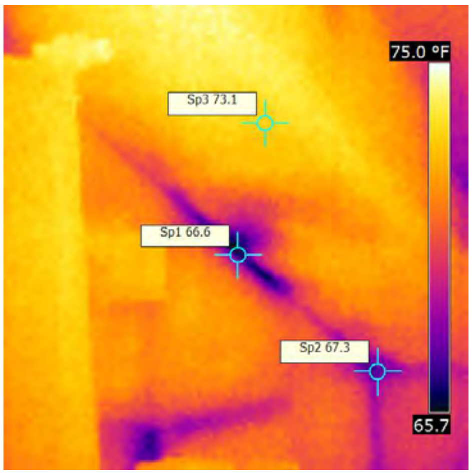
Text Comments

Description

IR of office window reveals thermal transfer around window frame. Refer to EEM T1-6 for weather sealing.

Inspection Report

Report Date	5/17/2012		
Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	



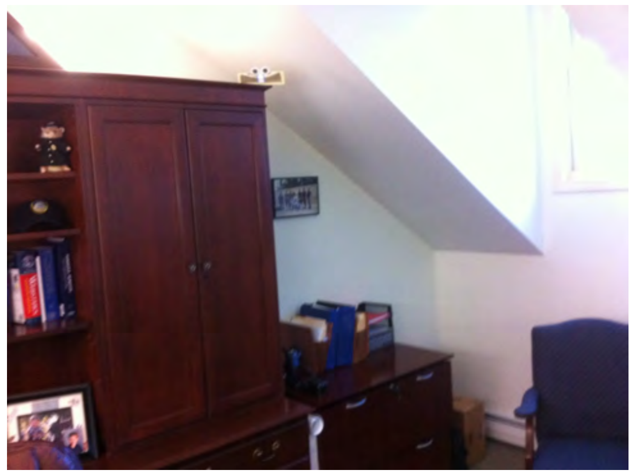


Image and Object Parameters

Text Comments

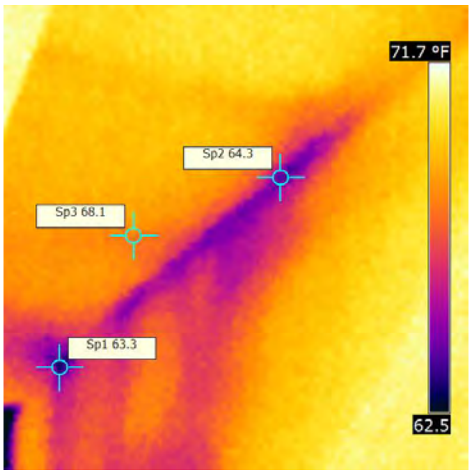
Camera Model	B-CAM Western S
Image Date	12/28/2011 10:06:54 AM
Image Name	IR_1941.jpg
Emissivity	0.96
Reflected apparent temperature	71.0 °F
Object Distance	10.0 ft

Description

Dark spots from IR in the office between the wall and the ceiling indicates thermal transfer due to poor insulation or sealing. Refer to T1-6 for air sealing envelope.

Inspection Report

Report Date	5/17/2012		
Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	



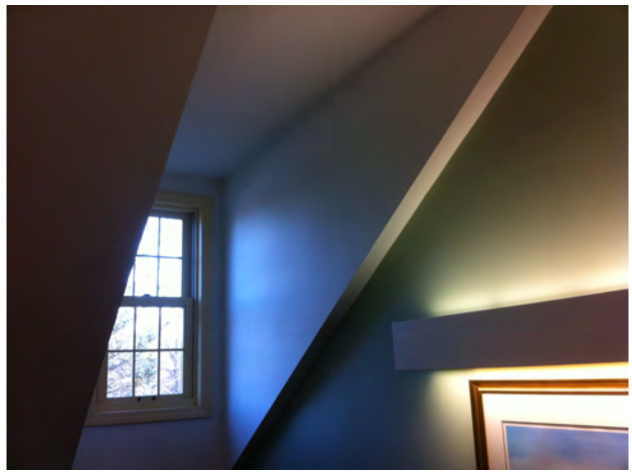


Image and Object Parameters

Text Comments

Camera Model	B-CAM Western S
Image Date	12/28/2011 10:07:12 AM
Image Name	IR_1942.jpg
Emissivity	0.96
Reflected apparent temperature	68.0 °F
Object Distance	8.0 ft

Description

Office ceiling IR reveals some signs of thermal transfer at seam between wall and ceiling. Refer to T1-6 for air sealing envelope.

Inspection Report

Report Date	5/17/2012		
Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	

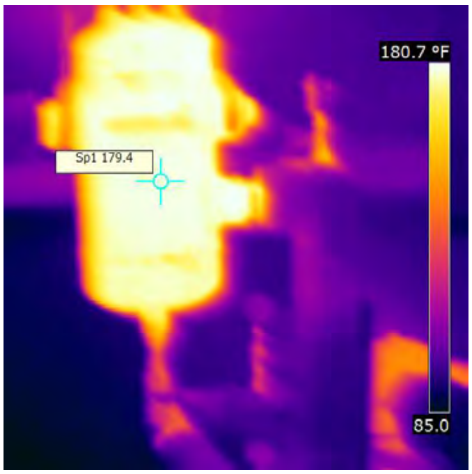


Image and Object Parameters

Camera Model	B-CAM Western S
Image Date	12/28/2011 10:20:39 AM
Image Name	IR_1944.jpg
Emissivity	0.96
Reflected apparent temperature	185.0 °F
Object Distance	3.0 ft

Text Comments

Description

IR of Taco air separator reveals lost energy through the unit. Visual inspection reveals possible corrosion of unit and associated piping. Unit may be past useful life. Recommend replacing as part of boiler replacement (EEM T3-3).

Inspection Report

Report Date	5/17/2012

Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	

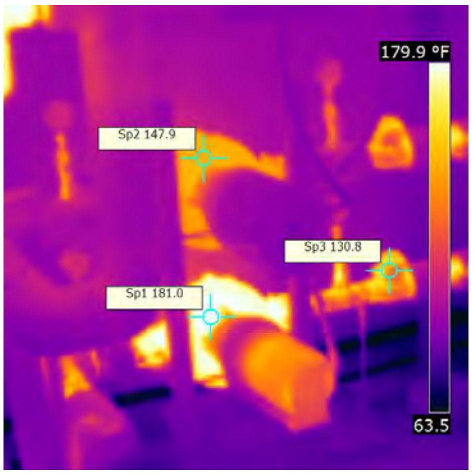


Image and Object Parameters

Camera Model	B-CAM Western S
Image Date	12/28/2011 10:20:43 AM
Image Name	IR_1945.jpg
Emissivity	0.96
Reflected apparent temperature	185.0 °F
Object Distance	4.0 ft

Text Comments

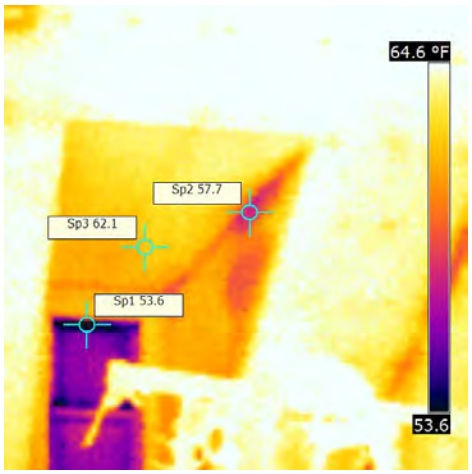
Description

IR of two circulating pumps reveal thermal energy produced by pump motors and thermal transfer occuring through the unit as well as through uninsulated pipes. Refer to T3-3 for pumps and insulation.

Inspection Report

Report Date	5/17/2012

Company	Acadia Engineers and Constructors	Customer	Hollis Police Department
Address	90 Main Street, Newmarket, NH 03857	Site Address	9 Silver Lake Road, Hollis, NH 03049
Thermographer	Hans Kuebler	Contact Person	



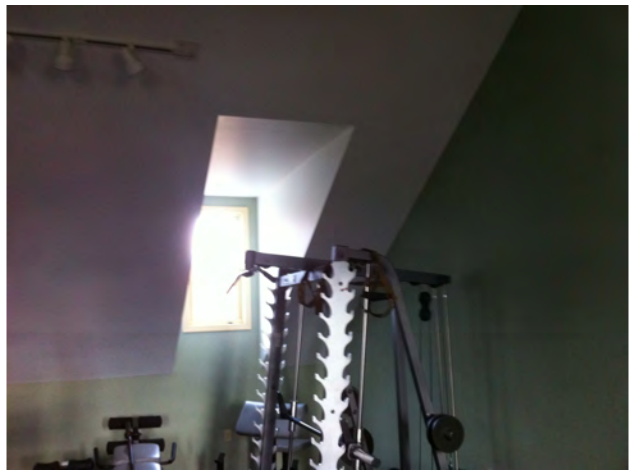


Image and Object Parameters

Camera Model	B-CAM Western S
Image Date	12/28/2011 10:44:10 AM
Image Name	IR_1948.jpg
Emissivity	0.96
Reflected apparent temperature	62.0 °F
Object Distance	10.0 ft

Text Comments

Description

IR of window cove in the weight room reveals thermal transfer around the window as well as at the seam between the ceiling and wall. Refer to T1-6 for envelope air sealing.

APPENDIX C

Indoor Metering Data

INDOOR METERING DATA

Facility:	Location:	Date:	Ambient Outdoor:
Hollis Police Department	Hollis, NH	12/28/2011	Temp= 45 RH= 40 CO2= 315

Location /Use Description	Time	Occupied	Air Quality			Lighting Density		Notes
			Temp (°F)	RH (%)	CO2 (ppm)	Horiz (FC)	Vert (FC)	
Interview room	819	N	64.5	42.6	774		27.7	
Entrance closet	821	N						
Men's locker	823	N	69.9	40.8	678		32.8	
Middle hall	826	N	70.7	34.1	705		29.2	
Interview							50.5	
Sargent office	830	Y	71	30.8	680		45.1	
Kitchen	833	N	71.6	31.1	630		51.9	
Squad room	835	N	72.3	29.9	584		28.6	
Training room	841	N	70.1	30.4	604		40.6	
Holding room	846	N	71.4	33.8	573		37.4	
South sallyport	849	N	68.7	45.1	924		38.1	
North sallyport	852	N	67.8	46	538		14.1	
Communications	859	Y	71.9	38.4	750		16.5	
Chiefs office	907	N	71	30.1	645		46.4	
Secretary	909	Y	71.9	30.2	658		67.7	Nat. Light
Lt.	911	Y	72.6	29.7	695		15.4	
Upstairs hall	919	N	71.7	30.2	625		22	
Detective	921	N	72.3	29.1	587			
IT	931	Y	75.5	27.1	707		47.1	
Office	936	N	73.9	26.4	641		27	
Weight room	941	N	70.8	28.9	444		10.3	All nat. Light
Averages:			**71.0**	**33.4**	**655**			

APPENDIX D

Lighting Fixture Inventory

LIGHTING FIXTURE INVENTORY

Facility: Hollis Police Department | Location: Hollis, NH | Date: 12/28/2011

Location /Use Description	Fixture	Watts/fixture	Qty	Controls	Total watts	Est. Hr/Wk	Est. KWH Consumption/Yr
Exit	Led	4	12	Always	48	168	419
Back stairwell	Cfl	17	1	Switch	17	30	27
Closet	Cfl	17	1	Switch	17	10	9
Dispatch	Cfl	17	3	Switch	51	168	446
Entrance hall	Cfl	17	1	Switch	17	168	149
Generator room	Cfl	17	1	Switch	17	0.5	0
Sargent	Cfl	17	2	Switch	34	34	60
Training closet	Cfl	17	1	Switch	17	0.5	0
Up supply	Cfl	17	4	Switch	68	0.5	2
Upstairs hall	Cfl	17	1	Switch	17	50	44
Upstairs men's	Cfl	17	1	Switch	17	2	2
Upstairs women's	Cfl	17	1	Switch	17	2	2
Weight room	Cfl track	17	9	Switch	153	10	80
Women's locker	Cfl	17	1	Switch	17	5	4
AHU 1 rm	T8	32	2	Switch	64	0.5	2
Armory	T8	32	1	Switch	32	20	33
Attic	T8	32	4	Switch	128	0.5	3
Back stairwell	T8	32	3	Switch	96	1	5
Closet	T8	32	2	Switch	64	0.5	2
Detective office	T8	32	1	Switch	32	40	67
Dispatch	T8	32	5	Switch	160	168	1,398
Front stairs	T8	32	4	Switch	128	20	133
Men's locker	T8	32	2	Switch	64	10	33
Tel data	T8	32	1	Switch	32	0.5	1
Upstairs men's	T8	32	1	Switch	32	2	3
Upstairs storage rooms	T8	32	10	Switch	320	0.5	8
Upstairs women's	T8	32	1	Switch	32	10	17
Weight room	T8	32	3	Switch	96	30	150
Women's locker	T8	32	1	Switch	32	10	17
Dispatch	Halogen	54	2	Switch	108	90	505
Secretary	Inc	60	1	Switch	60	40	125
Back hall	T8	64	3	Switch	192	60	599
Cell rooms	T8	64	12	Switch	768	10	399
Chiefs office	T8	64	4	Switch	256	40	532
Communication director	T8	64	1	Switch	64	5	17
Detective office	T8	64	2	Switch	128	40	266
Detective/prosecutor	T8	64	4	Switch	256	40	532
Entrance hall	T8	64	2	Switch	128	80	532
Holding room	T8	64	4	Switch	256	15	200
IT office	T8	64	4	Switch	256	40	532
Kitchen	T8	64	2	Switch	128	50	333

Lt.	T8	64	4	Switch	256	40	532
Meeting room	T8	64	2	Switch	128	10	67
Men's locker	T8	64	6	Switch	384	30	599
Middle hall	T8	64	7	Switch	448	168	3,914
Middle hall interview	T8	64	2	Switch	128	5	33
North sallyport	T8	64	8	Switch	512	168	4,473
Sargent	T8	64	2	Switch	128	40	266
Secretary	T8	64	4	Switch	256	40	532
South sallyport	T8	64	13	Switch	832	168	7,268
Squad room	T8	64	4	Switch	256	10	133
Stair hall	T8	64	2	Switch	128	80	532
Tel data	T8	64	1	Switch	64	0.5	2
Training room	T8	64	7	Switch	448	10	233
Up supply	T8	64	2	Switch	128	20	133
Upstairs hall	T8	64	12	Switch	768	40	1,597
Women's locker	T8	64	2	Switch	128	40	266
Exterior	HPS	70	7	Photocell	490	68	1,733
Exterior	Sign spotlight	75	2		150	60	468
Exterior	Wallpack	70	4	Photocell	280	64	932
Exterior	HPS	150	4		600	68	2,122
Totals:			**216**		**10,931**		**33,524**

APPENDIX E

Mechanical Equipment Inventory

HVAC SYSTEM INVENTORY

Unit/Location	Serves	Units	Affiliated System	Amps	RMP	Phase	T Stat Location	AC Unit	Man.	Model	Est. kWh/yr
Unit 1/Above Dispatch	Second Floor West	AHU	HVAC	15	1,725	1	2nd Floor Hall	Builing/Outdoor 2nd Floor 1	First Co.	30HBXB-HH	1,900
Unit 2/Above Dispatch	Dispatch	AHU	HVAC	15	1,725	1	Dispatch	Rear of Building Outdoor / #2	First Co.	30HBXB-HH	1,900
Unit 3/Above Dispatch	Traning Room/First Floor	AHU	HVAC	15	1,725	1	Training Room	Rear of building Outdoor / #3	First Co.	30HBXB-HH	1,900
Unit 5/Mechanical Closet 2nd floor	Second Floor North East	AHU	HVAC	15	1,725	1	2nd fl Corner Office	Rear of Building/Outdoor 5	First Co.	30HBXB-HH	1,900
Unit #1/Mechanical Room 2nd floor	Sergeant Office/First Floor	AHU	HVAC	15	1,725	1	Sergeant Office	Front Right of Entrance Outdoor / #1	Snyder General	SC8081A	1,900
Unit 3/Mechanical Closet 2nd floor	Second Floor Southeat	AHU	HVAC	15	1,725	1	IT Office	Front Right of Entry / #3	First Co.	30HBXB-HH	1,900
Unit FCU Weight Room Attic	Cell Block	AHU	HVAC	15	1,725	1	Cell Block	Front of building/AC 9	First Co.	30HBXB-HH	1,900
Unit 4/ Weight Room Attic	Weight Room	AHU	HVAC	15	1,725	1	Weight Room	Front of Building/York	First Co.	30HBXB-HH	1,900
Total:				**120**							**15,200**

UNIT HEATER INVENTORY

Name	Location	Qty.	CFM	BTU/hr	Amps	V	Phase	Manufacturer	Model	Est. kWh/yr
Modine Unit heater	Sallyport	2	500	18,400	0.65	115	1	Sterling	HB-118	117

OUTDOOR AC SYSTEM INVENTORY

Location /Use Description	Serves	Affiliated System	Volt	Phase	Compressor RLA	Compressor LRA	Fan FLA	Fan HP	Cooling (ton)	SEER	Manufacturer	Model	Est. kWh/yr
Front Right of Entry / #3	Second Floor Southeast	AC	208	1	11	60	1	0	5	11	York	H2RC024S06G	2,808
Front Right of Entrance Outdoor / #1	First Floor/Sergeant Office	AC	208	1	13	71	1	0	5	11	American Standard	2A7A1030A1000AA	2,808
Rear of Builing/Outdoor 2nd Floor 1	Secretary 2nd flr	AC	208	1	11	60	1	0	5	11	York	H2RC024S06G	2,808
Rear of Building Outdoor / #2 (limited Info)	Dispatch	AC	208	1	20	20	20	1	5	6	Unknown	Unknown	5,616
Rear of building Outdoor / #3 (limited info)	Training	AC	208	1	20	20	20	1	5	6	Unknown	Unknown	5,616
Front of Building/York	Weight Room	AC	208	1	11	60	1	0	5	11	York	H2RC024S06G	1,404
Front of building/AC 9	Cell Block/Booking	AC	208	1						11	Unknown	Unknown	2,808
Front of building/Mr Slim	Cell Block/Booking		115	1					1	13	Mitsubishi	MU09TW	1,404
Rear of Building/Outdoor Mr Slim	Second Floor Data Room	AC	115	1					1	13	Mitsubishi	MU09TW	1,404
Rear of Building/Outdoor 5	corner office 2nd fl	AC	208	1	14	73	1	0	5	11	York	H2RC024S06G	1,404
Total									**37**				**28,080**

PUMPS DATA SHEET

Location /Use Description	Manufacturer	Qty	GPM	HP	Volt	Phase	KWH
Well pump front / front wall #2	Gould	2	5	1	240	1	225
Water System		1					300
Circulation Pump	Taco	2	15	1	240	1	4,980
Total		**5**					**5,505**

APPENDIX F

Plug Load Inventory

PLUG LOAD INVENTORY

Facility:			Location:			Date:		
Hollis Police Department			Hollis, NH			12/28/2011		

Location /Use Description	Category	Description	Watts/fixture	Qty	Total watts	Est. Hr/Wk	Est. kWh/Yr	Notes
Kitchen	AL - Large Appliance	Dishwasher	1,000	1	1,000	4	208	
Kitchen	AL - Large Appliance	Stove	2,400	1	2,400	2	250	
Dispatch	AP - Air Purifier/Cleaner	Humidifier	90	1	90	160	749	
Dispatch	AS - Small Appliance	Microwave	1,000	1	1,000	1.5	78	
Dispatch	AS - Small Appliance	Toaster	1,000	1	1,000	1	52	
Kitchen	AS - Small Appliance	Microwave	1,000	1	1,000	2	104	
Corridor	AS - Small Appliance	Coffee maker	1,200	1	1,200	5	312	
Dispatch	AS - Small Appliance	Coffee maker	1,200	1	1,200	5	312	
Kitchen	AS - Small Appliance	Coffee maker	1,200	1	1,200	1	62	
Booking	CD - Desktop Computer	Computer	95	1	95	168	830	
Chiefs office	CD - Desktop Computer	Computer	95	1	95	80	395	
Detective office	CD - Desktop Computer	Computer	95	1	95	80	395	
Detective office upstairs	CD - Desktop Computer	Computer	95	1	95	80	395	
Dispatch	CD - Desktop Computer	Computer	100	13	1,300	168	11,357	
Electrical room	CD - Desktop Computer	Computer	95	4	380	168	3,320	
Evidence	CD - Desktop Computer	Computer	95	1	95	168	830	
IT office	CD - Desktop Computer	Computer	95	2	190	168	1,660	
Lieutenant's office	CD - Desktop Computer	Computer	95	1	95	80	395	
Secretary	CD - Desktop Computer	Computer	95	1	95	80	395	
Sergeant's office	CD - Desktop Computer	Computer	95	2	190	80	790	
Squad room	CD - Desktop Computer	Computer	95	3	285	80	1,186	
Booking	CM - Computer Monitor	LCD	30	1	30	1	2	
Chiefs office	CM - Computer Monitor	LCD	30	1	30	60	94	
Detective office	CM - Computer Monitor	LCD	30	1	30	60	94	
Detective office upstairs	CM - Computer Monitor	LCD	30	1	30	60	94	
Dispatch	CM - Computer Monitor	LCD	30	18	540	168	4,717	
Electrical room	CM - Computer Monitor	LCD	30	2	60	5	16	
Evidence	CM - Computer Monitor	LCD	30	1	30	50	78	
IT office	CM - Computer Monitor	LCD	30	1	30	60	94	
Lieutenant's office	CM - Computer Monitor	LCD	30	1	30	60	94	
Secretary	CM - Computer Monitor	LCD	30	1	30	60	94	

Sergeant's office	CM - Computer Monitor	LCD	30	1	30	40	62	
Squad room	CM - Computer Monitor	LCD	30	3	90	40	187	
Sergeant's office	CM - Computer Monitor	Old monitor	85	1	85	60	265	
Conference room	CN - Notebook Computer	Laptop	30	1	30	40	62	
Sally port	DL - Desk Lamp	Lamp	60	1	60	40	125	
Weight room	EL - Electronics	Radio	15	1	15	10	8	
Conference room	EL - Electronics	VCR	25	1	25	1	1	
Corridor	EL - Electronics	Time clock	15	1	15	168	131	
Detective office upstairs	FN - Fan	Fan	30	1	30	60	94	Summertime use
Squad room	FN - Fan	Fan	30	1	30	10	16	Summertime use
Sally port	MI - Musical/Audio Eqpt	Radio	30	1	30	40	62	
Radio Room	MI - Musical/Audio Eqpt	Radios and Backup	700	1	700	168	6,115	
Secretary	OE - Office Equipment	Hole punch	5	1	5	1	0	
Squad room	OE - Office Equipment	Shredder	200	1	200	1	10	
Conference room	OE - Office Equipment	Projector	240	1	240	1	12	
Chiefs office	OT - Other (describe)	Fish tank	50	1	50	168	437	
Corridor	PC - Photocopier	Copier	1,440	1	1,440	10	749	
Booking	PR - Computer Printer	Desk jet	35	1	35	2	4	
Detective office	PR - Computer Printer	Desk jet	35	1	35	2	4	
Detective office upstairs	PR - Computer Printer	Deskjet	35	1	35	2	4	
Lieutenant's office	PR - Computer Printer	Desk jet	35	1	35	2	4	
Sergeant's office	PR - Computer Printer	Desk jet	35	1	35	2	4	
Squad room	PR - Computer Printer	Desk jet	35	1	35	2	4	
Squad room	PR - Computer Printer	Reim printer	150	1	150	1	8	
Dispatch	PR - Computer Printer	Laser jet	500	1	500	1	26	
Secretary	PR - Computer Printer	Laser jet	500	1	500	1	26	
Squad room	PR - Computer Printer	Laser jet	500	1	500	1	26	
Booking	RM - Mini Refrigerator	Mini fridge	300	1	300	80	1,248	
Corridor	RM - Mini Refrigerator	Mini fridge	300	1	300	60	936	
Dispatch	RM - Mini Refrigerator	Mini fridge	300	1	300	60	936	
Sally port	RM - Mini Refrigerator	Mini fridge	150	1	150	60	468	
Kitchen	RS - Standard Refrigerator	Full fridge	414	1	414	60	1,292	
Conference room	TV - Television	Tv	160	1	160	1	8	
Dispatch	TV - Television	Tv	160	1	160	168	1,398	
Lieutenant's office	TV - Television	Tv	160	1	160	10	83	

Men's locker room	TV - Television	Tv	160	1	160	10	83	
Weight room	TV - Television	Tv	160	1	160	10	83	
Womans locker room	TV - Television	Tv	160	1	160	10	83	
Corridor	WF - Water Fountain	Water fountain	300	1	300	60	936	
Corridor	WF - Water Fountain	Water cooler	500	1	500	60	1,560	
Dispatch	WF - Water Fountain	Water cooler	500	1	500	60	1,560	
Totals:			**20,134**	**111**	**22,599**	**3,749**	**48,569**	

APPENDIX G

ENERGY STAR® Statement of Energy Performance

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Hollis Police Station

Building ID: 1713351
For 12-month Period Ending: December 31, 2011[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: January 26, 2012

Facility
Hollis Police Station
9 Silver Lake Road
Hollis, NH 03049

Facility Owner
Town of Hollis
7 Monument Square
Hollis, NH 03049

Primary Contact for this Facility
Troy Brown
7 Monument Square
Hollis, NH 03049

Year Built: 2006
Gross Floor Area (ft²): 9,918

Energy Performance Rating[2] (1-100) N/A

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	453,250
Propane (kBtu)	365,876
Natural Gas - (kBtu)[4]	0
Total Energy (kBtu)	819,126

Energy Intensity[4]

Site (kBtu/ft²/yr)	83
Source (kBtu/ft²/yr)	190

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	73

Electric Distribution Utility
Public Service Co of New Hampshire [Northeast Utilities]

National Median Comparison

National Median Site EUI	82
National Median Source EUI	146
% Difference from National Median Source EUI	30%
Building Type	Fire Station/Police Station

Stamp of Certifying Professional

Based on the conditions observed at the time of my visit to this building, I certify that the information contained within this statement is accurate.

Meets Industry Standards[5] **for Indoor Environmental Conditions:**

Ventilation for Acceptable Indoor Air Quality	**N/A**
Acceptable Thermal Environmental Conditions	**N/A**
Adequate Illumination	**N/A**

Certifying Professional
Timothy Nichols
20 Madbury Road STE 3
Durham, NH 03824

Notes:
1. Application for the ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of the ENERGY STAR is not final until approval is received from EPA.
2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.
3. Values represent energy consumption, annualized to a 12-month period.
4. Values represent energy intensity, annualized to a 12-month period.
5. Based on Meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) or a Registered Architect (RA) must validate the accuracy of the data underlying the building's energy performance rating. This checklist is designed to provide an at-a-glance summary of a property's physical and operating characteristics, as well as its total energy consumption, to assist the PE or RA in double-checking the information that the building owner or operator has entered into Portfolio Manager.

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.
NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Hollis Police Station	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Fire Station/Police Station	Is this an accurate description of the space in question?		☐
Location	9 Silver Lake Road, Hollis, NH 03049	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of a hospital, k-12 school, hotel and senior care facility) nor can they be submitted as representing only a portion of a building.		☐

Hollis Police Station (Other)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	7,918 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Number of PCs	29(Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	168Hours(Optional)	Is this the total number of hours per week that the space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	8(Optional)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100.		☐

Police Station Attached Garage (Other)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	2,000 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Number of PCs	0(Optional)	Is this the number of personal computers in the space?		☐

Weekly operating hours	168Hours(Optional)	Is this the total number of hours per week that the space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	0(Optional)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100.		☐

ENERGY STAR® Data Checklist
for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Public Service Co of New Hampshire [Northeast Utilities]

Fuel Type: Electricity		
Meter: 8004822-01-6-6 PSNH (kWh (thousand Watt-hours)) **Space(s):** Entire Facility **Generation Method:** Grid Purchase		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
12/01/2011	12/31/2011	9,800.00
11/01/2011	11/30/2011	10,680.00
10/01/2011	10/31/2011	11,920.00
09/01/2011	09/30/2011	12,680.00
08/01/2011	08/31/2011	14,320.00
07/01/2011	07/31/2011	12,160.00
06/01/2011	06/30/2011	11,280.00
05/01/2011	05/31/2011	9,880.00
04/01/2011	04/30/2011	9,480.00
03/01/2011	03/31/2011	9,160.00
02/01/2011	02/28/2011	10,760.00
01/01/2011	01/31/2011	10,720.00
8004822-01-6-6 PSNH Consumption (kWh (thousand Watt-hours))		**132,840.00**
8004822-01-6-6 PSNH Consumption (kBtu (thousand Btu))		**453,250.08**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**453,250.08**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Propane		
Meter: Propane - Police (Gallons) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (Gallons)**
12/01/2011	12/31/2011	722.60
11/01/2011	11/30/2011	256.00
10/01/2011	10/31/2011	0.00
09/01/2011	09/30/2011	0.00
08/01/2011	08/31/2011	585.30
07/01/2011	07/31/2011	0.00
06/01/2011	06/30/2011	0.00
05/01/2011	05/31/2011	102.40
04/01/2011	04/30/2011	543.00
03/01/2011	03/31/2011	466.00

02/01/2011	02/28/2011	809.10
01/01/2011	01/31/2011	507.80
Propane - Police Consumption (Gallons)		**3,992.20**
Propane - Police Consumption (kBtu (thousand Btu))		**365,875.55**
Total Propane Consumption (kBtu (thousand Btu))		**365,875.55**
Is this the total Propane consumption at this building including all Propane meters?		☐

Additional Fuels	
Do the fuel consumption totals shown above represent the total energy use of this building? Please confirm there are no additional fuels (district energy, generator fuel oil) used in this facility.	☐

On-Site Solar and Wind Energy	
Do the fuel consumption totals shown above include all on-site solar and/or wind power located at your facility? Please confirm that no on-site solar or wind installations have been omitted from this list. All on-site systems must be reported.	☐

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same PE or RA that signed and stamped the SEP.)

Name: ____ Date: _____________

Signature: ______________________________________

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

Please keep this Facility Summary for your own records; do not submit it to EPA. Only the Statement of Energy Performance (SEP), Data Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility
Hollis Police Station
9 Silver Lake Road
Hollis, NH 03049

Facility Owner
Town of Hollis
7 Monument Square
Hollis, NH 03049

Primary Contact for this Facility
Troy Brown
7 Monument Square
Hollis, NH 03049

General Information

Hollis Police Station	
Gross Floor Area Excluding Parking: (ft^2)	9,918
Year Built	2006
For 12-month Evaluation Period Ending Date:	December 31, 2011

Facility Space Use Summary

Hollis Police Station		Police Station Attached Garage	
Space Type	Other - Fire Station/Police Station	Space Type	Other - Fire Station/Police Station
Gross Floor Area(ft^2)	7,918	Gross Floor Area(ft^2)	2,000
Number of PCs^o	29	Number of PCs^o	0
Weekly operating hours^o	168	Weekly operating hours^o	168
Workers on Main Shift^o	8	Workers on Main Shift^o	0

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 12/31/2011)	**Baseline** (Ending Date 12/31/2008)	**Rating of 75**	**Target**	**National Median**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft^2)	83	108	0	N/A	82
Source (kBtu/ft^2)	190	228	0	N/A	146
Energy Cost					
$/year	$ 24,841.44	$ 33,094.46	N/A	N/A	$ 24,663.98
$/ft^2/year	$ 2.50	$ 3.34	N/A	N/A	$ 2.48
Greenhouse Gas Emissions					
$MtCO_2e$/year	73	92	0	N/A	72
$kgCO_2e/ft^2$/year	7	9	0	N/A	7

More than 50% of your building is defined as Fire Station/Police Station. This building is currently ineligible for a rating. Please note the National Median column represents the CBECS national median data for Fire Station/Police Station. This building uses 30% more energy per square foot than the CBECS national median for Fire Station/Police Station.

Notes:
o - This attribute is optional.
d - A default value has been supplied by Portfolio Manager.

APPENDIX H

Renewable Energies Screening Worksheets

RENEWABLE ENERGY SCREENING SUMMARY

Building/Facility:	Hollis Police Department	Location:	Hollis, NH
Gross Area (sf):	9,918	Date:	2/7/2012
Use Category:	Fire Station/Police Station	EUI (kBtu/sf/yr):	190
Heating Fuel(s):	Propane	PM Grade:	NA
Heating System(s):	Hydronic	Cooling System(s):	Limited (DX Coils)

RE Technology	Score (out of 70 pts.)	Grade	Notes/Comments
Geothermal Heating/Cooling	58.5	84%	Closed-loop GSHP system.
Biomass Heating	54.5	78%	Pellet feed system recommended.
Roof Photovoltaic	53.0	76%	Small system 5kw-10kw.
Ground Photovoltaic	52.0	74%	Small system 5kw-10kw.
Solar DHW	51.0	73%	DHW demand should be confirmed.
Solar Thermal	47.0	67%	Medium-temperature collector.
Wind Turbine Generator	43.5	62%	Permit requirements are height dependent.
Combined Heat & Power	43.0	61%	75kW system.

RENEWABLE ENERGY SCREENING WORKSHEET

Building/Facility:	Hollis Police Department	Location:	Hollis, NH
Gross Area (sf):	9,918	Date:	2/7/2012
Use Category:	Fire Station/Police Station	EUI (kBtu/sf/yr):	190
Heating Fuel(s):	Propane	PM Grade:	NA
Heating System(s):	Hydronic	Cooling System(s):	Limited (DX Coils)

Technology: **Geothermal Heating & Cooling**

No.	Criteria	Score (1-5 pts.)	Notes/Comments
1	Demonstrated technology	5	Well demonstrated technology but does require engineering design.
2	Expected service life/durability	5	Well field and loop system has +50 year service life. Equipment has +20 yr service life.
3	Geographical considerations	5	Abundant geothermal energy reserves.
4	Energy demand	4.5	Heating and cooling energy consumption is relatively high.
5	Facility/systems conditions	3	Existing system is functioning
6	Facility/systems compatibility	3	Building system is old and out dated but a heat pump can be installed
7	Permitting constraints	5	No special permitting required for a closed-loop system (open-loop would require state permit and is not recommended).
8	Abutter concerns	5	Abutters with water supply wells can be sensitive to geothermal wells but a closed-loop system will have no impact.
9	Capital investment	3	High capital cost.
10	O&M requirements	5	Very low O&M except routine equipment maintenance.
11	Financial incentives	2.5	Limited incentives in NH.
12	Owner initiatives	4	Owner is open to renewable options.
13	CO2e emissions	5	The building currently uses a large amount of oil.
14	Public awareness/education	3.5	Limited public use. Information could be displayed in the building so users are aware of geothermal system.
	Total Score:	**58.5**	
	Total Possible Score:	**70**	
	Grade:	**84%**	

RENEWABLE ENERGY SCREENING WORKSHEET

Building/Facility: Hollis Police Department
Location: Hollis, NH
Gross Area (sf): 9,918
Date: 2/7/2012
Use Category: Fire Station/Police Station
EUI (kBtu/sf/yr): 190
Heating Fuel(s): Propane
PM Grade: NA
Heating System(s): Hydronic
Cooling System(s): Limited (DX Coils)

Technology: **Biomass Heating Systems (wood, chips, pellets)**

No.	Criteria	Score (1-5 pts.)	Notes/Comments
1	Demonstrated technology	4	Well demonstrated technology. Some woodchip and pellet feed units are newer technology.
2	Expected service life/durability	4	Expected service life is 20 yrs.
3	Geographical considerations	3	Limited fuel in Southern NH
4	Energy demand	5	Heating energy is relatively high in the building.
5	Facility/systems conditions	3.5	Limited storage area for woodchips/pellets.
6	Facility/systems compatibility	3.5	Limited storage area for woodchips/pellets.
7	Permitting constraints	5	No special permits required.
8	Abutter concerns	4.5	Systems are located inside building. Wood or chip feedstock located outside could be a concern.
9	Capital investment	4.5	Low capital cost.
10	O&M requirements	4	Wood and woodchip units require constant attending and feedstock must be sourced. Pellet systems with hoppers are less intensive and feedstock is commercially available.
11	Financial incentives	2.5	Limited incentives.
12	Owner initiatives	4.5	Owner is open to renewable options.
13	CO2e emissions	4	Biomass does emit CO2 but the net reduction from the oil system will be significant.
14	Public awareness/education	2.5	Limited public use. Information could be displayed in the building so users are aware of biomass heating system.
	Total Score:	**54.5**	
	Total Possible Score:	**70**	
	Grade:	**78%**	

RENEWABLE ENERGY SCREENING WORKSHEET

Building/Facility: Hollis Police Department
Location: Hollis, NH
Gross Area (sf): 9,918
Date: 2/7/2012
Use Category: Fire Station/Police Station
EUI (kBtu/sf/yr): 190
Heating Fuel(s): Propane
PM Grade: NA
Heating System(s): Hydronic
Cooling System(s): Limited (DX Coils)

Technology: **Roof-Mounted Solar PV**

No.	Criteria	Score (1-5 pts.)	Notes/Comments
1	Demonstrated technology	5	Well demonstrated technology with more efficient panel systems in development.
2	Expected service life/durability	3	Expected service life of collector panels is 15 years.
3	Geographical considerations	3.5	Limited solar availability in New England.
4	Energy demand	5	Relatively high grid electrical demand.
5	Facility/systems conditions	4	Adequate amount of south facing roof space.
6	Facility/systems compatibility	4	Roof is relatively new.
7	Permitting constraints	2.5	Utility grid connection permit is long-lead and may require a designed/engineered system.
8	Abutter concerns	4.5	Commercial/residential setting.
9	Capital investment	2.5	High capital cost.
10	O&M requirements	3	Increased roof maintenance and panel replacement.
11	Financial incentives	2.5	Limited incentives in NH.
12	Owner initiatives	4	Owner is open to renewable options.
13	CO2e emissions	4.5	Electrical source energy is NH has lower than average CO2 emissions.
14	Public awareness/education	5	High visibility.
	Total Score:	**53**	
	Total Possible Score:	**70**	
	Grade:	**76%**	

RENEWABLE ENERGY SCREENING WORKSHEET

Building/Facility:	Hollis Police Department	Location:	Hollis, NH
Gross Area (sf):	9,918	Date:	2/7/2012
Use Category:	Fire Station/Police Station	EUI (kBtu/sf/yr):	190
Heating Fuel(s):	Propane	PM Grade:	NA
Heating System(s):	Hydronic	Cooling System(s):	Limited (DX Coils)

Technology: **Ground-Mounted Solar PV**

No.	Criteria	Score (1-5 pts.)	Notes/Comments
1	Demonstrated technology	5	Well demonstrated technology with more efficient panel systems in development.
2	Expected service life/durability	3	Expected service life of collector panels is 15 years.
3	Geographical considerations	3.5	Limited solar availability in New England.
4	Energy demand	5	Relatively high grid electrical demand.
5	Facility/systems conditions	4	Modern facility and systems.
6	Facility/systems compatibility	3	Limited land.
7	Permitting constraints	2.5	Utility grid connection permit is long-lead and may require a designed/engineered system.
8	Abutter concerns	3.5	Residential / commercial setting.
9	Capital investment	3	High capital cost.
10	O&M requirements	3.5	Vegetative cutting and panel replacement.
11	Financial incentives	2.5	Limited incentives in NH.
12	Owner initiatives	4	Owner is open to renewable options.
13	CO2e emissions	4.5	Electrical source energy is NH has lower than average CO2 emissions.
14	Public awareness/education	5	High visibility.
	Total Score:	**52**	
	Total Possible Score:	**70**	
	Grade:	**74%**	

RENEWABLE ENERGY SCREENING WORKSHEET

Building/Facility:	Hollis Police Department	Location:	Hollis, NH
Gross Area (sf):	9,918	Date:	2/7/2012
Use Category:	Fire Station/Police Station	EUI (kBtu/sf/yr):	190
Heating Fuel(s):	Propane	PM Grade:	NA
Heating System(s):	Hydronic	Cooling System(s):	Limited (DX Coils)

Technology: **Solar Domestic Hot Water**

No.	Criteria	Score (1-5 pts.)	Notes/Comments
1	Demonstrated technology	4	Well demonstrated technology although system design and function can vary.
2	Expected service life/durability	3	Expected service life of heating panels is 15 years.
3	Geographical considerations	3.5	Limited solar availability in New England.
4	Energy demand	4.5	Expected DHW demand is low.
5	Facility/systems conditions	3	System could utilize the existing 40-gal storage tank.
6	Facility/systems compatibility	4	System could utilize the existing 40-gal storage tank.
7	Permitting constraints	5	No special permitting required.
8	Abutter concerns	5	Low visibility/impact.
9	Capital investment	2.5	High capital cost.
10	O&M requirements	4	Panel replacement and normal DHW system maintenance.
11	Financial incentives	2.5	Limited incentives in NH.
12	Owner initiatives	4	Owner is open to renewable options.
13	CO2e emissions	3.5	Low reduction of oil use based on DHW demand.
14	Public awareness/education	2.5	Limited public use.
	Total Score:	**51**	
	Total Possible Score:	**70**	
	Grade:	**73%**	

RENEWABLE ENERGY SCREENING WORKSHEET

Building/Facility:	Hollis Police Department	Location:	Hollis, NH
Gross Area (sf):	9,918	Date:	2/7/2012
Use Category:	Fire Station/Police Station	EUI (kBtu/sf/yr):	190
Heating Fuel(s):	Propane	PM Grade:	NA
Heating System(s):	Hydronic	Cooling System(s):	Limited (DX Coils)

Technology: **Solar Thermal HVAC**

No.	Criteria	Score (1-5 pts.)	Notes/Comments
1	Demonstrated technology	3.5	Well demonstrated technology but supply limited. More efficient than regular PV.
2	Expected service life/durability	4	Expected service life of system is 20-25 years.
3	Geographical considerations	3	Limited solar availability in New England.
4	Energy demand	4.5	Heating and cooling relatively high.
5	Facility/systems conditions	3	System could be tied in with existing mechanical equipment. Building is small.
6	Facility/systems compatibility	2	Considerable space required. Plumbing complex to protect against freezing.
7	Permitting constraints	2.5	Utility grid connection permit is long-lead and may require a designed/engineered system.
8	Abutter concerns	4	Light residential and commercial setting.
9	Capital investment	2	High capital cost.
10	O&M requirements	3	Vegetative cutting for ground mount, roof maintenance for roof mount, panel replacement.
11	Financial incentives	2.5	Limited incentives in NH.
12	Owner initiatives	4	Owner is open to renewable options.
13	CO2e emissions	4	Electrical source energy is NH has lower than average CO2 emissions.
14	Public awareness/education	5	High visibility depending on placement.
	Total Score:	**47**	
	Total Possible Score:	**70**	
	Grade:	**67%**	

RENEWABLE ENERGY SCREENING WORKSHEET

Building/Facility:	Hollis Police Department	Location:	Hollis, NH
Gross Area (sf):	9,918	Date:	2/7/2012
Use Category:	Fire Station/Police Station	EUI (kBtu/sf/yr):	190
Heating Fuel(s):	Propane	PM Grade:	NA
Heating System(s):	Hydronic	Cooling System(s):	Limited (DX Coils)

Technology: **Wind Turbine Generator**

No.	Criteria	Score (1-5 pts.)	Notes/Comments
1	Demonstrated technology	4	A well demonstrated technology but proper site selection is critical.
2	Expected service life/durability	3	Some turbine units have proven unreliable (design flaws). Selection of a reputable manufacturer is critical.
3	Geographical considerations	2	Limited wind energy but a feasibility study is required.
4	Energy demand	4	Electric energy consumption is high.
5	Facility/systems conditions	3	Modern systems
6	Facility/systems compatibility	3	Modern systems
7	Permitting constraints	2	Special permits are required depending on the height of the pole-mounted turbine. Roof-mounted turbines may be practical however they provide less energy.
8	Abutter concerns	2	Pole-mounted turbines have a large visual impact.
9	Capital investment	3.5	Moderate capital cost.
10	O&M requirements	3	Routine maintenance required. Units are subject to damage from elements.
11	Financial incentives	2.5	Limited incentives in NH.
12	Owner initiatives	2.5	Unknown / neutral.
13	CO2e emissions	4	Electrical source energy is NH has lower than average CO2 emissions.
14	Public awareness/education	5	High visibility.
	Total Score:	**43.5**	
	Total Possible Score:	**70**	
	Grade:	**62%**	

RENEWABLE ENERGY SCREENING WORKSHEET

Building/Facility: Hollis Police Department
Location: Hollis, NH
Gross Area (sf): 9,918
Date: 2/7/2012
Use Category: Fire Station/Police Station
EUI (kBtu/sf/yr): 190
Heating Fuel(s): Propane
PM Grade: NA
Heating System(s): Hydronic
Cooling System(s): Limited (DX Coils)

Technology: **Combined Heat & Power System**

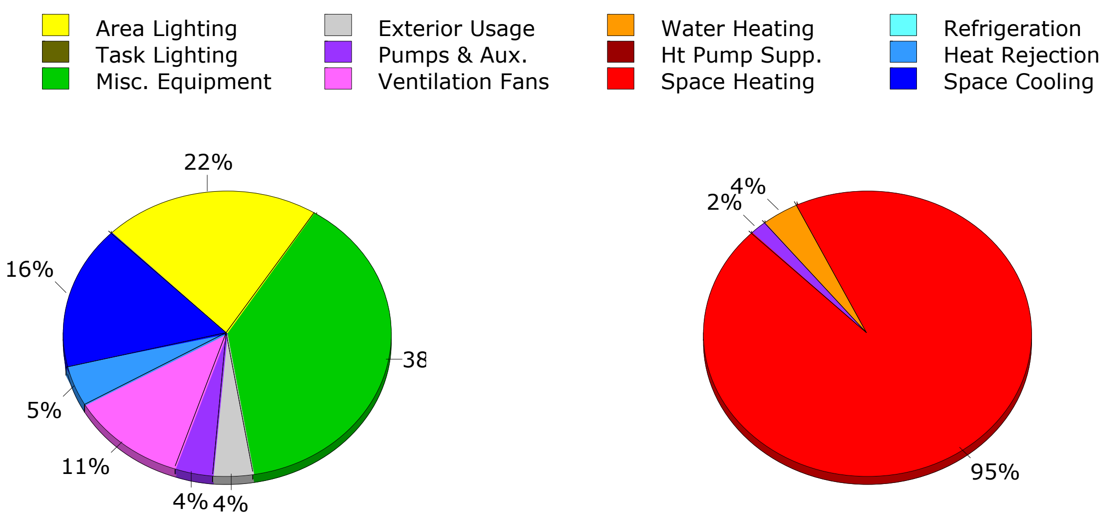
No.	Criteria	Score (1-5 pts.)	Notes/Comments
1	Demonstrated technology	5	Smaller CHP units are relatively new technology. Larger units (+75kW) are more reliable.
2	Expected service life/durability	2.5	Expected service life for a small CHP unit is 10 yrs. Large CHPs have a 20 yr. service life.
3	Geographical considerations	3	NH has a low electrical energy cost.
4	Energy demand	4	Electric energy consumption is relatively high.
5	Facility/systems conditions	4	Newer building .
6	Facility/systems compatibility	1	No renewables currently on site.
7	Permitting constraints	5	No special permits required.
8	Abutter concerns	5	Modern CHPs are relatively quiet and would be inside of the building.
9	Capital investment	2	High capital cost.
10	O&M requirements	2	Frequent maintenance required. Large system manufacturers require that they complete maintenance for warranty validation.
11	Financial incentives	2	Limited incentives.
12	Owner initiatives	4	Owner is open to renewable options
13	CO2e emissions	1	CHPs consume a large amount of fuel and emissions relative to the re-used energy.
14	Public awareness/education	2.5	Limited public use. Information could be displayed in the building so users are aware of CHP system. However CHP is not entirely renewable.
	Total Score:	**43**	
	Total Possible Score:	**70**	
	Grade:	**61%**	

APPENDIX I

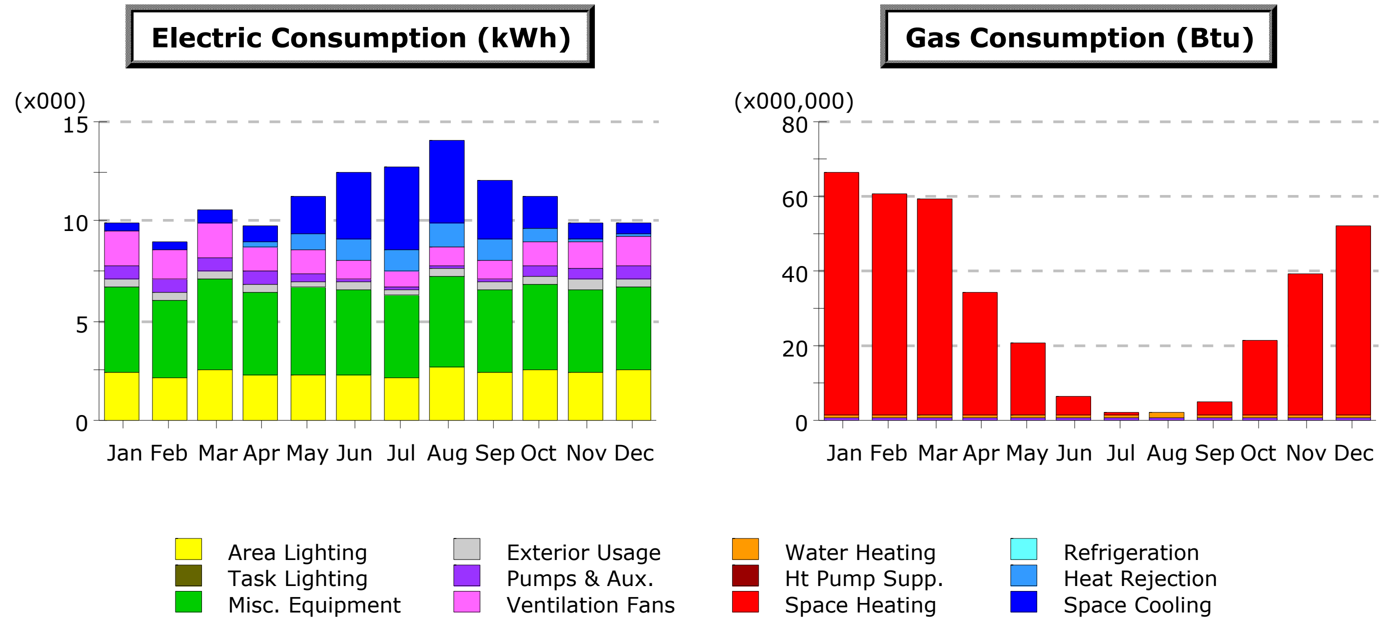
eQUEST® Energy Modeling

Annual Energy Consumption by Enduse

	Electricity kWh (x000)	Natural Gas MBtu	Steam Btu	Chilled Water Btu
Space Cool	21.84	-	-	-
Heat Reject.	6.24	-	-	-
Refrigeration	-	-	-	-
Space Heat	-	349.29	-	-
HP Supp.	-	-	-	-
Hot Water	-	13.46	-	-
Vent. Fans	15.26	-	-	-
Pumps & Aux.	4.98	6.66	-	-
Ext. Usage	5.15	-	-	-
Misc. Equip.	50.61	-	-	-
Task Lights	-	-	-	-
Area Lights	28.92	-	-	-
Total	133.00	369.40	-	-



Electricity **Natural Gas**



Electric Consumption (kWh x000)

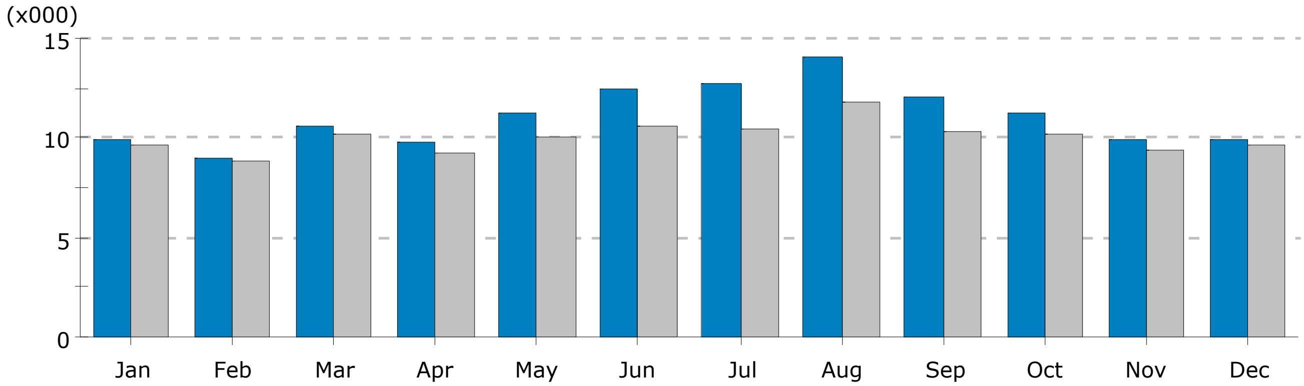
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	0.44	0.42	0.66	0.88	1.94	3.23	4.17	4.16	3.01	1.59	0.77	0.60	21.84
Heat Reject.	-	-	0.09	0.20	0.80	1.08	1.04	1.17	0.99	0.69	0.12	0.07	6.24
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	-	-	-	-	-	-	-	-	-	-	-	-	-
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	1.66	1.55	1.70	1.26	1.20	1.04	0.90	1.04	0.93	1.17	1.34	1.47	15.26
Pumps & Aux.	0.66	0.60	0.65	0.60	0.37	0.16	0.01	0.04	0.17	0.48	0.61	0.65	4.98
Ext. Usage	0.52	0.40	0.44	0.42	0.30	0.29	0.30	0.49	0.48	0.49	0.50	0.52	5.15
Misc. Equip.	4.16	3.86	4.50	4.10	4.39	4.32	4.16	4.50	4.09	4.28	4.09	4.16	50.61
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	2.48	2.20	2.59	2.34	2.31	2.29	2.16	2.68	2.42	2.52	2.45	2.48	28.92
Total	9.91	9.03	10.63	9.80	11.30	12.40	12.74	14.07	12.08	11.21	9.88	9.94	133.00

Gas Consumption (Btu x000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	64.66	59.22	57.74	32.94	18.62	4.99	0.14	0.42	3.10	19.39	37.65	50.42	349.29
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	1.09	1.03	1.23	1.08	1.18	1.17	1.08	1.22	1.08	1.13	1.08	1.09	13.46
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	0.53	0.48	0.54	0.54	0.58	0.57	0.59	0.59	0.57	0.58	0.54	0.55	6.66
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	66.28	60.72	59.51	34.56	20.38	6.74	1.81	2.24	4.75	21.10	39.26	52.05	369.40

BASELINE VS REPLACEMENT OF AC UNITS

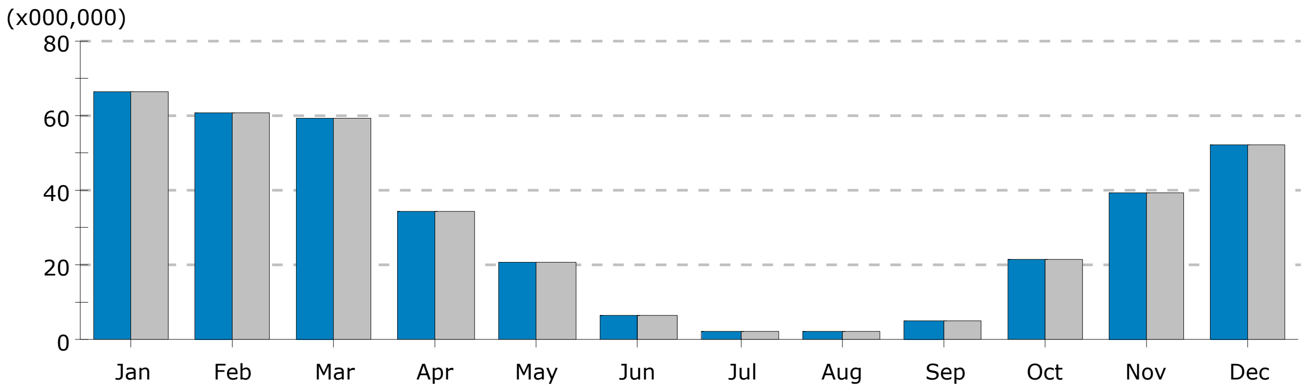
Electric Consumption (kWh)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Run 1.	9.91	9.03	10.63	9.80	11.30	12.40	12.74	14.07	12.08	11.21	9.88	9.94	133.00
Run 2.	9.66	8.79	10.23	9.26	10.09	10.54	10.38	11.72	10.38	10.21	9.41	9.59	120.26
Run 3.													
Run 4.													
Run 5.													

1. Hollis Police Department Baseline - Baseline Design (02/09/12 @ 10:54)
2. Hollis Police Department Baseline - 4 (02/09/12 @ 08:48)

Gas Consumption (Btu)

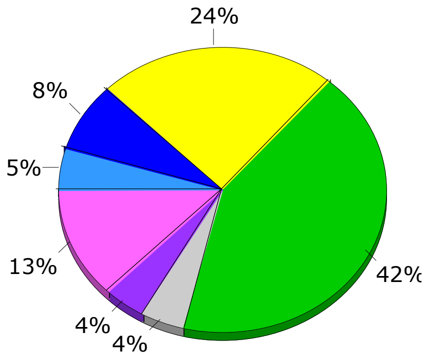


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Run 1.	66.28	60.72	59.51	34.56	20.38	6.74	1.81	2.24	4.75	21.10	39.26	52.05	369.40
Run 2.	66.28	60.72	59.51	34.56	20.38	6.74	1.81	2.24	4.75	21.10	39.26	52.05	369.40
Run 3.													
Run 4.													
Run 5.													

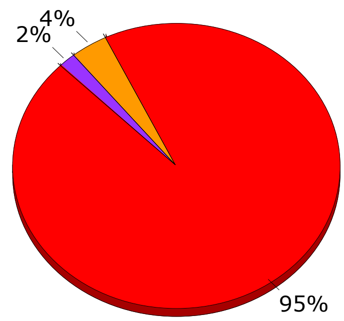
Annual Energy Consumption by Enduse

	Electricity kWh (x000)	Natural Gas MBtu	Steam Btu	Chilled Water Btu
Space Cool	9.56	-	-	-
Heat Reject.	5.78	-	-	-
Refrigeration	-	-	-	-
Space Heat	-	349.29	-	-
HP Supp.	-	-	-	-
Hot Water	-	13.46	-	-
Vent. Fans	15.26	-	-	-
Pumps & Aux.	4.98	6.66	-	-
Ext. Usage	5.15	-	-	-
Misc. Equip.	50.61	-	-	-
Task Lights	-	-	-	-
Area Lights	28.92	-	-	-
Total	120.26	369.40	-	-

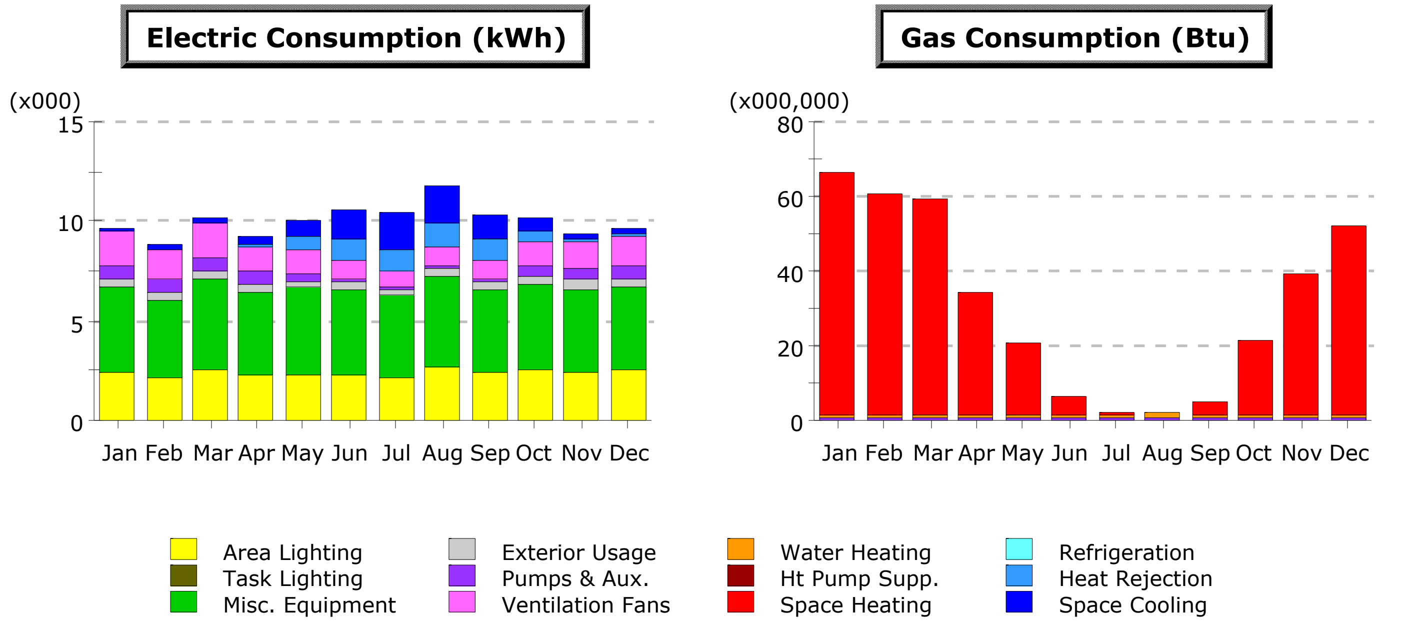
Area Lighting
Task Lighting
Misc. Equipment
Exterior Usage
Pumps & Aux.
Ventilation Fans
Water Heating
Ht Pump Supp.
Space Heating
Refrigeration
Heat Rejection
Space Cooling



Electricity



Natural Gas



Electric Consumption (kWh x000)

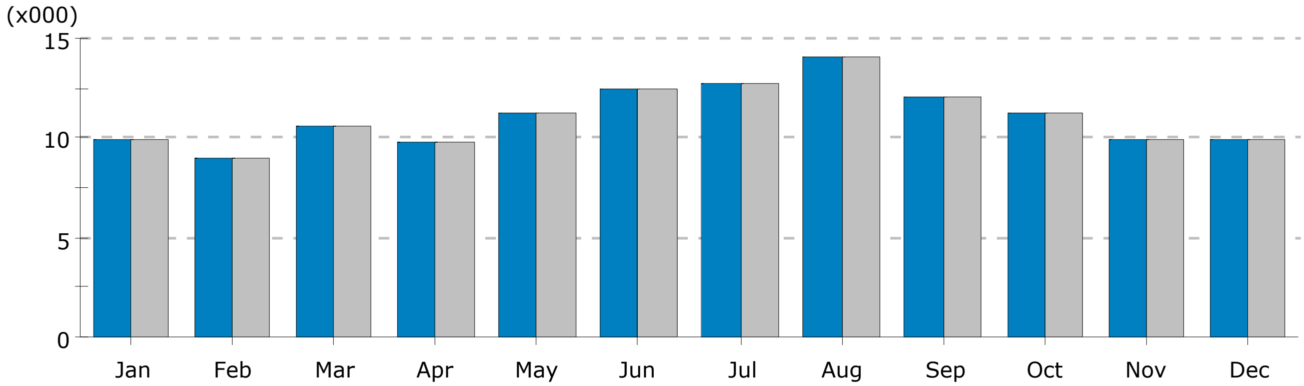
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	0.19	0.18	0.29	0.38	0.84	1.42	1.83	1.83	1.32	0.69	0.33	0.26	9.56
Heat Reject.	-	-	0.06	0.16	0.68	1.03	1.01	1.14	0.97	0.58	0.09	0.05	5.78
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	-	-	-	-	-	-	-	-	-	-	-	-	-
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	1.66	1.55	1.70	1.26	1.20	1.04	0.90	1.04	0.93	1.17	1.34	1.47	15.26
Pumps & Aux.	0.66	0.60	0.65	0.60	0.37	0.16	0.01	0.04	0.17	0.48	0.61	0.65	4.98
Ext. Usage	0.52	0.40	0.44	0.42	0.30	0.29	0.30	0.49	0.48	0.49	0.50	0.52	5.15
Misc. Equip.	4.16	3.86	4.50	4.10	4.39	4.32	4.16	4.50	4.09	4.28	4.09	4.16	50.61
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	2.48	2.20	2.59	2.34	2.31	2.29	2.16	2.68	2.42	2.52	2.45	2.48	28.92
Total	9.66	8.79	10.23	9.26	10.09	10.54	10.38	11.72	10.38	10.21	9.41	9.59	120.26

Gas Consumption (Btu x000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	64.66	59.22	57.74	32.94	18.62	4.99	0.14	0.42	3.10	19.39	37.65	50.42	349.29
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	1.09	1.03	1.23	1.08	1.18	1.17	1.08	1.22	1.08	1.13	1.08	1.09	13.46
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	0.53	0.48	0.54	0.54	0.58	0.57	0.59	0.59	0.57	0.58	0.54	0.55	6.66
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	66.28	60.72	59.51	34.56	20.38	6.74	1.81	2.24	4.75	21.10	39.26	52.05	369.40

BASELINE VS TANKLESS HOT WATER HEATER

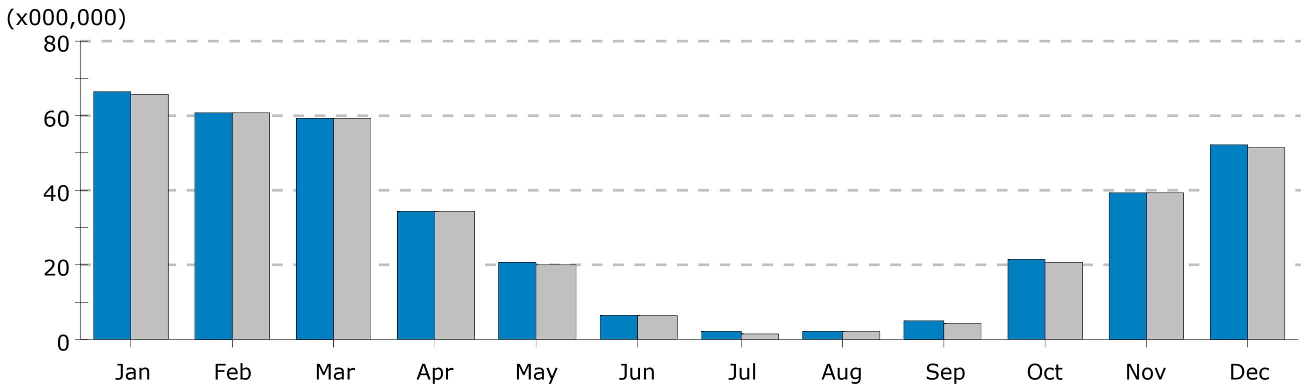
Electric Consumption (kWh)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Run 1.	9.91	9.03	10.63	9.80	11.30	12.40	12.74	14.07	12.08	11.21	9.88	9.94	133.00
Run 2.	9.91	9.03	10.63	9.80	11.30	12.40	12.74	14.07	12.08	11.21	9.88	9.94	133.00
Run 3.													
Run 4.													
Run 5.													

1. Hollis Police Department Baseline - Baseline Design (02/09/12 @ 10:54)
2. Hollis Police Department Baseline - 1 (02/09/12 @ 08:39)

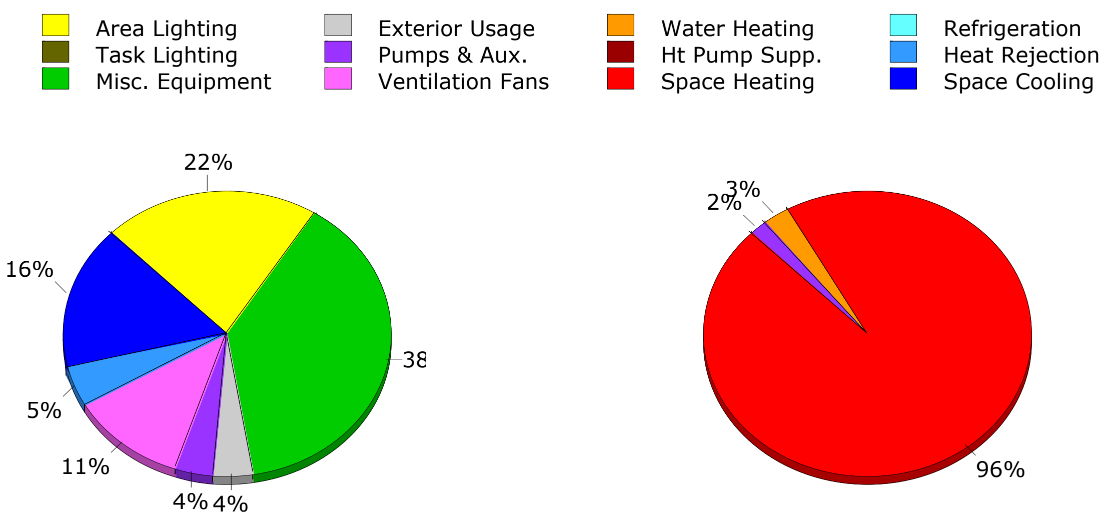
Gas Consumption (Btu)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Run 1.	66.28	60.72	59.51	34.56	20.38	6.74	1.81	2.24	4.75	21.10	39.26	52.05	369.40
Run 2.	65.96	60.42	59.16	34.25	20.04	6.40	1.50	1.89	4.45	20.77	38.95	51.73	365.53
Run 3.													
Run 4.													
Run 5.													

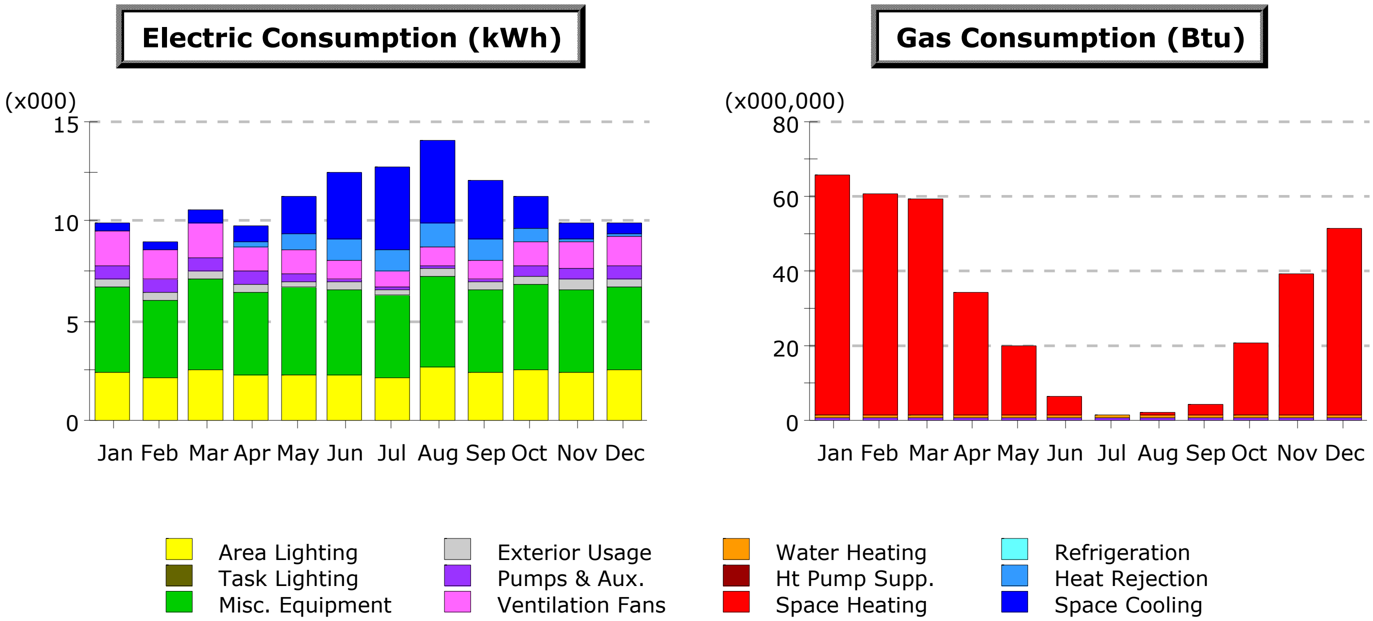
Annual Energy Consumption by Enduse

	Electricity kWh (x000)	Natural Gas MBtu	Steam Btu	Chilled Water Btu
Space Cool	21.84	-	-	-
Heat Reject.	6.24	-	-	-
Refrigeration	-	-	-	-
Space Heat	-	349.29	-	-
HP Supp.	-	-	-	-
Hot Water	-	9.58	-	-
Vent. Fans	15.26	-	-	-
Pumps & Aux.	4.98	6.66	-	-
Ext. Usage	5.15	-	-	-
Misc. Equip.	50.61	-	-	-
Task Lights	-	-	-	-
Area Lights	28.92	-	-	-
Total	133.00	365.53	-	-



Electricity

Natural Gas



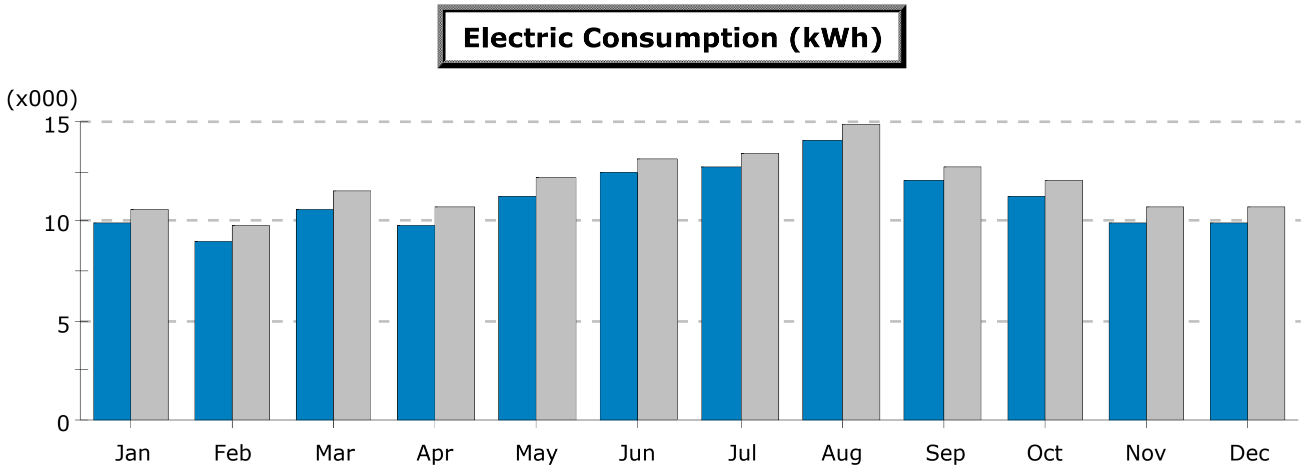
Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	0.44	0.42	0.66	0.88	1.94	3.23	4.17	4.16	3.01	1.59	0.77	0.60	21.84
Heat Reject.	-	-	0.09	0.20	0.80	1.08	1.04	1.17	0.99	0.69	0.12	0.07	6.24
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	-	-	-	-	-	-	-	-	-	-	-	-	-
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	1.66	1.55	1.70	1.26	1.20	1.04	0.90	1.04	0.93	1.17	1.34	1.47	15.26
Pumps & Aux.	0.66	0.60	0.65	0.60	0.37	0.16	0.01	0.04	0.17	0.48	0.61	0.65	4.98
Ext. Usage	0.52	0.40	0.44	0.42	0.30	0.29	0.30	0.49	0.48	0.49	0.50	0.52	5.15
Misc. Equip.	4.16	3.86	4.50	4.10	4.39	4.32	4.16	4.50	4.09	4.28	4.09	4.16	50.61
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	2.48	2.20	2.59	2.34	2.31	2.29	2.16	2.68	2.42	2.52	2.45	2.48	28.92
Total	9.91	9.03	10.63	9.80	11.30	12.40	12.74	14.07	12.08	11.21	9.88	9.94	133.00

Gas Consumption (Btu x000,000)

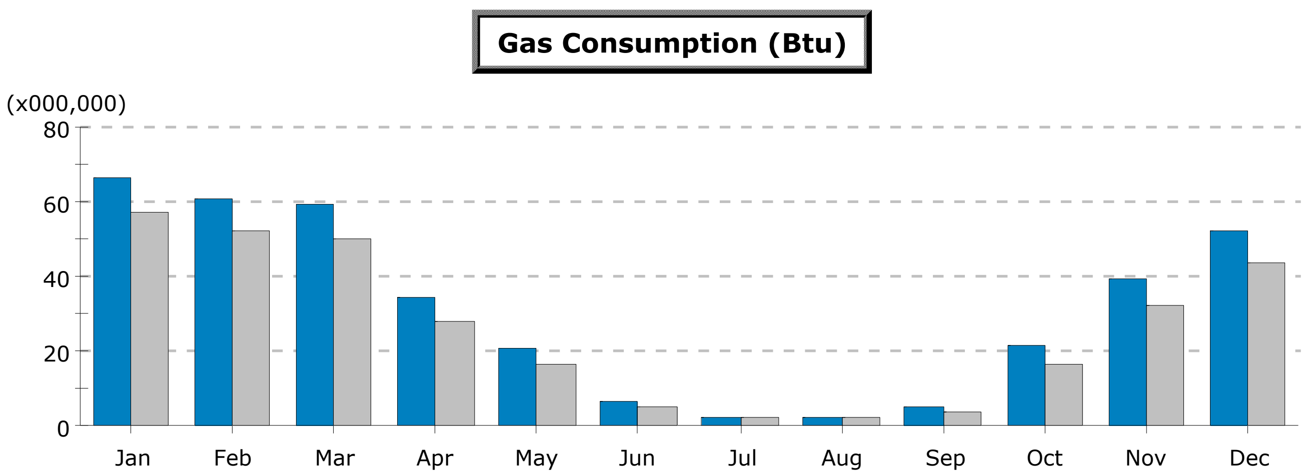
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	64.66	59.22	57.74	32.94	18.62	4.99	0.14	0.42	3.10	19.39	37.65	50.42	349.29
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	0.77	0.73	0.88	0.77	0.84	0.84	0.77	0.88	0.77	0.81	0.77	0.77	9.58
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	0.53	0.48	0.54	0.54	0.58	0.57	0.59	0.59	0.57	0.58	0.54	0.55	6.66
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	65.96	60.42	59.16	34.25	20.04	6.40	1.50	1.89	4.45	20.77	38.95	51.73	365.53

BASELINE VS HEAT RECOVERY



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Run 1.	9.91	9.03	10.63	9.80	11.30	12.40	12.74	14.07	12.08	11.21	9.88	9.94	133.00
Run 2.	10.63	9.73	11.56	10.70	12.14	13.18	13.37	14.80	12.76	12.07	10.70	10.73	142.39
Run 3.													
Run 4.													
Run 5.													

1. Hollis Police Department Baseline - Baseline Design (02/09/12 @ 10:54)
2. Hollis Police Department Baseline - 3 (02/09/12 @ 10:19)

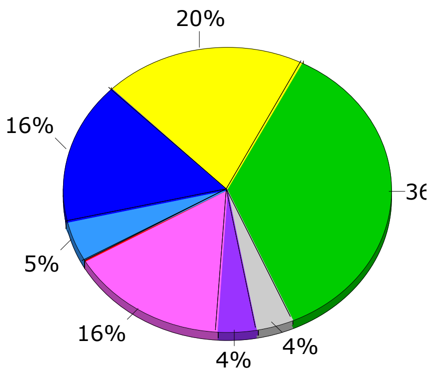


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Run 1.	66.28	60.72	59.51	34.56	20.38	6.74	1.81	2.24	4.75	21.10	39.26	52.05	369.40
Run 2.	57.22	52.22	49.97	28.07	16.18	5.23	1.81	2.16	3.86	16.60	32.29	43.75	309.35
Run 3.													
Run 4.													
Run 5.													

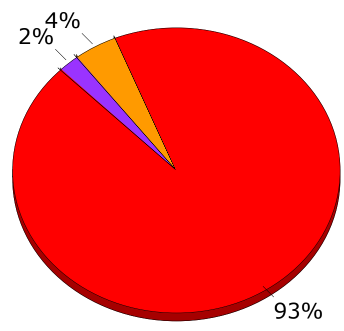
Annual Energy Consumption by Enduse

	Electricity kWh (x000)	Natural Gas MBtu	Steam Btu	Chilled Water Btu
Space Cool	23.29	-	-	-
Heat Reject.	6.54	-	-	-
Refrigeration	-	-	-	-
Space Heat	0.23	289.24	-	-
HP Supp.	-	-	-	-
Hot Water	-	13.46	-	-
Vent. Fans	22.19	-	-	-
Pumps & Aux.	5.47	6.66	-	-
Ext. Usage	5.15	-	-	-
Misc. Equip.	50.61	-	-	-
Task Lights	-	-	-	-
Area Lights	28.92	-	-	-
Total	142.39	309.35	-	-

Area Lighting | Exterior Usage | Water Heating | Refrigeration
Task Lighting | Pumps & Aux. | Ht Pump Supp. | Heat Rejection
Misc. Equipment | Ventilation Fans | Space Heating | Space Cooling

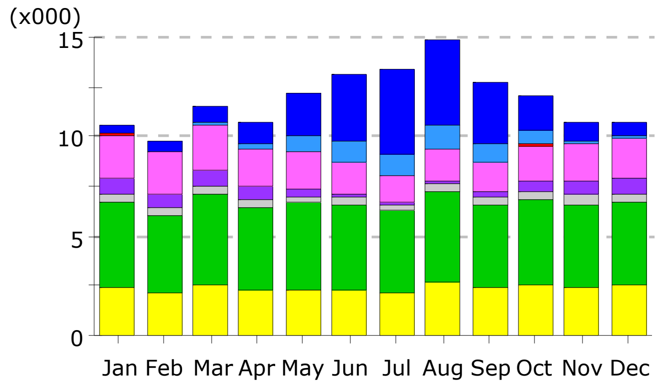


Electricity

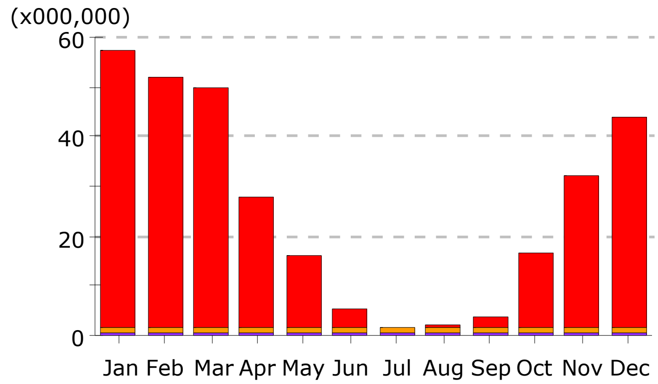


Natural Gas

Electric Consumption (kWh)



Gas Consumption (Btu)



Area Lighting
Task Lighting
Misc. Equipment
Exterior Usage
Pumps & Aux.
Ventilation Fans
Water Heating
Ht Pump Supp.
Space Heating
Refrigeration
Heat Rejection
Space Cooling

Electric Consumption (kWh x000)

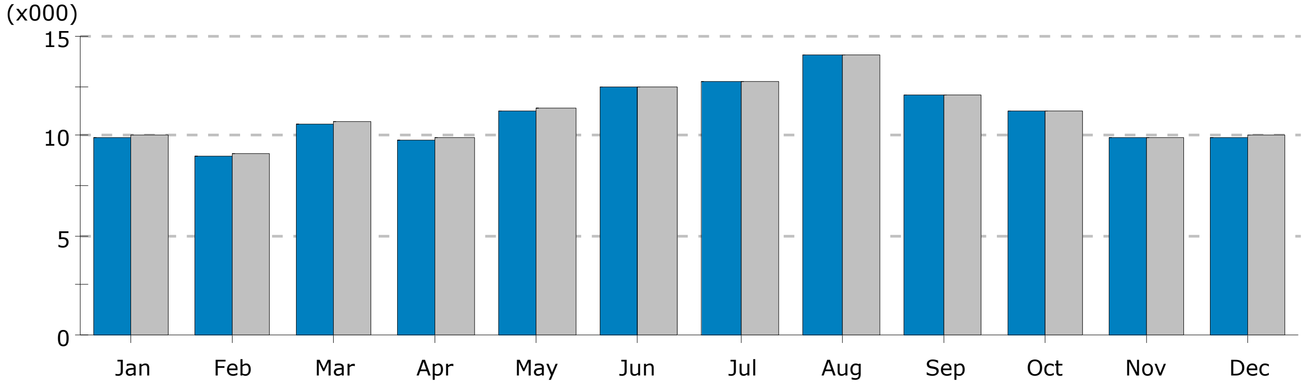
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	0.50	0.50	0.82	1.03	2.09	3.36	4.24	4.25	3.10	1.76	0.92	0.72	23.29
Heat Reject.	-	-	0.12	0.32	0.82	1.08	1.05	1.17	0.99	0.74	0.17	0.09	6.54
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	0.03	0.03	0.03	0.03	0.02	0.01	-	0.00	0.00	0.02	0.03	0.03	0.23
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	2.23	2.09	2.35	1.81	1.80	1.65	1.45	1.66	1.49	1.74	1.89	2.03	22.19
Pumps & Aux.	0.72	0.65	0.71	0.65	0.42	0.18	0.01	0.04	0.19	0.53	0.66	0.71	5.47
Ext. Usage	0.52	0.40	0.44	0.42	0.30	0.29	0.30	0.49	0.48	0.49	0.50	0.52	5.15
Misc. Equip.	4.16	3.86	4.50	4.10	4.39	4.32	4.16	4.50	4.09	4.28	4.09	4.16	50.61
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	2.48	2.20	2.59	2.34	2.31	2.29	2.16	2.68	2.42	2.52	2.45	2.48	28.92
Total	10.63	9.73	11.56	10.70	12.14	13.18	13.37	14.80	12.76	12.07	10.70	10.73	142.39

Gas Consumption (Btu x000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	55.61	50.71	48.20	26.44	14.42	3.49	0.14	0.34	2.21	14.90	30.67	42.12	289.24
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	1.09	1.03	1.23	1.08	1.18	1.17	1.08	1.22	1.08	1.13	1.08	1.09	13.46
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	0.53	0.48	0.54	0.54	0.58	0.57	0.59	0.59	0.57	0.58	0.54	0.55	6.66
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	57.22	52.22	49.97	28.07	16.18	5.23	1.81	2.16	3.86	16.60	32.29	43.75	309.35

BASELINE VS BOILER REPLACEMENT

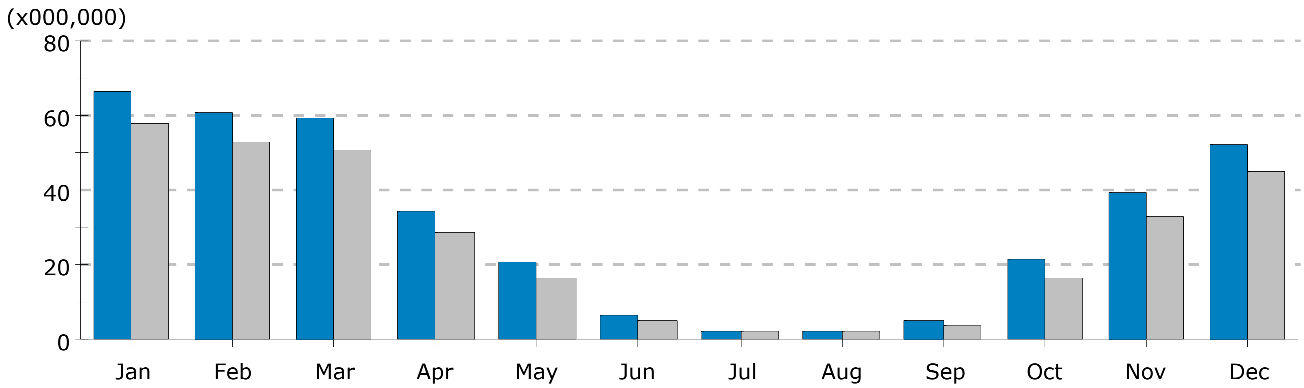
Electric Consumption (kWh)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Run 1.	9.91	9.03	10.63	9.80	11.30	12.40	12.74	14.07	12.08	11.21	9.88	9.94	133.00
Run 2.	10.00	9.12	10.73	9.89	11.36	12.42	12.74	14.08	12.11	11.28	9.96	10.03	133.73
Run 3.													
Run 4.													
Run 5.													

1. Hollis Police Department Baseline - Baseline Design (02/09/12 @ 10:54)
2. Hollis Police Department Baseline - 2 (01/26/12 @ 15:00)

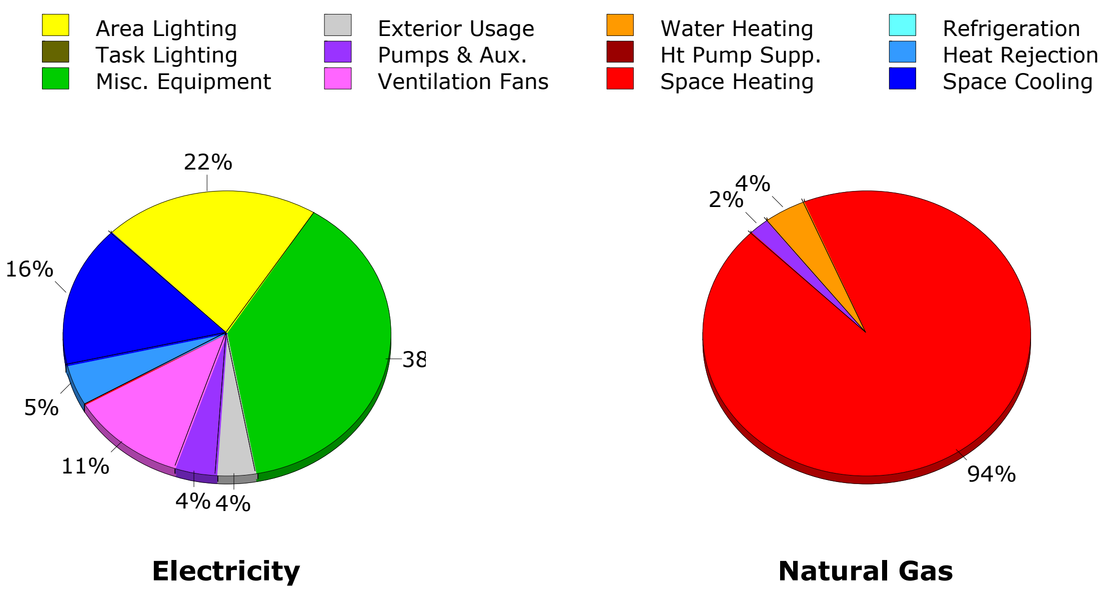
Gas Consumption (Btu)

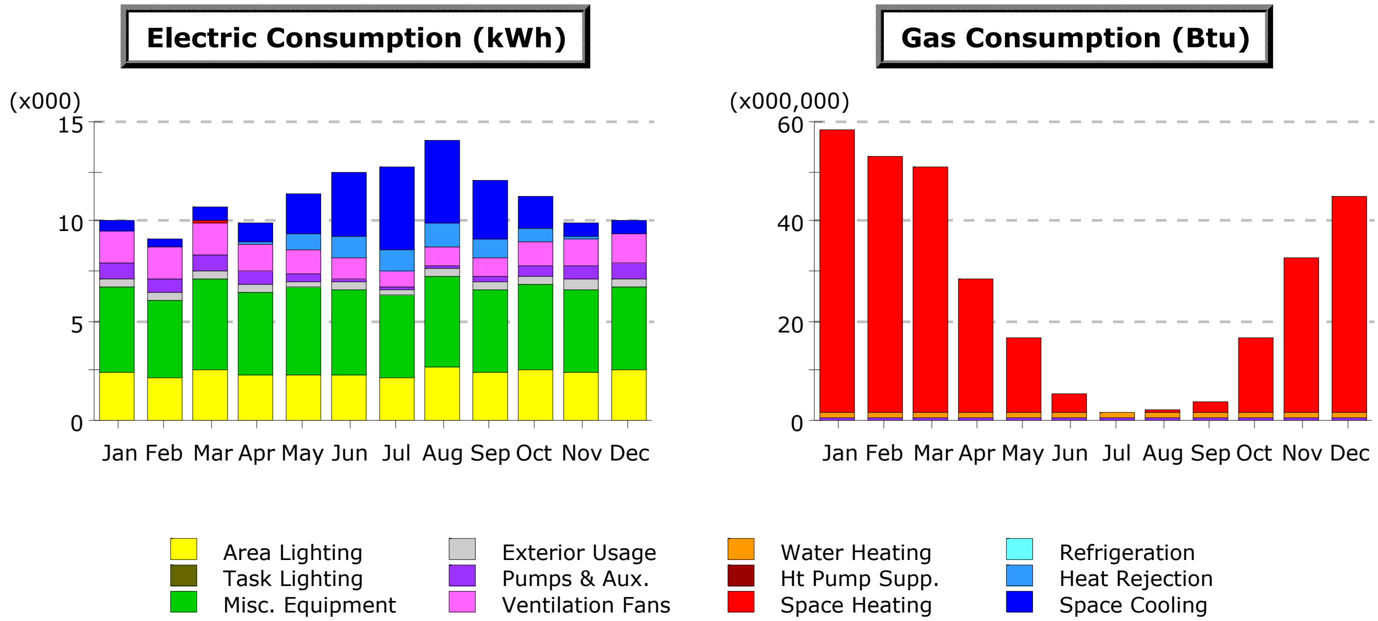


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Run 1.	66.28	60.72	59.51	34.56	20.38	6.74	1.81	2.24	4.75	21.10	39.26	52.05	369.40
Run 2.	58.18	53.07	50.97	28.56	16.37	5.24	1.81	2.16	3.87	16.78	32.92	44.74	314.67
Run 3.													
Run 4.													
Run 5.													

Annual Energy Consumption by Enduse

	Electricity kWh (x000)	Natural Gas MBtu	Steam Btu	Chilled Water Btu
Space Cool	21.84	-	-	-
Heat Reject.	6.24	-	-	-
Refrigeration	-	-	-	-
Space Heat	0.23	294.56	-	-
HP Supp.	-	-	-	-
Hot Water	-	13.46	-	-
Vent. Fans	15.26	-	-	-
Pumps & Aux.	5.48	6.66	-	-
Ext. Usage	5.15	-	-	-
Misc. Equip.	50.61	-	-	-
Task Lights	-	-	-	-
Area Lights	28.92	-	-	-
Total	133.73	314.68	-	-





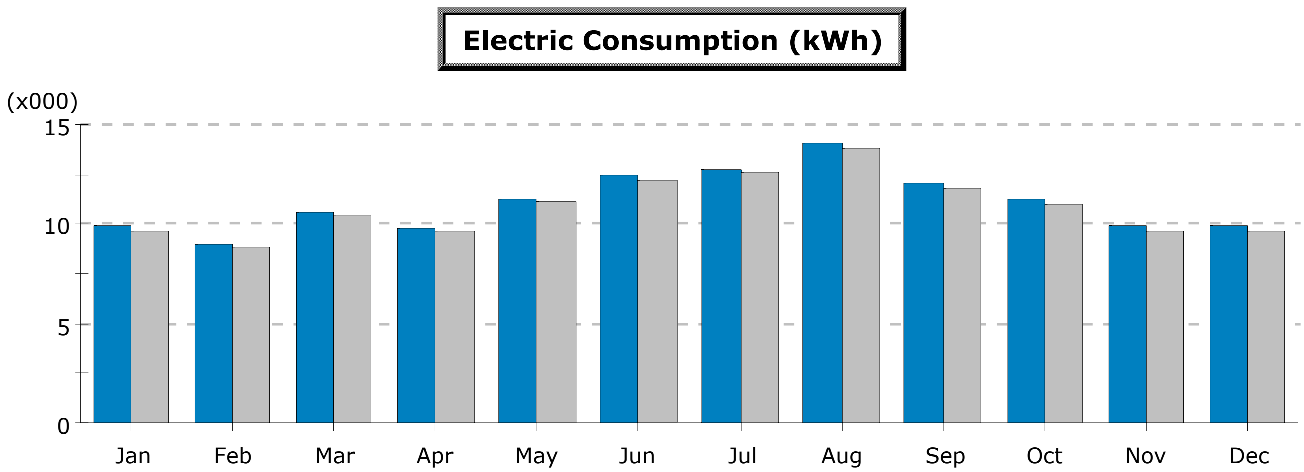
Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	0.44	0.42	0.66	0.88	1.94	3.23	4.17	4.16	3.01	1.59	0.77	0.60	21.84
Heat Reject.	-	-	0.09	0.20	0.80	1.08	1.04	1.17	0.99	0.69	0.12	0.07	6.24
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	0.03	0.03	0.04	0.03	0.02	0.01	-	0.00	0.00	0.02	0.03	0.03	0.23
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	1.66	1.55	1.70	1.26	1.20	1.04	0.90	1.04	0.93	1.17	1.34	1.47	15.26
Pumps & Aux.	0.72	0.65	0.71	0.66	0.41	0.18	0.01	0.04	0.19	0.53	0.67	0.71	5.48
Ext. Usage	0.52	0.40	0.44	0.42	0.30	0.29	0.30	0.49	0.48	0.49	0.50	0.52	5.15
Misc. Equip.	4.16	3.86	4.50	4.10	4.39	4.32	4.16	4.50	4.09	4.28	4.09	4.16	50.61
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	2.48	2.20	2.59	2.34	2.31	2.29	2.16	2.68	2.42	2.52	2.45	2.48	28.92
Total	10.00	9.12	10.73	9.89	11.36	12.42	12.74	14.08	12.11	11.28	9.96	10.03	133.73

Gas Consumption (Btu x000,000)

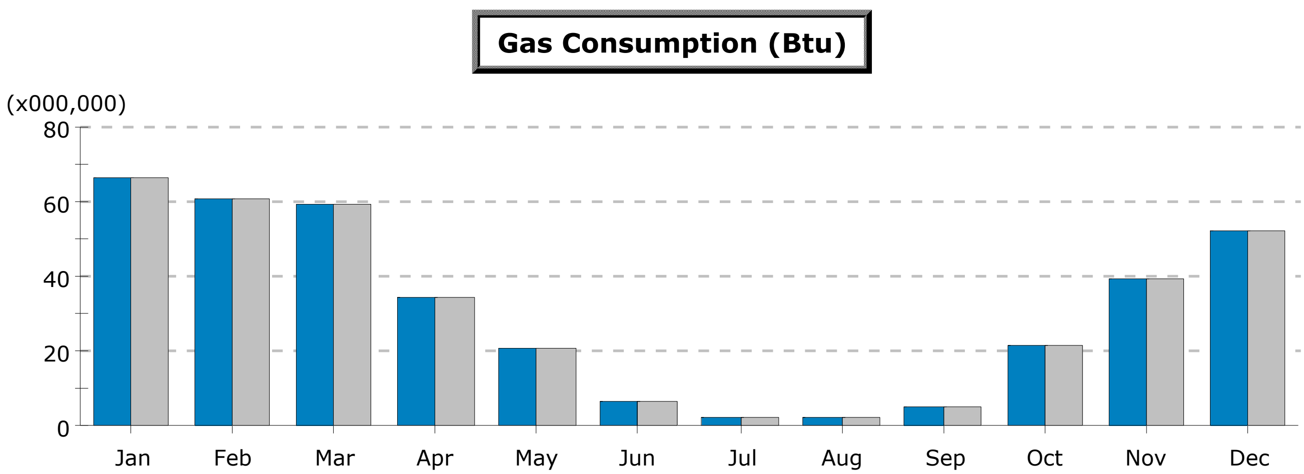
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	56.56	51.56	49.20	26.94	14.61	3.49	0.14	0.34	2.22	15.08	31.30	43.10	294.56
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	1.09	1.03	1.23	1.08	1.18	1.17	1.08	1.22	1.08	1.13	1.08	1.09	13.46
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	0.53	0.48	0.54	0.54	0.58	0.57	0.59	0.59	0.57	0.58	0.54	0.55	6.66
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	58.18	53.07	50.97	28.56	16.37	5.24	1.81	2.16	3.87	16.78	32.92	44.74	314.67

BASELINE VS LED EXTERIOR LIGHTING



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Run 1.	9.91	9.03	10.63	9.80	11.30	12.40	12.74	14.07	12.08	11.21	9.88	9.94	133.00
Run 2.	9.65	8.83	10.41	9.59	11.15	12.25	12.59	13.82	11.84	10.96	9.62	9.68	130.40
Run 3.													
Run 4.													
Run 5.													

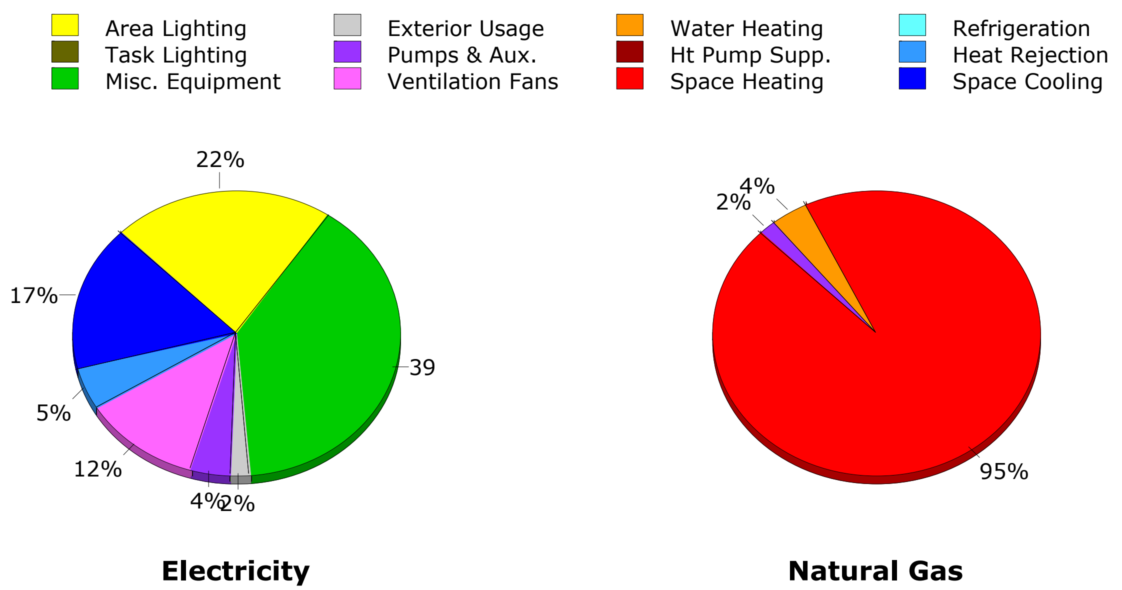
1. Hollis Police Department Baseline - Baseline Design (02/09/12 @ 10:54)
2. Hollis Police Department Baseline - 5 (02/09/12 @ 08:49)

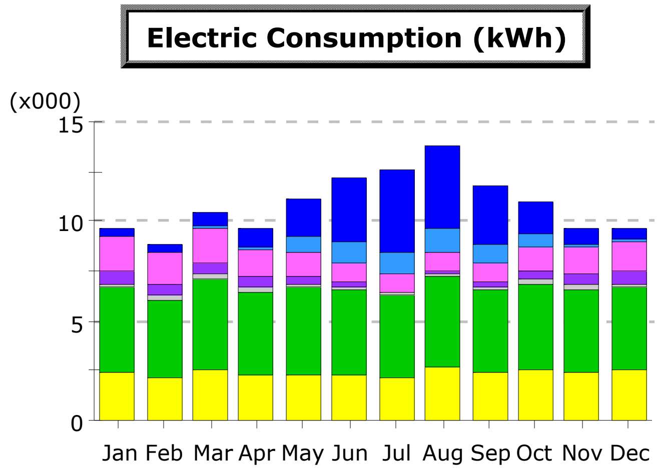


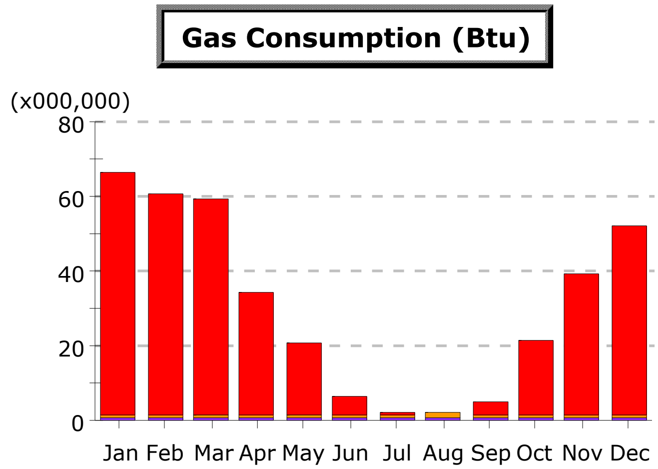
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Run 1.	66.28	60.72	59.51	34.56	20.38	6.74	1.81	2.24	4.75	21.10	39.26	52.05	369.40
Run 2.	66.28	60.72	59.51	34.56	20.38	6.74	1.81	2.24	4.75	21.10	39.26	52.05	369.40
Run 3.													
Run 4.													
Run 5.													

Annual Energy Consumption by Enduse

	Electricity kWh (x000)	Natural Gas MBtu	Steam Btu	Chilled Water Btu
Space Cool	21.84	-	-	-
Heat Reject.	6.24	-	-	-
Refrigeration	-	-	-	-
Space Heat	-	349.29	-	-
HP Supp.	-	-	-	-
Hot Water	-	13.46	-	-
Vent. Fans	15.26	-	-	-
Pumps & Aux.	4.98	6.66	-	-
Ext. Usage	2.55	-	-	-
Misc. Equip.	50.61	-	-	-
Task Lights	-	-	-	-
Area Lights	28.92	-	-	-
Total	130.40	369.40	-	-







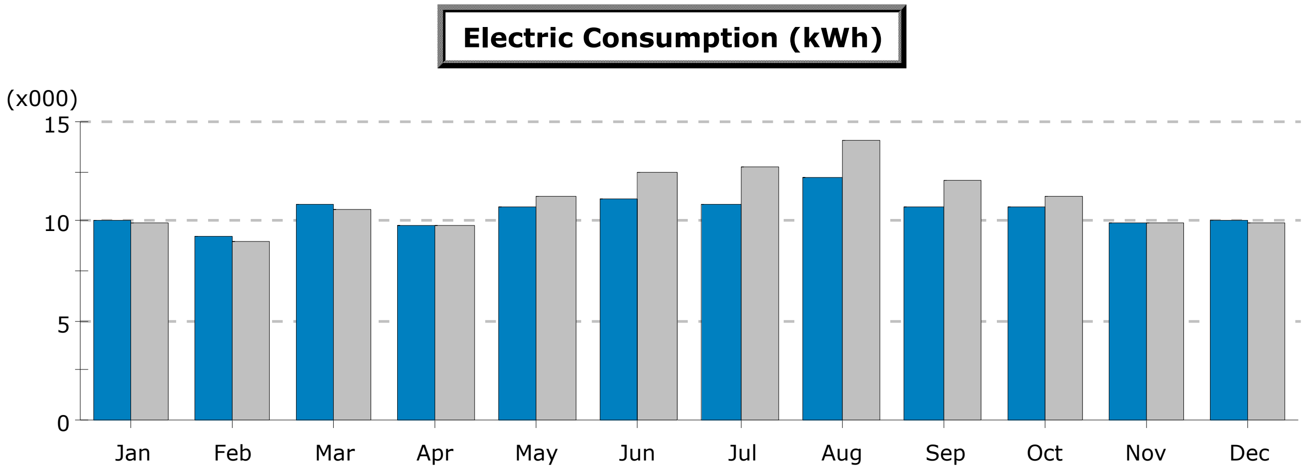
Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	0.44	0.42	0.66	0.88	1.94	3.23	4.17	4.16	3.01	1.59	0.77	0.60	21.84
Heat Reject.	-	-	0.09	0.20	0.80	1.08	1.04	1.17	0.99	0.69	0.12	0.07	6.24
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	-	-	-	-	-	-	-	-	-	-	-	-	-
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	1.66	1.55	1.70	1.26	1.20	1.04	0.90	1.04	0.93	1.17	1.34	1.47	15.26
Pumps & Aux.	0.66	0.60	0.65	0.60	0.37	0.16	0.01	0.04	0.17	0.48	0.61	0.65	4.98
Ext. Usage	0.26	0.20	0.22	0.21	0.15	0.15	0.15	0.24	0.24	0.24	0.25	0.26	2.55
Misc. Equip.	4.16	3.86	4.50	4.10	4.39	4.32	4.16	4.50	4.09	4.28	4.09	4.16	50.61
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	2.48	2.20	2.59	2.34	2.31	2.29	2.16	2.68	2.42	2.52	2.45	2.48	28.92
Total	9.65	8.83	10.41	9.59	11.15	12.25	12.59	13.82	11.84	10.96	9.62	9.68	130.40

Gas Consumption (Btu x000,000)

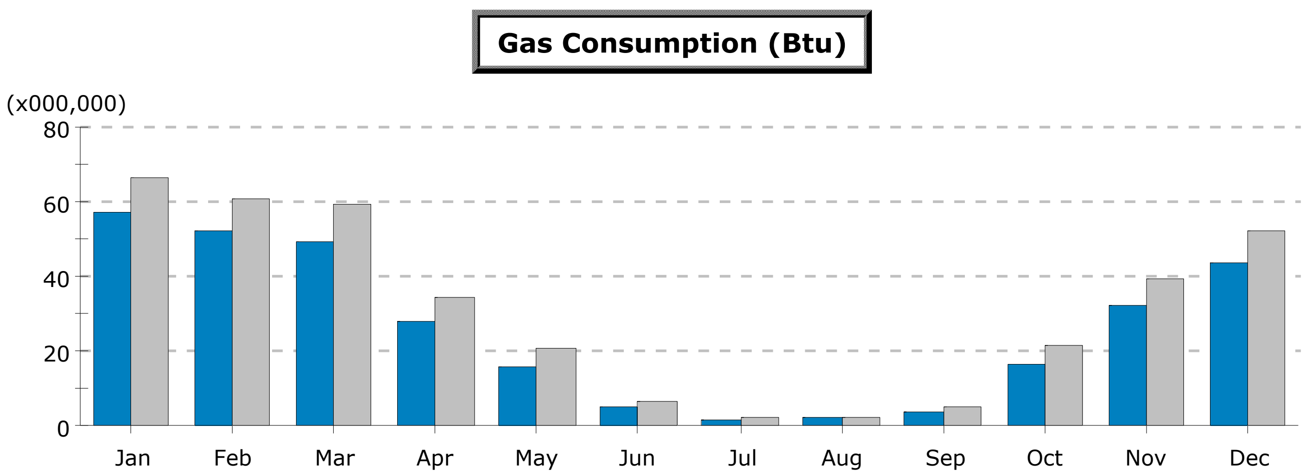
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	64.66	59.22	57.74	32.94	18.62	4.99	0.14	0.42	3.10	19.39	37.65	50.42	349.29
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	1.09	1.03	1.23	1.08	1.18	1.17	1.08	1.22	1.08	1.13	1.08	1.09	13.46
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	0.53	0.48	0.54	0.54	0.58	0.57	0.59	0.59	0.57	0.58	0.54	0.55	6.66
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	66.28	60.72	59.51	34.56	20.38	6.74	1.81	2.24	4.75	21.10	39.26	52.05	369.40

BASELINE VS ALL EEM IN PARAMETIC RUN



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Run 1.	10.09	9.25	10.83	9.78	10.71	11.11	10.82	12.15	10.77	10.72	9.87	10.04	126.16
Run 2.	9.91	9.03	10.63	9.80	11.30	12.40	12.74	14.07	12.08	11.21	9.88	9.94	133.00
Run 3.													
Run 4.													
Run 5.													

1. Hollis Police Department Baseline - 5 (02/09/12 @ 11:05)
2. Hollis Police Department Baseline - Baseline Design (02/09/12 @ 11:04)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Run 1.	56.91	51.92	49.61	27.76	15.84	4.90	1.50	1.81	3.55	16.28	31.98	43.44	305.48
Run 2.	66.28	60.72	59.51	34.56	20.38	6.74	1.81	2.24	4.75	21.10	39.26	52.05	369.40
Run 3.													
Run 4.													
Run 5.													

APPENDIX J

Cost Estimates

BUDGETARY COST ESTIMATE

Facility: **Hollis Police Department**

Date: **5/30/2012**

EEM	Design + Engineering	Installed Cost				Construction Management	Contingency (15%)	Total Investment
		Pricing Unit	Price	Qty	Subtotal			
Install occupancy sensing (ultrasonic) lighting controls in offices, common spaces, and corridors.	$ 100	EA	$ 800	1	**$ 858**	$ 86	$ 157	**$ 1,200**
Replace existing domestic hot water heater with mini-tank LP-fired hot water heater, OR, a condensing tank unit.	$ 300	EA	$ 834	1	**$ 834**	$ 83	$ 183	**$ 1,400**
Replace exterior lighting fixtures with dark-sky 20w LED units (15)	$ 300	EA	$ 4,945	1	**$ 4,945**	$ 495	$ 861	**$ 6,600**
Replace nine (9) air conditioning units with energy efficient units	$ 500	EA	$ 16,937	1	**$ 16,937**	$ 1,694	$ 2,870	**$ 22,000**
Replace existing boiler with ultra-efficient condensing gas-fired modulating boiler. Replace circulation pumps with VFD NEMA rated models and insulate all hydronic piping.	$ 1,200	EA	$ 27,367	1	**$ 27,367**	$ 2,737	$ 4,696	**$ 35,999**
Replace existing boiler, air-conditioning units, and AHUs with a high-efficiency electric air-source heat pump system with energy recovery.	$ 2,400	EA	$ 96,650	1	**$ 96,650**	$ 9,665	$ 16,307	**$ 125,022**