LOCAL GOVERNMENT ENERGY AUDIT PROGRAM: ENERGY AUDIT REPORT

PREPARED FOR:

COUNTY OF HUDSON
JUVENILE DETENTION CENTER
595 COUNTY AVE., SECAUCUS, NJ

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I. EXECUTIVE SUMMARY

This report presents the findings of the energy audit conducted for:

County of Hudson
Juvenile Detention Center
595 County Avenue
Secaucus, NJ, 07094

Municipal Contact Person: Kevin Barry
Facility Contact Person: Michael Lenz

This audit is performed in connection with the New Jersey Clean Energy - Local Government Energy Audit Program. The energy audit is conducted to promote the mission of the office of Clean Energy, which is to use innovation and technology to solve energy and environmental problems in a way that improves the State's economy. This can be achieved through the wiser and more efficient use of energy.

The annual energy costs for the Hudson County Meadowview Campus are as follows:

Electricity	$690,991
Natural Gas	$675,114
Total	$1,366,105

The annual energy costs for the Campus are provided in lieu of individual buildings based on the utility bills provided.

The potential annual energy cost savings for each energy conservation measure (ECM) and renewable energy measure (REM) are shown below in Table 1. Be aware that the ECM's and REM's are not additive because of the interrelation of some of the measures. This audit is consistent with an ASHRAE level 2 audit. The cost and savings for each measure is ± 20%. The evaluations are based on engineering estimations and industry standard calculation methods. More detailed analyses would require engineering simulation models, hard equipment specifications, and contractor bid pricing.

Table 1
Financial Summary Table

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST[A]**	**ANNUAL SAVINGS[B]**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
ECM #1	Lighting Equipment Upgrade	$73,650	$15,168	4.9	414.9%
ECM #2	DDC Controls	$221,904	$10,516	21.1	18.5%
ECM #3	Kitchen Exhaust Hood Controls	$27,055	$2,810	9.6	55.8%
ECM #4	Combined Heat & Power	$415,098	$55,048	7.5	165.2%
ECM #5	Water Cooled Chiller Installation	$322,028	$19,284	16.7	19.8%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	Solar Photovoltaic System	$2,200,640	$143,676	15.3	63.2%

Notes: A. Cost takes into consideration applicable NJ Smart StartTM incentives.
B. Savings takes into consideration applicable maintenance savings.

The estimated demand and energy savings for each ECM and REM is shown below in Table 2. The descriptions in this table correspond to the ECM's and REM's listed in Table 1.

Table 2
Estimated Energy Savings Summary Table

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Lighting Equipment Upgrade	25.5	126,009	0
ECM #2	DDC Controls	0	26,222	9,142
ECM #3	Kitchen Exhaust Hood Controls	0	18,084	1,341
ECM #4	Combined Heat & Power	197.7	1,195,862	(68,045)
ECM #5	Water Cooled Chiller Installation	129.5	207,200	0
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	Solar Photovoltaic System	222.8	317,868	0

Concord Engineering Group (CEG) recommends proceeding with the implementation of all ECM's that provide a calculated simple payback at or under ten (10) years. The following Energy Conservation Measures are recommended for the facility:

- **ECM #1:** Lighting Upgrade
- **ECM #3:** Kitchen Exhaust Hood Controls
- **ECM #4:** Combined Heat and Power

ECM # 1 – Lighting Equipment Upgrade

This ECM includes retrofit of all T-12 magnetic ballast fixtures with new energy efficiency T-8 bulbs and electronic ballasts. The majority of the building is lit with T-12 fixtures and this ECM represents as simple and effective approach to reducing significant energy use. This ECM also benefits from the replacement of all fluorescent exit signs with LED exit signs as well as a few remaining incandescent bulbs with compact fluorescent bulbs. The total savings from this ECM is estimated to be $15,168 per year, which pays for the installation cost in approximately 5 years. This ECM is the quickest payback of all ECMs evaluated and is highly recommended for the facility.

ECM #3 – Kitchen Exhaust Hood Controls

This ECM includes the installation of sensors on the kitchen exhaust hoods as well as variable frequency drives on the make-up and exhaust fans. This ECM allows for the kitchen exhaust and make-up air system to change exhaust air quantities based on the variations in operating conditions of the kitchen equipment. This allows for a savings in fan horse power as well as make up air conditioning energy. The energy savings from this ECM is approximately $2,810 annually which pays for the installation cost in 9.6 years. This ECM has a longer payback but provides valuable energy savings for the facility.

ECM #4 – Combined Heat and Power

The energy savings impact made by the installation of a combined heat and power system is considerable. The benefits of a combined heat and power plant include; $55,058 annual energy savings, added redundancy to the existing system's power supply, electric power pricing security in a volatile energy market, and a significant reduction in electrical power requirement from the grid and global impact. Unlike most energy conservation measures, a CHP system looks at the facilities potential to greatly increase the efficiency of power production over conventional power plant efficiencies. The energy otherwise rejected as waste heat is captured by the facility while simultaneously reducing the building's electrical requirement. The reduction in electrical use from the grid is approximately 18% of the current energy used of Meadowview Campus. With Since the campus requires high electrical use to support many buildings with 24/7 operation, this ECM represents a large increase in overall energy efficiency.

Campus Wide Combined Heat and Power Plant (CHP) Considerations

The savings estimated for the Juvenile Detention Center CHP system ECM is based on a percentage of steam use from the central plant based on square footage. This system is relatively small when compared to the baseline heat load of the central plant. The entire campus base load steam requirements even through the summer were noted to be very substantial. The central plant represents an even more beneficial opportunity for a CHP plant since the incremental costs for a CHP plant goes down with increasing plant sizes. Also the diversity of the central plant offers a very steady and more continuous base-line steam load, which allows for more continuous operation of the CHP. These factors point to the likely potential for a very profitable system that could be installed particularly with the very competitive gas prices that the County is paying. In addition a CHP plant will only further flatten both the campus's electric and natural gas load profiles which allows for the most advantageous procurement of energy prices. It is highly recommended to further investigate a CHP system for implementation at the campus's central plant.

Operations and Maintenance Considerations

As with the majority of existing facilities, there are maintenance and operational measures that can provide significant energy savings and provide immediate benefit. The ECMs listed above represent investments that can be made to the facility which are justified by the savings seen overtime. However, the maintenance items and small operational improvements below are typically achievable with on site staff or maintenance contractors and in turn have the potential to provide substantial operational savings compared to the costs associated. The following are recommendations which should be considered a priority in achieving an energy efficient building:

1. Maintain all weather stripping on entrance doors.
2. Maintain insulation on the hot and chilled water pipes.
3. Clean all light fixtures to maximize light output. Although not an energy saving technique, this maintenance effort will provide better light quality and limit additional light from being added where it is not needed.
4. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.
5. Confirm that outside air economizers on the air handling units are functioning properly to take advantage of free cooling and avoid excess outside air during occupied periods.
6. Implement a steam trap maintenance program. When steam traps fail, they will release steam which can accumulate to huge volumes of steam contributing to increased boiler plant flue costs. Steam traps should be inspected to ensure proper operation, or monitored with temperature sensors to alarm when steam is passing.

Solar System Analysis

Renewable Energy Measures (REMs) through the installation of a solar PV system was also reviewed for the Meadowview Complex. Based on the limited roof space available throughout the Detention Center facility, a solar PV system mounted as shading over the parking lot was

analyzed for the campus. The system proposed as REM #1 details a solar parking lot shading system located East of the facility. Savings are available for a system installed at grade versus a roof mounted system for easy access and ease of construction. The recommended 275 kW PV system will produce approximately 317,870 kWh of electricity annually. The system's calculated simple payback is 15.32 years is past the standard 10 year simple payback threshold; however, with alternative funding this payback could be lessened. CEG recommends the Owner review all funding options available when considering their financial analysis.

Retro-Commissioning

In addition to the above recommendations, based on the review of the facility's energy bills and discussions with the operations personnel, the energy audit team recommends Retro-Commissioning of this facility to meet the following objectives:

- Bring existing HVAC equipment to its proper operational state including air and water distribution systems
- Reduce energy use and energy costs
- Improve indoor air quality
- Verify the installation and performance of identified system upgrades
- Address overall building energy use and demand and identify areas of highest energy use and demand
- Identify the location of the most comfort problems or trouble spots in the building
- Review current O&M practices

Conclusion

Overall, the Juvenile Detention Center appears to be in a good position for energy improvement options. With the implementation of the above recommended measures the County will see beneficial energy savings that will provide significant life cycle cost reductions in a relatively short time period. Although not included in the scope of this audit report, the central plant appears to have the greatest potential for energy savings opportunities due to its ability to apply efficiency changes globally throughout the campus.

II. INTRODUCTION

The comprehensive energy audit covers the 55,476 square foot *Hudson County Juvenile Detention Center,* which includes the following spaces: offices, day rooms, gymnasium, kitchen and dining room.

Electrical and natural gas utility information is collected and analyzed for one full year's energy use of the building. The utility information allows for analysis of the building's operational characteristics; calculate energy benchmarks for comparison to industry averages, estimated savings potential, and baseline usage/cost to monitor the effectiveness of implemented measures. A computer spreadsheet is used to calculate benchmarks and to graph utility information (see the utility profiles below).

The Energy Use Index (EUI) is established for the building. Energy Use Index (EUI) is expressed in British Thermal Units/square foot/year (BTU/ft^2/yr), which is used to compare energy consumption to similar building types or to track consumption from year to year in the same building. The EUI is calculated by converting the annual consumption of all energy sources to BTU's and dividing by the area (gross square footage) of the building. Blueprints (where available) are utilized to verify the gross area of the facility. The EUI is a good indicator of the relative potential for energy savings. A low EUI indicates less potential for energy savings, while a high EUI indicates poor building performance therefore a high potential for energy savings.

Existing building architectural and engineering drawings (where available) are utilized for additional background information. The building envelope, lighting systems, HVAC equipment, and controls information gathered from building drawings allow for a more accurate and detailed review of the building. The information is compared to the energy usage profiles developed from utility data. Through the review of the architectural and engineering drawings a building profile can be defined that documents building age, type, usage, major energy consuming equipment or systems, etc.

The preliminary audit information is gathered in preparation for the site survey. The site survey provides critical information in deciphering where energy is spent and opportunities exist within a facility. The entire site is surveyed to inventory the following to gain an understanding of how each facility operates:

- Building envelope (roof, windows, etc.)
- Heating, ventilation, and air conditioning equipment (HVAC)
- Lighting systems and controls
- Facility-specific equipment

The building site visit is performed to survey all major building components and systems. The site visit includes detailed inspection of energy consuming components. Summary of building occupancy schedules, operating and maintenance practices, and energy management programs provided by the building manager are collected along with the system and components to determine a more accurate impact on energy consumption.

III. METHOD OF ANALYSIS

Post site visit work includes evaluation of the information gathered, researching possible conservation opportunities, organizing the audit into a comprehensive report, and making recommendations on HVAC, lighting and building envelope improvements. Data collected is processed using energy engineering calculations to anticipate energy usage for each of the proposed energy conservation measures (ECMs). The actual building's energy usage is entered directly from the utility bills provided by the owner. The anticipated energy usage is compared to the historical data to determine energy savings for the proposed ECMs.

It is pertinent to note, that the savings noted in this report are not additive. The savings for each recommendation is calculated as standalone energy conservation measures. Implementation of more than one ECM may in some cases affect the savings of each ECM. The savings may in some cases be relatively higher if an individual ECM is implemented in lieu of multiple recommended ECMs. For example implementing reduced operating schedules for inefficient lighting will result in a greater relative savings. Implementing reduced operating schedules for newly installed efficient lighting will result in a lower relative savings, because there is less energy to be saved. If multiple ECM's are recommended to be implemented, the combined savings is calculated and identified appropriately.

ECMs are determined by identifying the building's unique properties and deciphering the most beneficial energy saving measures available that meet the specific needs of the facility. The building construction type, function, operational schedule, existing conditions, and foreseen future plans are critical in the evaluation and final recommendations. Energy savings are calculated base on industry standard methods and engineering estimations. Energy consumption is calculated based on manufacturer's cataloged information when new equipment is proposed.

Cost savings are calculated based on the actual historical energy costs for the facility. Installation costs include labor and equipment costs to estimate the full up-front investment required to implement a change. Costs are derived from Means Cost Data, industry publications, and local contractors and equipment suppliers. The NJ Smart Start Building® program incentives savings (where applicable) are included for the appropriate ECM's and subtracted from the installed cost. Maintenance savings are calculated where applicable and added to the energy savings for each ECM. The life-time for each ECM is estimated based on the typical life of the equipment being replaced or altered. The costs and savings are applied and a simple payback, simple lifetime savings, and simple return on investment are calculated. See below for calculation methods:

ECM Calculation Equations:

$$Simple\ Payback = \left(\frac{Net\ Cost}{Yearly\ Savings} \right)$$

$$Simple\ \ Lifetime\ \ Savings\ = \left(Yearly\ \ Savings \times ECM\ \ Lifetime \right)$$

$$Simple\ \ Lifetime\ \ ROI\ = \frac{(Simple\ \ Lifetime\ \ Savings\ -\ Net\ \ Cost)}{Net\ \ Cost}$$

$$Lifetime\ \ Ma\,\mathrm{int}\,enance\ \ Savings\ = \left(Yearly\ \ Ma\,\mathrm{int}\,enance\ \ Savings \times ECM\ \ Lifetime \right)$$

$$Internal\ \ Rate\ of\ \ \mathrm{Re}\,turn = \sum_{n=0}^{N} \left(\frac{Cash\ \ Flow\ of\ \ Period}{\left(1 + IRR\right)^{n}} \right)$$

$$Net\ \ \mathrm{Pr}\,esent\ Value = \sum_{n=0}^{N} \left(\frac{Cash\ \ Flow\ of\ \ Period}{\left(1 + DR\right)^{n}} \right)$$

Net Present Value calculations based on Interest Rate of 3%.

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

The energy usage for the facility has been tabulated and plotted in graph form as depicted within this section. Each energy source has been identified and monthly consumption and cost noted per the information provided by the Owner.

The electric usage profile represents the actual electrical usage for the facility. Public Service Electric and Gas (PSE&G) provides electricity to the facility under their LPLS and LPLP rate structures. The electric utility measures consumption in kilowatt-hours (KWH) and maximum demand in kilowatts (KW). One KWH usage is equivalent to 1000 watts running for one hour. One KW of electric demand is equivalent to 1000 watts running at any given time. The basic usage charges are shown as generation service and delivery charges along with several non-utility generation charges. Rates used in this report reflect the historical data received for the facility.

The gas usage profile shows the total actual natural gas energy usage for the facility. Public Service Electric and Gas (PSE&G) provides natural gas to three (3) delivery points in this facility under the TSGNF and GSG rate structures. The gas utility measures consumption in cubic feet x 100 (CCF), and converts the quantity into Therms of energy. One Therm is equivalent to 100,000 BTUs of energy.

The third party commodity provider HESS Energy Service Company is responsible for the supply of electricity to the Hospital, Power House, Juvenile Center and the Buildings 1 to 3. Commodity (Supply) and delivery is billed separately for the service. There is no third party supplier for the electric service to the buildings 4-9 and also for the entire gas utility.

The overall cost for utilities is calculated by dividing the total cost by the total usage. Based on the utility history provided, the average cost for utilities for the campus is as follows:

Description	Average
Electricity	10.7¢ / kWh
Natural Gas	$0.72 / Therm

Table 3
Electricity Billing Data

ELECTRIC USAGE SUMMARY

Utility Provider: PSE&G
Rate: LPLS, LPLP
Meter No: 778009754, 778000991
Customer ID No: 42 005 270 06, 42 000 410 06
Third Party Utility HESS
TPS Meter / Acct No: -

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
Jan-09	417,913	910	$51,689
Feb-09	469,519	909	$50,414
Mar-09	470,033	894	$45,657
Apr-09	557,483	866	$53,420
May-09	540,674	1199	$49,635
Jun-09	545,921	1109	$61,460
Jul-09	676,135	1306	$75,815
Aug-09	683,033	1462	$81,500
Sep-09	636,318	1500	$74,798
Oct-09	458,147	1154	$45,255
Nov-09	470,521	911	$47,289
Dec-09	542,851	906	$54,059
Totals	**6,468,548**	**1500 Max**	**$690,991**

AVERAGE DEMAND **1094 KW average**
AVERAGE RATE **$0.107** **$/kWh**

Figure 1
Electricity Usage Profile

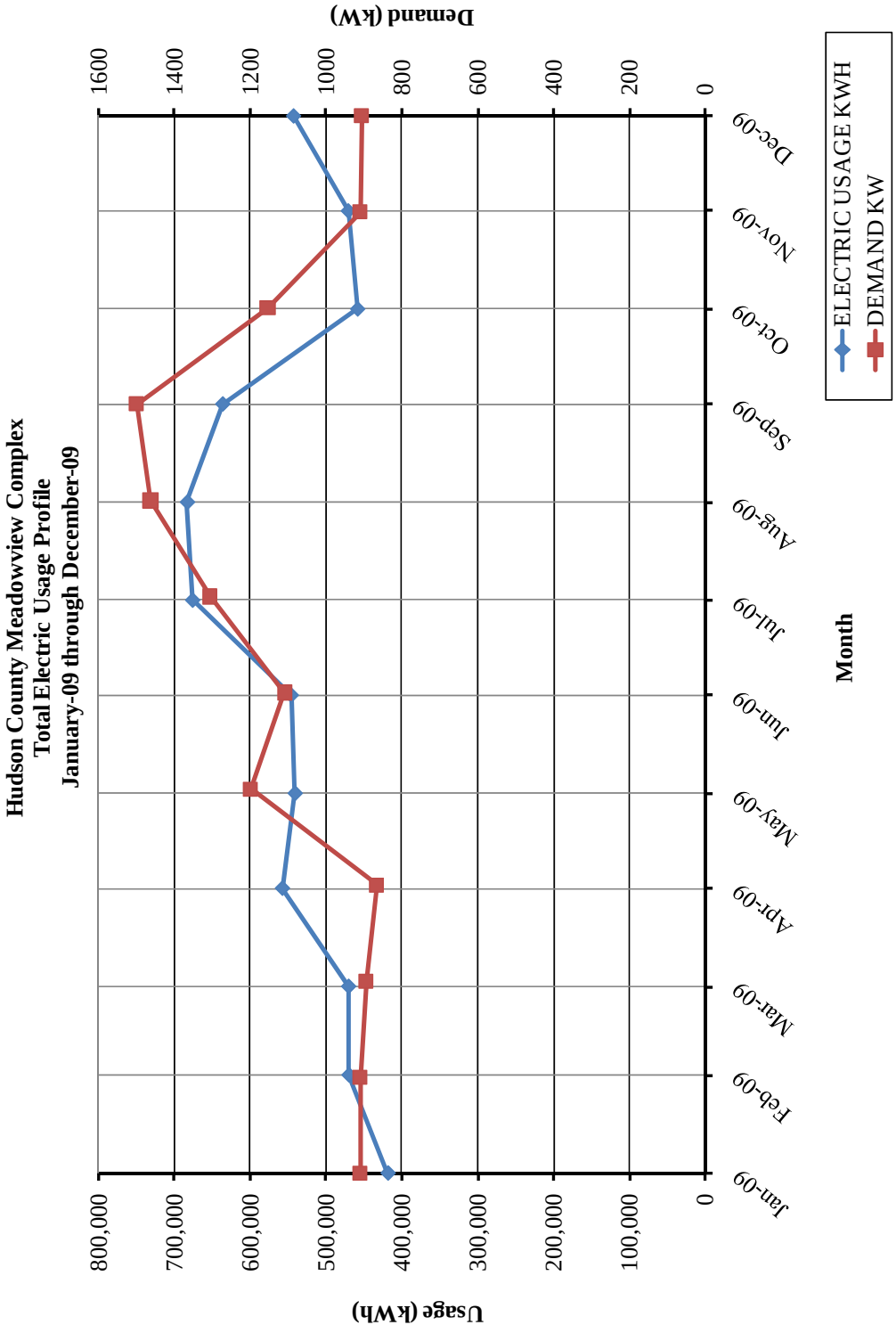


Table 4
Natural Gas Billing Data

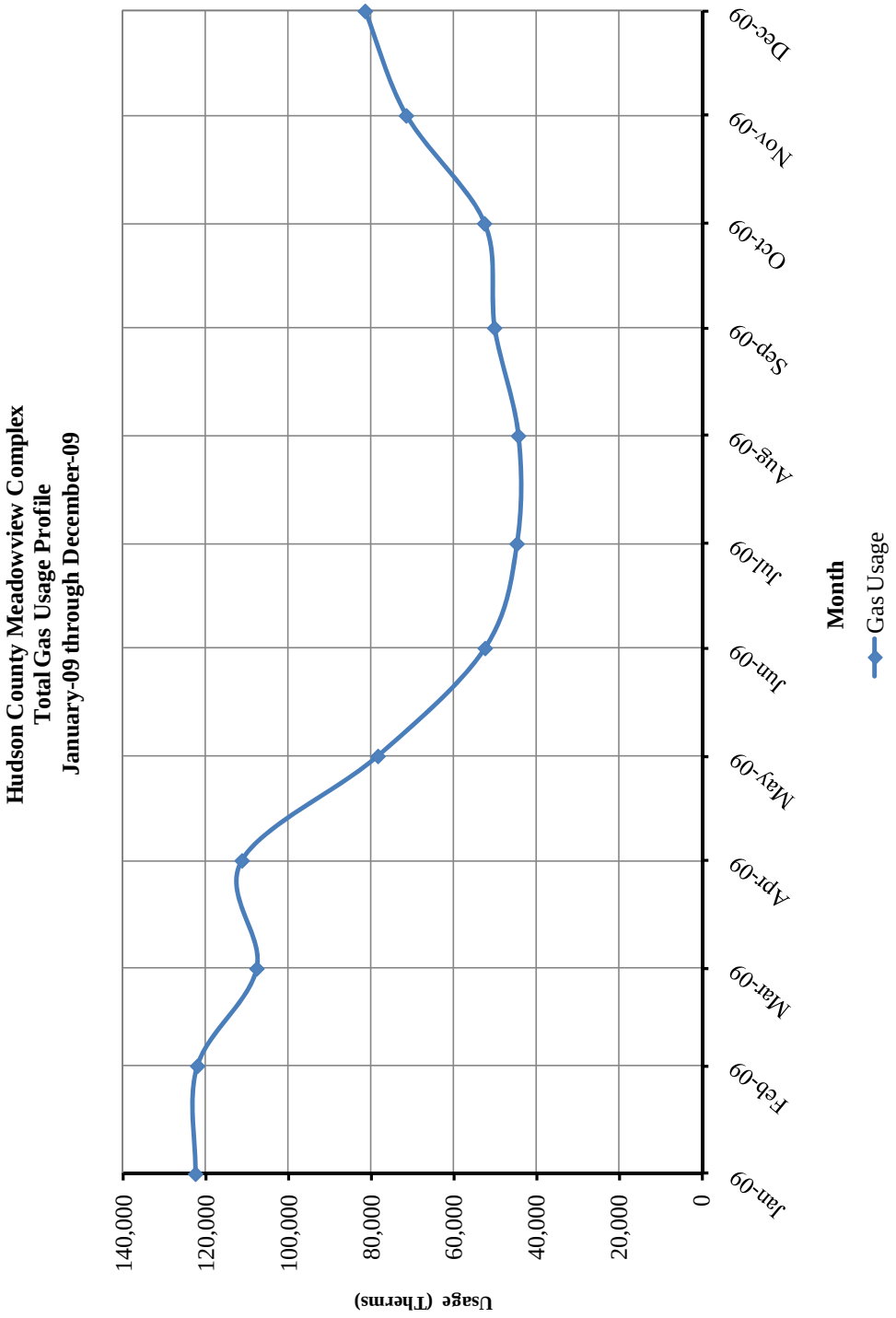
NATURAL GAS USAGE SUMMARY

Utility Provider:	PSE&G
Rate:	TSGNF, GSG
Meter No:	1784801, 2369009, 2858907, 3007747
Point of Delivery ID:	PG000011545808543339, PG000011223037043339, PG000011223036243339
Third Party Utility Provider:	-
TPS Meter No:	-

MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Jan-09	122,573	$128,718
Feb-09	122,095	$117,923
Mar-09	107,714	$77,430
Apr-09	111,312	$14,899
May-09	78,362	$52,911
Jun-09	52,403	$33,832
Jul-09	44,680	$29,540
Aug-09	44,326	$31,337
Sep-09	50,127	$32,454
Oct-09	52,558	$30,830
Nov-09	71,497	$49,301
Dec-09	81,464	$75,939
TOTALS	**939,111.26**	**$675,113.89**

AVERAGE RATE: **$0.72** **$/THERM**

Figure 2
Natural Gas Usage Profile



B. Energy Use Index (EUI)

Energy Use Index (EUI) is a measure of a building's annual energy utilization per square foot of building. This calculation is completed by converting all utility usage consumed by a building for one year, to British Thermal Units (BTU) and dividing this number by the building square footage. EUI is a good measure of a building's energy use and is utilized regularly for comparison of energy performance for similar building types. The Oak Ridge National Laboratory (ORNL) Buildings Technology Center under a contract with the U.S. Department of Energy maintains a Benchmarking Building Energy Performance Program. The ORNL website determines how a building's energy use compares with similar facilities throughout the U.S. and in a specific region or state.

Source use differs from site usage when comparing a building's energy consumption with the national average. Site energy use is the energy consumed by the building at the building site only. Source energy use includes the site energy use as well as all of the losses to create and distribute the energy to the building. Source energy represents the total amount of raw fuel that is required to operate the building. It incorporates all transmission, delivery, and production losses, which allows for a complete assessment of energy efficiency in a building. The type of utility purchased has a substantial impact on the source energy use of a building. The EPA has determined that source energy is the most comparable unit for evaluation purposes and overall global impact. Both the site and source EUI ratings for the building are provided to understand and compare the differences in energy use.

The site and source EUI for this facility is calculated as follows:

$$Building\ \ Site\ EUI = \frac{(Electric\ \ Usage\ \ in\ kBtu + Gas\ Usage\ \ in\ kBtu)}{Building\ \ Square\ \ Footage}$$

$$Building\ \ Source\ \ EUI = \frac{(Electric\ \ Usage\ \ in\ kBtu\ \ X\ \ SS\ \ Ratio + Gas\ Usage\ \ in\ kBtu\ \ X\ \ SS\ \ Ratio)}{Building\ \ Square\ \ Footage}$$

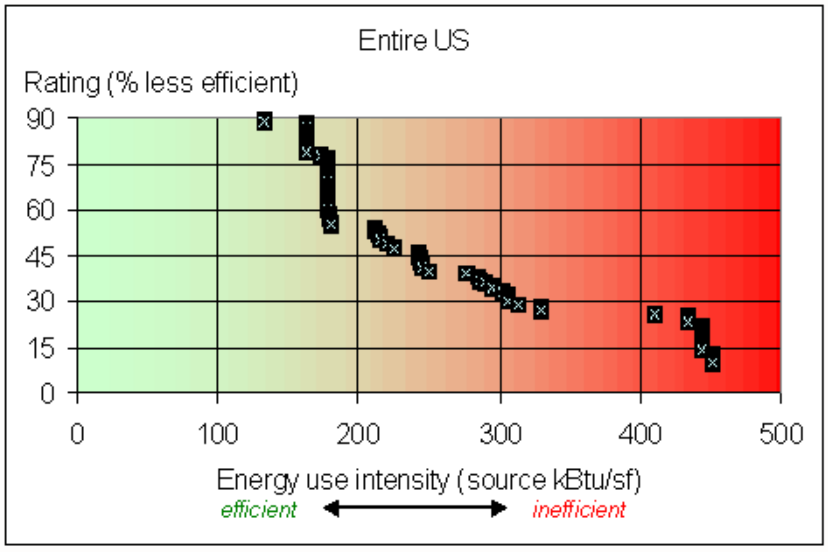
An energy use intensity index cannot be calculated for the Meadowview Campus or any of the individual buildings. This is because the campus power house provides steam and domestic hot water to the entire Meadowview Complex including buildings that are not analyzed in this report. In addition, the electric service to the campus is not sub-metered for each building. In order to obtain an energy use index for the campus, the utility information and the area of each building in the entire campus is required.

Table 5
Facility Energy Use Index (EUI) Calculation

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	BUILDING USE			SITE ENERGY	SITE-SOURCE RATIO	SOURCE ENERGY
	kWh	Therms	Gallons	kBtu		kBtu
ELECTRIC	6,468,548			22,083,624	3.340	73,759,304
NATURAL GAS		939,111		93,911,126	1.047	98,324,949
FUEL OIL			0.0	0	1.010	0
PROPANE			0.0	0	1.010	0
TOTAL				115,994,751		172,084,254
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
TOTAL BUILDING AREA		*N/A*	SQUARE FEET			
BUILDING SITE EUI		*N/A*	kBtu/SF/YR			
BUILDING SOURCE EUI		*N/A*	kBtu/SF/YR			

Figure 3 below depicts a national EUI grading for the source use of *Public Order and Safety Buildings* .

Figure 3
Source Energy Use Intensity Distributions: Public Order Buildings



A comparison to the national average is not available for this facility since individual energy utility information for this facility cannot be obtained.

C. EPA Energy Benchmarking System

The United States Environmental Protection Agency (EPA) in an effort to promote energy management has created a system for benchmarking energy use amongst various end users. The benchmarking tool utilized for this analysis is entitled Portfolio Manager. The Portfolio Manager tool allows tracking and assessment of energy consumption via the template forms located on the ENERGY STAR website (www.energystar.gov). The importance of benchmarking for local government municipalities is becoming more important as utility costs continue to increase and emphasis is being placed on carbon reduction, greenhouse gas emissions and other environmental impacts.

Based on information gathered from the ENERGY STAR website, Government agencies spend more than $10 billion a year on energy to provide public services and meet constituent needs. Furthermore, energy use in commercial buildings and industrial facilities is responsible for more than 50 percent of U.S. carbon dioxide emissions. It is vital that local government municipalities assess facility energy usage, benchmark energy usage utilizing Portfolio Manager, set priorities and goals to lessen energy usage and move forward with priorities and goals.

In accordance with the Local Government Energy Audit Program, CEG has created an ENERGY STAR account for the municipality to access and monitoring the facility's yearly energy usage as it compares to facilities of similar type. The login page for the account can be accessed at the following web address; the username and password are also listed below:

https://www.energystar.gov/istar/pmpam/index.cfm?fuseaction=login.login

User Name: hudsoncounty
Password: lgeaceg2009

Security Question: What city were you born in?
Security Answer: "hudson county"

The utility bills and other information gathered during the energy audit process are entered into the Portfolio Manager. The following is a summary of the results for the facility:

Table 6
ENERGY STAR Performance Rating

ENERGY STAR PERFORMANCE RATING		
FACILITY DESCRIPTION	**ENERGY PERFORMANCE RATING**	**NATIONAL AVERAGE**
Meadowview Campus	N/A	N/A

An Energy Performance Rating cannot be established for the Campus or individual buildings. The Energy Star program does not have enough bin data available to calculate a campus wide

Energy Performance Rating at this time. Also, individual building ratings cannot be established due to the design of the Campus wide electric and gas distribution system. One year of utility data must be entered for each building or facility, since reliable building energy meters do not exist, this approach cannot be taken.

V. FACILITY DESCRIPTION

The 55,476 building is a single story correctional facility comprised of housing units, kitchen and dining room, laundry, classrooms, office spaces, gymnasium, storage spaces and mechanical spaces.

Exterior of this building is constructed of concrete walls with partial brick façade. The amount of insulation within the wall is unknown. The windows throughout the facility are in good condition and appear to be well maintained. Typical windows throughout the facility are double pane, ¼" clear glass with aluminum frames.

The kitchen in the Juvenile Detention Center has a walk-in refrigerated room with a freezer section within. There is another large walk in refrigerator outside of the building on grade. The kitchen has a commercial grade dishwasher. The staff lounge has two (2) soda and one (1) candy machines. Laundry facility in the first floor has a set of (2) washers and a large gas fired drier. The staff lounge has two (2) soda and one (1) candy machines.

The majority of the roof is standing seam metal roof system. A small portion of the roof is constructed of a built-up roof with light rubber covering, where all rooftop HVAC equipment is located. The amount of insulation below the roofing is unknown. The building was built in 1996 with a housing unit extension added after the original building construction.

HVAC Systems

The HVAC system in the Juvenile Detention Center is comprised of an air cooled chiller, steam converters, constant volume air handling units, unit ventilators and various ventilation and exhaust fans.

The major source of cooling for the Youth House building is an electric driven, 185 ton, air cooled chiller made by Trane (Model #RTAA). The chiller is original to the building. It was installed in 1996. The chiller uses R22 refrigerant. Load control of this chiller is achieved by sequencing two screw compressors. The chiller is located on a concrete pad on the south-west grounds of the building. The chiller provides chilled water to the air handling units and the unit ventilators. The chilled water is circulated through the air handling units via two (2) 15 HP constant volume chilled water pumps. The air handling units are equipped with 3-way control valves for supply air temperature controls.

The major source of heating for the building is the high pressure steam, which is delivered to the building directly from the campus steam plant. The high pressure steam at approximately 120 psig is reduced to low pressure at 15 psig through two (2) pressure reducing valves. The steam is used in two (2) hot water converters located in the mechanical room. Two steam pressure condensate pumps send the condensate back to the power house.

The high pressure, medium pressure and low pressure steam condensate is flashed into a single flash tank. It was observed that there was a significant loss of steam through the flash tank vent.

There are a total of nine (9) air handling units, serving various air conditioning zones in the building. The units are equipped with chilled water and hot water coils. AHUs are constant volume and distribute conditioned air to the nine (9) zones in the building through duct network and ceiling diffusers.

A make up air unit provides 100% fresh air to the kitchen. The unit has heating coils only. There are unit heaters for the kitchen and sally port. The storage and maintenance area is equipped with fan-coil units.

Exhaust System

Air is exhausted from the kitchen, housing units, mechanical rooms, toilets and locker rooms through the roof exhausters. Most of the exhaust fans are interlocked with the air handling units and run continuously.

The Cura Inc. kitchen in the first floor is equipped with gas range and an exhaust hood. The size of the hood is 10'x4'. The Integrity House kitchen is equipped with gas range and two exhaust hoods. The sizes of the hoods are 16'x4' and 6'x3'. The hoods in both kitchens are operated manually with local switches.

HVAC System Controls

The HVAC systems within the facility are controlled via pneumatic controls. The control system panel is located in the main mechanical room. This facility utilizes stand alone controls.

Domestic Hot Water

Domestic hot water for the facility is generated on site via two steam domestic hot water tank heaters. One of the tanks is in poor condition with rust spots and leaks. The domestic hot water is circulated throughout the building by a hot water re-circ pump. The circulation pump is controlled by an aqua stat. The domestic hot water piping insulation appeared to be in good condition. The steam condensate from the domestic hot water tank heater is pumped back to the campus steam plant via a duplex condensate pump set.

Lighting

Typical lighting throughout building is fluorescent tube lay-in, vandal proof fixtures with T-12 lamps and electronic ballasts. Day rooms are lit with metal halide fixtures. Outside lighting is provided with 250W fixture with high pressure sodium lamps. The majority of the lighting is centrally controlled throughout the facility by a front end computer. Lighting is on 24 / 7 in most common areas except for the administration areas that operate on a daytime office schedule. Lighting is on continuous for security reasons due to surveillance required throughout the facility. Refer to the **Lighting Equipment List Appendix** for the details about this building.

VI. MAJOR EQUIPMENT LIST

The equipment list contains major energy consuming equipment that through implementation of energy conservation measures could yield substantial energy savings. The list shows the major equipment in the facility and all pertinent information utilized in energy savings calculations. An approximate age was assigned to the equipment in some cases if a manufactures date was not shown on the equipment's nameplate. The ASHRAE service life for the equipment along with the remaining useful life is also shown in the Appendix.

Refer to the **Major Equipment List Appendix** for this facility.

VII. ENERGY CONSERVATION MEASURES

ECM #1: Lighting Upgrade

Description:

The office spaces, corridors, restrooms, classrooms, bedrooms, kitchen, dining room and storage spaces in the building are lit with older fixtures with T12 lamps and electronic ballasts. The dayrooms are lit with a combination of metal halides and fluorescent lights. The gymnasium lighting is provided with 400W metal halide fixtures. Vandal proof fixtures are used in the inmate areas. In addition, there are some exit signs with fluorescent bulbs throughout the building. It is recommended to replace all of the fluorescent exit signs with high efficiency LED signs. LED is an acronym for light-emitting-diode. LED's are small light sources that are readily associated with electronic equipment. LED exit signs have been manufactured in a variety of shapes and sizes. The benefits of LED technology are substantial. LED exit signs will last for 20-30 years without maintenance. Lamp costs ($2-$7 each) and labor costs ($8-$20 per lamp) add up rapidly. Additionally, a LED exit sign total fixture input can be as low as 2 Watts.

This ECM includes retrofit of all T12 fixtures with T8 fixtures with electronic ballasts in the Juvenile Detention Center building. The new energy efficient, T8 fixtures will provide adequate lighting and will save on electrical costs due to better performance of the lamp and ballasts. This ECM also includes maintenance savings through the reduced number of lamps replaced per year. The expected lamp life of a T8 lamp is approximately 30,000 burn-hours, in comparison to the existing T12 lamps which is approximately 20,000 burn-hours. The facility will need approximately 33% less lamps replaced per year for each one for one fixture replaced.

In addition, this ECM will replace all of the existing exit signs with new LED exit fixtures. The basis of design is the Progress Lighting PE001 LED Exit Sign or equal. The included battery provides 1-1/2 hours of emergency power.

Energy Savings Calculations:

The **Investment Grade Lighting Audit Appendix** outlines the hours of operation, proposed retrofits, costs, savings, and payback periods for each set of fixtures in the each building.

There are incentives available from NJ Smart Start® Program for these retrofits. Incentives are calculated as follows:

From the Smart Start Incentive appendix, the retrofit of a T-12 fixture to a T-5 or T-8 fixture warrants the following incentive: T-5 or T-8 (1-4 lamp) is $15 per fixture. The replacement of an incandescent exit sign with a new LED exit sign is $10 per fixture.

$$\text{Smart Start® } \textit{Incentives} = (\#\text{ of } 1-4 \text{ lamp fixtures} \times \$15) + (\#\text{ of LED Exist signs} \times \$10)$$

Total number of 1-4 lamp T12 fixtures: 759
Total number of CFL LED Signs: 69

Total Smart Start incentives = $12,075

Replacement and Maintenance Savings are calculated as follows:

$$\text{Savings} = (\text{reduction in lamps replaced per year}) \times (\text{replacement \$ per lamp} + \text{Labor \$ per lamp})$$

Considering that the typical T12 lamp life is 20,000 Hours while that of T8 is 30,000:

Reduction in lamp replacement due to T12 to T8 conversion: 115.75
Cost of a lamp replacement including labor for all types: $7
Maintenance savings =$7 x 115.75 = $2,315

There isn't any significant maintenance savings by switching to LED exit signs from fluorescent exit signs.

Total maintenance savings generated by the retrofits = $2,315

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$85,725
NJ Smart Start Equipment Incentive ($):	$12,075
Net Installation Cost ($):	$73,650
Maintenance Savings ($/Yr):	$2,315
Energy Savings ($/Yr):	$12,853
Total Yearly Savings ($/Yr):	$15,168
Estimated ECM Lifetime (Yr):	25
Simple Payback	4.9
Simple Lifetime ROI	415%
Simple Lifetime Maintenance Savings	$57,877
Simple Lifetime Savings	$379,200
Internal Rate of Return (IRR)	20%
Net Present Value (NPV)	$190,473

ECM #2: DDC System – Juvenile Detention Center

Description:

The current HVAC systems within the Juvenile Detention Center are controlled via a central pneumatic system located in the Mechanical Room. The indoor temperature control elements of pneumatic systems are inaccurate due to temperature drift, age, cost of maintenance of pneumatics and not having been re-calibrated. Pneumatic control systems also do not have night time setback feature. In addition, the pneumatic controllers don't have the ability to maintain the temperature at set-point under changing load conditions. It is recommended to install a state of the art, digital controls in order to accurately control HVAC equipment in this building including set back temperatures, temperature and/or static pressure re-sets, enthalpy based economizer controls and complex schedules.

This ECM includes installing a Building Automation system with Direct Digital Controls (DDC) wired through an Ethernet backbone and front end controller within the Juvenile Detention Center. The system will include new thermostat controllers for all indoor air-handling systems and the rooftop units, in addition to each piece of equipment being wired back to a front end controller and computer interface. With the communication between the devices and the front end computer interface, the operators will be able to take advantage of equipment scheduling for occupied and unoccupied periods based on the actual occupancy of the zones within facility. Due to the fact that different parts of the building has different hours of occupancy, including evening and weekend hours, having supervisory control over all of the equipment is crucial. The DDC system will also aid in the response time to service / maintenance issues when the facility is not under normal maintenance supervision, i.e. after-hours.

The new DDC system has the potential to provide substantial savings by controlling the HVAC systems as a whole and provide operating schedules and features such as space averaging, night set-back, temperature override control, outside air economizer etc. The U.S. Department of Energy sponsored a study to analyze energy savings achieved through various types of building system controls. The referenced savings is based on the "Advanced Sensors and Controls for Building Applications: Market Assessment and Potential R&D Pathways," document posted for public use April 2005. The study has found that commercial buildings have the potential to achieve significant energy savings through the use of building controls. The average energy savings are as follows based on the referenced report:

- Energy Management and Control System Savings: 5%-15%.

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 15% of the total energy cost for the facility due to complexity of the spaces and usage compared to typical office spaces.

The cost of a full DDC system with new field devices, controllers, computer, software, programming, etc. is approximately $4.00 per SF in accordance with recent Contractor pricing for systems of this magnitude. Savings from the implementation of this ECM will be from the

reduced energy consumption currently used by the HVAC system by proper control of schedule and temperatures via the DDC system.

Cost of complete DDC System = ($4.00/SF x 55,476 SF) = $221,904

Heating Season Heating Degree Days = 4,860 °F (March 2009 – February 2010)
Average Cost of Gas = $0.72 / Therm

Cooling Season Full Load Cooling Hrs. = 1,158 hrs / yr
Average Cost of Electricity = $0.102 / kWh
Heating System Efficiency = 70%
Cooling System Efficiency = 10 EER (1.2 kW/Ton)

Note: Degree Days and Full Load Hours referenced from ASHRAE Weather Data for Newark, NJ.

Energy Savings Calculations:

15% Savings on Heating Calculations

$$\text{Heat Load} = \frac{\text{Heat Loss } \left(\frac{\text{Btu}}{\text{Hr SF}}\right) \times \text{Area(SF)}}{1000 \left(\frac{\text{Btu}}{\text{kBtu}}\right)}$$

$$\text{Heat Load} = \frac{50 \left(\frac{\text{Btu}}{\text{hr SF}}\right) \times 55{,}476\text{(SF)}}{1000 \left(\frac{\text{Btu}}{\text{kBtu}}\right)} = 2{,}774 \left(\frac{\text{kBtu}}{\text{Hr}}\right)$$

$$\text{Energy Consumption} = \frac{\text{Heat Load } \left(\frac{\text{kBtu}}{\text{Hr}}\right) \times \text{HDD (°F)} \times 24 \text{ Hr} \times \text{Correction Factor}}{\text{Design T. Diff (°F)} \times \text{Heating System Eff \%} \times \text{Fuel Value } \left(\frac{\text{kBtu}}{\text{Therm}}\right)}$$

$$\text{Energy Consumption} = \frac{2{,}774 \left(\frac{\text{kBtu}}{\text{Hr}}\right) \times 4860 \text{ (°F)} \times 24 \text{ Hr} \times 0.6}{65 \text{ (°F)} \times 70 \text{ \%} \times 100 \left(\frac{\text{kBtu}}{\text{Therm}}\right)}$$

$$\text{Estimated Energy Consumption} = 60{,}949 \text{ Therms/Yr}$$

$$\text{Estimated Energy Cost} = \$43{,}883/\text{Yr}$$

$$\text{Energy Savings} = \text{Energy Consumption} \times 15\% \text{ Savings}$$

$$\text{Energy Savings} = 9{,}142\ \frac{\text{Therms}}{\text{Year}}$$

$$\text{Energy Cost Savings} = \text{Energy Cost} \times 15\%\ \text{Savings}$$

$$\text{Energy Cost Savings} = \frac{\$6{,}582}{\text{Year}}$$

15% Savings on Cooling Calculations**:**

Estimated Cooling Energy Consumption:

$$\text{Energy Consumption} = \frac{\text{Cool Load (Tons)} \times 12{,}000\ \left(\frac{\text{Btu}}{\text{Ton Hr}}\right) \times \text{Full Load Cooling Hours}}{\text{Cooling Systems Efficiency}\ \left(\frac{\text{Btu}}{\text{Wh}}\right) \times 1000\left(\frac{\text{Wh}}{\text{kWh}}\right)}$$

$$\text{Energy Consumption} = \frac{185\ \text{(Tons)} \times 12{,}000\ \left(\frac{\text{Btu}}{\text{Ton Hr}}\right) \times 1158\ \text{Hours}}{10\ \left(\frac{\text{Btu}}{\text{Wh}}\right) \times 1000\left(\frac{\text{Wh}}{\text{kWh}}\right)} = 257{,}076\ \text{kWh}$$

$$\text{Estimated Cooling Energy Cost} = \$26{,}222/\text{Yr}$$

$$\text{Energy Savings} = \text{Energy Consumption} \times 15\%\ \text{Savings}$$

$$\text{Energy Savings} = 38{,}561\ \frac{\text{kWh}}{\text{Year}}$$

$$\text{Energy Cost Savings} = \text{Energy Cost} \times 15\%\ \text{Savings}$$

$$\text{Energy Cost Savings} = \frac{\$3{,}933}{\text{Year}}$$

$$\text{Total Savings} = \text{Heating Energy Savings} + \text{Cooling Energy Savings}$$

Total Annual Energy Savings = $6,582 + $3,933 = $10,516 per year

It is pertinent to note that no electric demand savings are estimated. Also, incentives for the installation of the DDC system are not currently available.

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$221,904
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$221,904
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$10,516
Total Yearly Savings ($/Yr):	$10,516
Estimated ECM Lifetime (Yr):	15
Simple Payback	21.1
Simple Lifetime ROI	-28.9%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$157,736
Internal Rate of Return (IRR)	-4%
Net Present Value (NPV)	($96,367.98)

ECM #4: Combined Heat and Power System

Description:

Hudson County Juvenile Detention Center is a 24/7 facility with significant energy needs. The long term residence of the inmates results in a yearlong consistent demand for heat for domestic hot water and commercial kitchen. Typically the limitation for implementing a combined heat and power plant is the lack of year round heat requirement.

A combined heat and power plant utilizes the rejected heat from an electric generator. The heat is used for the building's heating loads such as HVAC system heating, domestic hot water, and kitchen cooking appliances. The electric production is used for the building's electrical loads. EPA has determined the typical range of "total system efficiency," for typical CHP systems. The efficiency range is as follows:

Nat Gas Micro Turbine: 70%-80%

*Estimated efficiency based on production steam heat is 65% efficient due to higher temperature heat output.

CEG conducted a review of the applicability of a combined heat and power (CHP) plant installation. The base line heating load for the facility is limited by the domestic hot water usage, and steam requirement. Based on typical output values of CHP systems the averaged energy production from a CHP is 30% electric production and 35% heat production. Since the baseline heating load is the limiting factor, the system size is based on the minimum continuous heat load. The remaining electric production potential is provided to offset the purchase of electric energy from the electric grid. The runtime factor is estimated to be 93% based on the EPA "Combined Heat and Power Partnership" Incentive grant reduction for maintenance due to downtime.

This ECM includes installation of a natural gas driven micro turbine for electrical power and heat production. This ECM is based on a CHP plant producing steam for hot water use. This plant would serve the Juvenile Detention Center Building only. This system provides all heat loads during the summer months and supplements the heat load throughout the winter months. Since the summer heat load is not 24/7, the CHP would be turned off at night during low heat demands.

<u>Existing Baseline Heat Parameters:</u>

Currently the Juvenile Detention Center does not have any sort of energy metering system. Therefore the heating energy usage of the building is estimated based on the ratio of the square footage of the building with respect to that of the whole campus.

Total Area of the campus including the nursing facility (not included in this study) is approximately 666,000 square feet. The total square footage of the Juvenile Detention Center is 55,476 square feet. The ratio of the area of the building to the campus is 8.3%.

TOTAL GAS CONSUMPTION	
Month	Gas (Therms)
Jun-09	52,403
Jul-09	44,680
Aug-09	44,326
Sep-09	50,127
Oct-09	52,558
Average	**48,819**

Average baseline monthly gas consumption of the campus is 48,818 Therms based on the utility information provided by the County. The Juvenile Detention Center building gas consumption is estimated to be 8.3% of this value, which is 4,065 Therms/Month.

Existing baseline heat requirement of the building:

Baseline Heating Load Main Bldg (Nat Gas) = 4,065 Therms / Month
Baseline heat applicable for CHP = 4,065 Therms / Month

Note: Measurement of the Juvenile Detention Center steam usage would allow for a more accurate sizing of the CHP system.

Baseline Heat Load – established based on limiting factor of the summertime heat load

$$Baseline\ Heat = \frac{Ave\ HW\ \&\ Steam\ Use\left(\frac{Therms}{Month}\right) \times HeatValue\left(\frac{Btu}{Therm}\right) \times Boiler\ Eff\,\%}{30.12\left(\frac{Day}{Month}\right) \times Summer\ Use\left(\frac{Hr}{Day}\right)}$$

Generator Sizing – sizing based on baseline heat load:

$$Sys\ Elec\ Size = \frac{Base\ Heat\ Load\left(\frac{Btu}{Hr.}\right)}{Heat\ \mathrm{Pr}oduction\ Eff\,\%} \times Electric\ \mathrm{Pr}oduction\ Eff\,\% \times \left(\frac{1(KWH)}{3{,}414(BTU)}\right)$$

CHP Fuel Consumption – natural gas usage based on total run time of the CHP plant at full load.

$$CHP\ Fuel\ Cons = \frac{Baseline\ Heat\left(\frac{Btu}{Hr.}\right) \times Runtime\ 93\%}{HeatValue\left(\frac{Btu}{Therm}\right) \times Heat\ Eff\ \%} \times$$
$$\ldots\left(Summer\ Use\left(\frac{Hr.}{Day}\right) \times 180\left(\frac{Day}{Yr.}\right) + W\,\text{int}\,er\ Use\left(\frac{Hr.}{Day}\right) \times 180\left(\frac{Day}{Yr.}\right)\right)$$

CHP Power Generation – kWh production based on total run time of the CHP plant at full load.

$$\text{Re}\,duced\ CHP\ Elec\ Cons = Elec\ Demand(KW) \times 93\% \times$$
$$\ldots\left(Summer\ Use\left(\frac{Hr.}{Day}\right) \times 180\left(\frac{Day}{Yr.}\right) + W\,\text{int}\,er\ Use\left(\frac{Hr.}{Day}\right) \times 180\left(\frac{Day}{Yr.}\right)\right)$$

Existing Gas Usage – total baseline heat plus offset winter heat provided by CHP.

$$Existing\ Fuel\ Cons = \frac{CHP\ Fuel\ Cons(Therms) \times CHP\ Heat\ Eff\ \%}{Boiler\ Heat\ Eff\ \%}$$

Cost Calculations

$$Electric\ Cost = Elec\ Usage \times Ave\ Cost\left(\frac{\$}{kWh}\right)$$

$$Natural\ Gas\ Cost = Gas\ Usage \times Ave\ Cost\left(\frac{\$}{Therm}\right)$$

COMBINED HEAT AND POWER CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing	Combined Heat and Power Plant	
Baseline (Heat) Gas Usage Per Utility Bills (Therms/Month)	4,065	N/A	
System Elec Production Efficiency (%)	N/A	30%	
Ave System Heat Efficiency (%)	70%	35%	
Summer Operating Hrs per Day (6 Months)	12	12	
Winter Operating Hrs per Day (6 Months)	24	24	
Runtime Factor (%)	N/A	93%	
Electric Heat Value (Btu/kWh)	N/A	3414	
Gas Heat Value (BTU/Therm)	100,000	100,000	
Baseline Heat Load - (BTU/HR)	787,313	787,313	
CHP Sys Elec Size (KW)	0	198	
Gas Cost ($/Therm)	0.72	0.72	
Elec Cost ($/kWh)	0.107	0.107	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Gas Usage (Therms)	68,045	136,089	-68,045
Electric Energy (kWh)	0	-1,195,862	1,195,862
Gas Energy Cost ($)	$48,992	$97,984	-$48,992
Electric Energy Cost ($)	$0	-$127,957	$127,957
Total Energy Cost ($)	$48,992	-$29,973	$78,965
COMMENTS:			

The cost of a natural gas driven CHP system, including installation and all components, is approximately $3,000 per KW rated capacity.

Cost of CHP System = ($3,000/KW x 198 KW) = $593,000

The maintenance requirements of a combined heat and power system are estimate to be $0.02/KWH production.

Annual Maintenance = ($0.02/KWH x 1,195,862KWH) = $23,917

NJ Clean Energy Program – Pay 4 Performance program provides considerable incentives for the installation of a combined heat and power plant. The incentives include $1.00 per Watt of system size up to a maximum of 30% of the total project costs. The incentives are calculated as follows.

$$P4P\ Incentive = \left(CHP\ System\ Size\ (KW) \times 1000 \left(\frac{W}{kW} \right) \times\ 1.00 \left(\frac{\$}{Watt} \right) \right)$$

$$P4P\ Incentive = \left(198\ (KW) \times 1000 \left(\frac{W}{kW} \right) \times\ \left(\frac{\$1.00}{Watt} \right) \right) = \sim\ \$198{,}000$$

$$\%\ of\ Total\ System\ Cost = \frac{Incentive\ Cost}{Total\ \mathrm{Pr}oject\ Cost} = \frac{\$198{,}000}{\$593{,}000} = 33.3\%$$

$$P4P\ Incentive\ \ Max = 30\% \times Total\ \mathrm{Pr}oject\ Cost$$

$$P4P\ Incentive\ \ Max = 30\% \times \$593{,}200 = \$177{,}900$$

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$593,000
NJ Smart Start Equipment Incentive ($):	$177,902
Net Installation Cost ($):	$415,098
Maintenance Savings ($/Yr):	($23,917)
Energy Savings ($/Yr):	$78,965
Total Yearly Savings ($/Yr):	$55,048
Estimated ECM Lifetime (Yr):	15
Simple Payback	7.5
Simple Lifetime ROI	98.9%
Simple Lifetime Maintenance Savings	($358,759)
Simple Lifetime Savings	$825,719
Internal Rate of Return (IRR)	10%
Net Present Value (NPV)	$242,059.92

This ECM is based on an adequate natural gas supply provided to the facility. Additional cost would have to be included if the gas service is upgraded.

ECM #5: Water Cooled Chiller Installation

Description:

The Juvenile Detention Center is cooled by a 185 ton air cooled chiller. The air cooled chiller is over 10 years old but it is in good operating condition. However the unit is far less efficient compared to water cooled chillers. In addition, typical air cooled chillers require more maintenance service compared to water cooled chillers.

Water cooled chillers provide significant energy savings over air cooled chillers due to the efficiency increase. The efficiency of the existing air cooled chillers is 1.1 KW/Ton when new. The efficiency of a water cooled chiller is approximately 0.38 KW/Ton (IPLV). The ancillary pumping energy and cooling tower fan energy is approximately 0.12 KW/Ton. Cooling tower make-up water requirements is estimated to be 2.5 Gal/Ton*Hr.

This ECM includes the installation of a new water cooled chiller. Currently, there is no redundancy in the cooling system. Therefore, the existing air cooled chiller would be utilized as a back-up to the water cooled chiller. The equipment includes the chiller enclosed in a water proof enclosure, cooling tower, and package condenser water pumps. The installation also includes all associated piping, labor, and controls. The ECM is based on a Trane packaged water cooled chiller model number CVHE CenTraVac Chiller or equivalent. Sizing indicated within the calculation of this ECM is based on the capacity of the existing equipment. The owner should have a Professional Engineer verify heating and cooling loads to verify actual building cooling requirements.

Parameters:

Full Load Cooling Hrs.	= 1600 hrs/yr.
Average Cost of Electricity	= $0.102/kWh
Cooling Capacity	= 185 Tons
Estimated Unit Eff.	= 1.20 KW/Ton
New Unit Eff.*	= 0.5 KW/Ton

*Eff including ancillary equipment energy

Energy Savings Calculations:

Cooling Energy:

$$Cooling\ Energy = Cooling(Tons) \times Eff. \left(\frac{kW}{Ton}\right) \times Full\ Load\ Hrs.$$

$$Demand\ Savings = \frac{Energy\ Savings\ (kWh)}{Full\ Load\ Hrs}$$

$$Water\ Usage = Make-up\ water\left(\frac{gal}{Ton\ Hr}\right)\times Cooling\ Capacity(Tons)\times Full\ Load\ Hrs$$

$$Water\ Cost = water\ consumption(gal)\times Ave\ Water\ Cost\left(\frac{\$}{Gal}\right)$$

$$Elec\ Savings = Elec\ Energy(kWh)\times Ave\ Elec\ Cost\left(\frac{\$}{kWh}\right)$$

WATER COOLED CHILLER CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Air Cooled Chillers	Water Cooled Chiller & Cooling	
Operating Capacity (Tons)	185	185	
Total System Full Load Efficiency (KW/Ton)	1.20	0.50	
Full Load Cooling Hrs (Est.)	1,600	1,600	
Make-Up Water Use (Gal/Ton Hr)	0	2.5	
Cooling Energy (kWh)	355,200	148,000	
Ave HW Heat Usage (Therms / Month) - From		0	
Water Cost ($/Gallon)	0.0025	0.0025	
Elec Cost ($/kWh)	0.102	0.102	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Water Usage (Gallons)	0.0	740,000	-740,000
Electric Energy (kWh)	355,200	148,000	207,200
Electric Demand (KW)	222.0	92.5	129.5
Water Cost ($)	$0.0	$1,850	-$1,850
Electric Energy Cost ($)	$36,230	$15,096	$21,134
Total Energy Cost ($)	$36,230	$16,946	$19,284
COMMENTS:			

Installation cost for the packaged water cooled chiller, condenser water pumps, cooling tower, heat exchangers, and controls is estimated to be $331,833 ($217,900 Materials).

From the NJ Smart Start® Program appendix, the unit falls under the category "Electric Chiller" and warrants an incentive based on part load efficiency (EER) at 0.38 KW/Ton. The program incentives are calculated as follows:

$$\text{Smart Start®}\ \textit{Incentive} = (\textit{Cooling Tons} \times\ \$/\textit{Ton Incentive})$$
$$= (185\ \textit{Tons} \times \$53/\textit{Ton}) = \$9{,}805$$

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$331,833
NJ Smart Start Equipment Incentive ($):	$9,805
Net Installation Cost ($):	$322,028
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$19,284
Total Yearly Savings ($/Yr):	$19,284
Estimated ECM Lifetime (Yr):	20
Simple Payback	16.7
Simple Lifetime ROI	19.8%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$385,688
Internal Rate of Return (IRR)	2%
Net Present Value (NPV)	($35,124.64)

VIII. RENEWABLE/DISTRIBUTED ENERGY MEASURES

Globally, renewable energy has become a priority affecting international and domestic energy policy. The State of New Jersey has taken a proactive approach, and has recently adopted in its Energy Master Plan a goal of 30% renewable energy by 2020. To help reach this goal New Jersey created the Office of Clean Energy under the direction of the Board of Public Utilities and instituted a Renewable Energy Incentive Program to provide additional funding to private and public entities for installing qualified renewable technologies. A renewable energy source can greatly reduce a building's operating expenses while producing clean environmentally friendly energy. CEG has assessed the feasibility of installing renewable energy technologies for the Meadowview Campus, to evaluate if there is any potential for solar or wind energy generation. The solar photovoltaic system calculation summary will be concluded as **REM#1** within this report.

Solar energy produces clean energy and reduces a building's carbon footprint. This is accomplished via photovoltaic panels which could be mounted on all south and southwestern facades of the building. Flat roof, as well as sloped areas can be utilized; flat areas will have the panels turned to an optimum solar absorbing angle. (A structural survey of the roof would be necessary before the installation of PV panels is considered). Parking lots can also be utilized for the installation of a solar array. A truss system can be installed that is high enough to park a vehicle under the array, this way no parking lot area is lost. The state of New Jersey has instituted a program in which one Solar Renewable Energy Certificate (SREC) is given to the Owner for every 1000 kWh of generation. SREC's can be sold anytime on the market at their current market value. The value of the credit varies upon the current need of the power companies. The average value per credit is around $350, this value was used in our financial calculations. This equates to $0.35 per kWh generated.

CEG has reviewed the campus and believes that a parking lot canopy system would be more appropriate given the small amount of space on the roof. The proposed arrays will be installed in the Juvenile Detention Center Parking Lot. This lot was selected based on proximity with the existing electrical system site distribution. The new parking lot arrays should be directly tied into closest building. Given the additional expense for a step up transformer and installation of high voltage wire it is more economical to run secondary distribution voltage wire to adjacent buildings to be fed from the solar arrays. A depiction of the proposed area layouts is shown in Renewable / Distributed Energy Measures Calculation, Appendix F following the financial calculations. Based on measurements of the parking lot it was determined that a system size of 275 kilowatts could be installed. The total system has an estimated kilowatt hour production of 317,870 KWh annually, reducing the overall campus electric consumption by approximately 4.9%. It should be noted the Center has additional parking lots and roof spaces that could be considered for additional solar capacity, however due to the distance required to connect with the campus electric distribution and the additional cost burden those parking lots were not placed in our recommendations at this time. A detailed financial analysis can be found in Appendix F. This analysis illustrates the payback of the system over a 25 year period. The eventual degradation of the solar panels and the price of accumulated SREC's are factored into the payback.

The proposed photovoltaic array layout is designed based on the specifications for the Sun Power SPR-230 panel. This panel has a "DC" rated full load output of 230 watts, and has a total panel conversion efficiency of 18%. Although panels rated at higher wattages are available through Sun Power and other various manufacturers, in general most manufacturers who produce commercially available solar panels produce a similar panel in the 200 to 250 watt range. This provides more manufacturer options to the public entity if they wish to pursue the proposed solar recommendation without losing significant system capacity.

The array system capacity was sized on available parking lot space on the campus. Estimated solar array generation was then calculated based on the National Renewable Energy Laboratory PVWatts Version 1.0 Calculator. In order to calculate the array generation an appropriate location with solar data on file must be selected. In addition the system DC rated kilowatt (kW) capacity must be inputted, a DC to AC de-rate factor, panel tilt angle, and array azimuth angle. The DC to AC de-rate factor is based on the panel nameplate DC rating, inverter and transformer efficiencies (95%), mismatch factor (98%), diodes and connections (100%), dc and ac wiring(98%, 99%), soiling, (95%), system availability (95%), shading (if applicable), and age(new/100%). The overall DC to AC de-rate factor has been calculated at an overall rating of 81%. The PVWatts Calculator program then calculates estimated system generation based on average monthly solar irradiance and user provided inputs. The monthly energy generation and offset electric costs from the PVWatts calculator is shown in the Renewable/Distributed Energy Measures Calculation appendix.

The proposed solar array is qualified by the New Jersey Board of Public Utilities Net Metering Guidelines as a Class I Renewable Energy Source. These guidelines allow onsite customer generation using renewable energy sources such as solar and wind with a capacity of 2 megawatts (MW) or less. This limits a customer system design capacity to being a net user and not a net generator of electricity on an annual basis. Although these guidelines state that if a customer does net generate (produce more electricity than they use), the customer will be credited those kilowatt-hours generated to be carried over for future usage on a month to month basis. Then, on an annual basis if the customer is a net generator the customer will then be compensated by the utility the average annual PJM Grid LMP price per kilowatt-hour for the over generation. Due to the aforementioned legislation, the customer is at limited risk if they generate more than they use at times throughout the year. With the inefficiency of today's energy storage systems, such as batteries, the added cost of storage systems is not warranted and was not considered in the proposed design.

CEG has reviewed financing options for the owner. Direct purchase involves the county paying for 100% of the total project cost upfront via one of the methods noted in the Installation Funding Options section below. These calculations include a utility inflation rate as well as the degradation of the solar panels over time. Based on our calculation the following is the payback period for this method of payment:

Table 7
Financial Summary – Photovoltaic System

FINANCIAL SUMMARY - PHOTOVOLTAIC SYSTEM			
PAYMENT TYPE	**SIMPLE PAYBACK**	**NET PRESENT VALUE**	**INTERNAL RATE OF RETURN**
Direct Purchase	15.32 Years	$1,538,051	4.5 %

*The solar energy measure is shown for reference in the executive summary ECM table

Given the large amount of capital required by the County to invest in a solar system whether through a Direct Purchase option CEG does not recommend the County pursue this route. It would be more advantageous for the County to solicit Power Purchase Agreement (PPA) Providers who will own, operate, and maintain the system for a period of 15 years. During this time the PPA Provide would sell all of the electric generated by Solar Arrays to the County at a reduced rate compared to their existing electric rate.

In addition to the Solar Analysis, CEG also conducted a review of the applicability of wind energy for the facility. Wind energy production is another option available through the Renewable Energy Incentive Program. Wind turbines of various types can be utilized to produce clean energy on a per building basis. Cash incentives are available per kWh of electric usage. Based on CEG's review of the applicability of wind energy for the facility; the low average wind speed, proximity to residential neighbor hoods, and limited site space make the County not a good candidate for wind.

IX. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

Load Profile analysis was performed to determine the seasonal energy usage of the facility. Irregularities in the load profile will indicate potential problems within the facility. Consequently based on the profile a recommendation will be made to remedy the irregularity in energy usage. For this report, the facility's energy consumption data was gathered in table format and plotted in graph form to create the load profile. Refer to The Electric and Natural Gas Usage Profiles included within this report to reference the respective electricity and natural gas usage load profiles.

Electricity:

The Total Electric Usage Profile of the Meadowview Complex demonstrates a fairly flat electrical load profile. The summer (May-August) demonstrates increased consumption typical to air conditioning load as exemplified by the various types of packaged air conditioning units, split system AC units, chillers, and window air conditioning units throughout the campus. The monthly energy consumption peaks around August when the space cooling load is the largest. Most of the cooling is achieved in the campus buildings via air cooled equipment. Air cooled air conditioners are significantly less efficient than water cooled equipment, which increases the electric power demand of the facility as well as the consumption. There is a fairly steady yearlong electric load most likely attributable to the 24 hour operation of many of the buildings in the campus, such as the County Psychiatric Hospital, Juvenile Detention Center and the Rehabilitation Programs.

Natural Gas:

The Natural Gas Usage Profile demonstrates a somewhat typical heating load profile. An increase in consumption is observed October through May during the standard heating season. However, significant gas consumption remains throughout year. This is because the majority of the facilities in this complex operates 24/7 and requires natural gas for hot water production and cooking. Heating and domestic hot water are supplied to the entire complex by a central steam boiler plant. The plant provides hot water to a large nursing home complex, not owned by the county. This, along with the other facility's constant need for domestic hot water, creates a large baseline natural gas load for the campus.

Tariff Analysis:

Electricity:

The facility receives electric service through Public Service Electric and Gas Company (PSE&G) on two different rate structures. Buildings #4-9 receives the service on Large Power and Lighting Service (LPLS) rate schedules. LPLS is the secondary service to the facilities between 150 - 750 kW demand ranges. The service for the rest of the campus buildings receive the service on Large

Power and Lighting Service (LPLP) rate schedules, which is the secondary service for the facilities with electrical demand above 750KW.

For electric supply (generation), the customer can elect to use the utility's Basic Generation Service (BGS) or a Third Party Supplier (TPS). This facility uses a Third Party Supplier for the buildings #1-3, 10, 12, 15 and the Basic Generation Service (BGS) from the PSE&G for buildings #4-9. They pay according to the BGS default service for only buildings #4-9 and the TPS for the rest of the campus. The Delivery Service includes the following charges: Annual Demand Charge (kW Demand all months), Summer Demand Charge (kW Demand June – Sept), Distribution Kilowatthour Charge (kWh Usage), as well as other supplemental charges.

Natural Gas:

This facility receives natural gas service through Public Service Electric and Gas Company (PSE&G) on GSG (General Service Gas) and TSG-NF (Non-Firm Transportation Gas Service) rates. GSG is a firm delivery service (higher level of delivery) for general purposes where customer does not qualify for RSG (residential) and customer's usage does not exceed 3,000 therms in any month. Customers may either purchase gas supply from a Third Party (TPS) or from Public Services Basic Gas Supply Service (BGSS) default service as detailed in the rate schedule. Currently this facility receives the commodity supply from PSEG at BGSS default rates. This service is used at the Meadowview buildings for low consumption purposes such as cooking and laundry. The service described above has a much higher priority of delivery, based on the pipeline capacity. The "firm" service is the highest priority, and does not get interrupted.

TSG-NF is an interruptible delivery for general purposes where the maximum requirement for interruptible gas is not less than 150 Therms per hour and where the customer has the installed capability to utilize an alternate type of fuel, except as provided for in Special Provisions. Customers may either purchase gas supply from a Third Party Supplier (TPS) or from Public Service's Basic Gas Supply Service default service as detailed in this rate schedule. This service is used mainly at the central steam plant, which delivers steam to the various buildings throughout the campus. Currently this facility receives the commodity supply from PSEG at BGSS default rates. The service described above has a lower priority of delivery, based on the pipeline capacity. If the gas demand in the pipeline increases, this facility can switch to oil as primary fuel for the boilers because the plant is capable of utilizing oil as boiler fuel.

Both of these rate schedules have a Delivery Charge Mechanism which includes: Balancing Charge, Societal Benefits Charge, Realignment Adjustment Charge, Margin Adjustment Charge, RGGI Charge and Customer Account Service Charge. The customer can elect to have the Supply Charge (Commodity Charge) serviced through the utility or by a Third Party Supplier (TPS).

Note: Should the TPS not deliver, the customer may receive service from PSE&G under Emergency Sales Service. Emergency Sales Service carries an extremely high penalty cost of service. Should the TPS un-deliver to the utility on behalf of the client, the utility will automatically supply this default service to the client. Imbalances occur when Third Party Suppliers are used to supply natural gas, full-delivery is not made, and when a new supplier is contracted or the customer returns to the utility. It is important when utilizing a Third Party

Supplier, that an experienced regional supplier is used. Otherwise, imbalances can occur, jeopardizing economics and scheduling.

Recommendations:

CEG recommends a global approach that will be consistent with all facilities within the County. One area for potential improvement is seen in the electric costs. The average price per kWh (kilowatt hour) for the electrical service to the buildings #4-9 is $0.11/kWh, (this is the average "price to compare" if the client intends to shop for energy) based on the default BGS supply charges. The price per kWh (kilowatt hour) for the rest of the campus is $0.69/kWh based on the default TPS supply charges (This is the average "price to compare"). It is recommended to shop for pricing based on the combined load profile for all buildings owned by the County. The more diversified the load patterns, the more advantageous the load profile becomes.

The load factor for this facility is slightly below 50% which will allow for Hudson County Correctional Center to procure fairly competitive pricing. The higher the load factor, the more advantageous. Although many additional factors play a role in energy procurement, having a load factor above 50% is beneficial.

The average price per dekatherm for natural gas is $ 7.20 / dth (dth, dekatherm is the common unit of measure). Energy commodities are among the most volatile of all commodities, however at this point and time, energy is competitive. Based on this facility's average annual natural gas costs Hudson County Correctional Center is already receiving extremely competitive natural gas costs. It is recommended that the County receive further advisement on these prices through an energy advisor. The County should also consider procuring energy (natural gas) through alternative supply sources as well.

It is recommended that the County schedule a meeting with the current utility providers to review their utility charges and current tariff structures for electricity and natural gas. This meeting would provide insight regarding alternative procurement options that are currently available. Through its meeting with the Local Distribution Company (LDC), the municipality can learn more about the competitive supply process. Hudson County can acquire a list of approved Third Party Suppliers from the New Jersey Board of Public Utilities website at www.nj.gov/bpu. Hudson County should consider using a billing-auditing service to further analyze the utility invoices, manage the data and use the information for ongoing demand-side management projects. Furthermore, special attention should be given to credit mechanisms, imbalances, balancing charges and commodity charges when meeting with the utility representative. The County should ask the utility representative about alternative billing options, such as consolidated billing when utilizing the service of a Third Party Supplier. Finally, if the supplier for energy (natural gas) is changed, closely monitor balancing, particularly when the contract is close to termination. This could be performed with the aid of an "energy advisor".

X. INSTALLATION FUNDING OPTIONS

CEG has reviewed various funding options for the facility owner to utilize in subsidizing the costs for installing the energy conservation measures noted within this report. Below are a few alternative funding methods:

i. *Energy Savings Improvement Program (ESIP)* – Public Law 2009, Chapter 4 authorizes government entities to make energy related improvements to their facilities and par for the costs using the value of energy savings that result from the improvements. The "Energy Savings Improvement Program (ESIP)" law provides a flexible approach that can allow all government agencies in New Jersey to improve and reduce energy usage with minimal expenditure of new financial resources.

ii. *Municipal Bonds* – Municipal bonds are a bond issued by a city or other local government, or their agencies. Potential issuers of municipal bonds include cities, counties, redevelopment agencies, school districts, publicly owned airports and seaports, and any other governmental entity (or group of governments) below the state level. Municipal bonds may be general obligations of the issuer or secured by specified revenues. Interest income received by holders of municipal bonds is often exempt from the federal income tax and from the income tax of the state in which they are issued, although municipal bonds issued for certain purposes may not be tax exempt.

iii. *Power Purchase Agreement* – Public Law 2008, Chapter 3 authorizes contractor of up to fifteen (15) years for contracts commonly known as "power purchase agreements." These are programs where the contracting unit (Owner) procures a contract for, in most cases, a third party to install, maintain, and own a renewable energy system. These renewable energy systems are typically solar panels, windmills or other systems that create renewable energy. In exchange for the third party's work of installing, maintaining and owning the renewable energy system, the contracting unit (Owner) agrees to purchase the power generated by the renewable energy system from the third party at agreed upon energy rates.

iv. *Pay For Performance* – The New Jersey Smart Start Pay for Performance program includes incentives based on savings resulted from implemented ECMs. The program is available for all buildings that were audited as part of the NJ Clean Energy's Local Government Energy Audit Program. The facility's participation in the program is assisted by an approved program partner. An "Energy Reduction Plan" is created with the facility and approved partner to shown at least 15% reduction in the building's current energy use. Multiple energy conservation measures implemented together are applicable toward the total savings of at least 15%. No more than 50% of the total energy savings can result from lighting upgrades / changes.

Total incentive is capped at 50% of the project cost. The program savings is broken down into three benchmarks; Energy Reduction Plan, Project Implementation, and Measurement and Verification. Each step provides additional incentives as the energy reduction project continues. The benchmark incentives are as follows:

1. Energy Reduction Plan – Upon completion of an energy reduction plan by an approved program partner, the incentive will grant $0.10 per square foot between $5,000 and $50,000, and not to exceed 50% of the facility's annual energy expense. (Benchmark #1 is not provided in addition to the local government energy audit program incentive.)

2. Project Implementation – Upon installation of the recommended measures along with the "Substantial Completion Construction Report," the incentive will grant savings per KWH or Therm based on the program's rates. Minimum saving must be 15%. (Example $0.11 / kWh for 15% savings, $0.12/ kWh for 17% savings, … and $1.10 / Therm for 15% savings, $1.20 / Therm for 17% saving, …) Increased incentives result from projected savings above 15%.

3. Measurement and Verification – Upon verification 12 months after implementation of all recommended measures, that actual savings have been achieved, based on a completed verification report, the incentive will grant additional savings per kWh or Therm based on the program's rates. Minimum savings must be 15%. (Example $0.07 / kWh for 15% savings, $0.08/ kWh for 17% savings, … and $0.70 / Therm for 15% savings, $0.80 / Therm for 17% saving, …) Increased incentives result from verified savings above 15%.

CEG recommends the Owner review the use of the above-listed funding options in addition to utilizing their standard method of financing for facilities upgrades in order to fund the proposed energy conservation measures.

XI. ADDITIONAL RECOMMENDATIONS

The following recommendations include no cost/low cost measures, Operation & Maintenance (O&M) items, and water conservation measures with attractive paybacks. These measures are not eligible for the Smart Start Buildings incentives from the office of Clean Energy but save energy none the less.

A. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.

B. Maintain all weather stripping on windows and doors.

C. Clean all light fixtures to maximize light output.

D. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.

E. Confirm that outside air economizers on the rooftop air handling units are functioning properly to take advantage of free cooling and avoid excess outside air during occupied periods.

F. Check steam traps and make sure they are not leaking. Develop an annual steam trap check and replacement program.

In addition to the recommendations above, implementing Retro-Commissioning would be beneficial for this facility. Retro-Commissioning is a means to verify your current equipment is operating at its designed efficiency, capacity, airflow, and overall performance. Retro-Commissioning provides valuable insight into systems or components not performing correctly or efficiently. The commissioning process defines the original system design parameters and recommends revisions to the current system operating characteristics.

XII. ENERGY AUDIT ASSUMPTIONS

The assumptions utilized in this energy audit include but are not limited to following:

A. Cost Estimates noted within this report are based on industry accepted costing data such as RS Means™ Cost Data, contractor pricing and engineering estimates. All cost estimates for this level of auditing are +/- 20%. Prevailing wage rates for the specified region has been utilized to calculate installation costs. The cost estimates indicated within this audit should be utilized by the owner for prioritizing further project development post the energy audit. Project development would include investment grade auditing and detailed engineering.
B. Energy savings noted within this audit are calculated utilizing industry standard procedures and accepted engineering assumptions. For this level of auditing, energy savings are not guaranteed.
C. Information gathering for each facility is strongly based on interviews with operations personnel. Information dependent on verbal feedback is used for calculation assumptions including but not limited to the following:
    a. operating hours
    b. equipment type
    c. control strategies
    d. scheduling
D. Information contained within the major equipment list is based on the existing owner documentation where available (drawings, O&M manuals, etc.). If existing owner documentation is not available, catalog information is utilized to populate the required information.
E. Equipment incentives and energy credits are based on current pricing and status of rebate programs. Rebate availability is dependent on the individual program funding and applicability.
F. Equipment (HVAC, Plumbing, Electrical, & Lighting) noted within an ECM recommendation is strictly noted as a **basis for calculation** of energy savings. The owner should use this equipment information as a benchmark when pursuing further investment grade project development and detailed engineering for specific energy conservation measures.
G. Utility bill annual averages are utilized for calculation of all energy costs unless otherwise noted. Accuracy of the utility energy usage and costs are based on the information provided. Utility information including usage and costs is estimated where incomplete data is provided.

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Hudson County - Juvenile Detention Center

ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Svaing * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^{N} \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^{N} \frac{C_n}{(1+DR)^n}$
		($)	($)	($)	($)	($/Yr)	($/Yr)	($/Yr)	(Yr)	($)	($)	(%)	(Yr)	($)	($)
ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM #1	Lighting Equipment Upgrade	$34,290	$51,435	$12,075	$73,650	$12,853	$2,315	$15,168	25	$379,200	$57,877	414.9%	4.9	20.40%	$190,472.73
ECM #2	DDC Controls	$221,904	$0	$0	$221,904	$10,516	$0	$10,516	25	$262,893	$0	18.5%	21.1	1.35%	($38,792.17)
ECM #3	Kitchen Exhaust Hood Controls	$27,055	$0	$0	$27,055	$2,810	$0	$2,810	15	$42,155	$0	55.8%	9.6	6.14%	$6,495.05
ECM #4	Combined Heat & Power	$593,000	$0	$177,902	$415,098	$78,965	($23,917)	$55,048	20	$1,100,958	-$478,345	165.2%	7.5	11.85%	$403,875.42
ECM #5	Water Cooled Chiller Installation	$217,900	$113,933	$9,805	$322,028	$19,284	$0	$19,284	20	$385,688	$0	19.8%	16.7	1.78%	($35,124.64)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	Solar Photovoltaic System	$2,200,640	$0	$0	$2,200,640	$32,423	$111,254	$143,676	25	$3,591,908	$2,781,345	63.2%	15.3	4.19%	$301,217.26

Notes: 1) The variable Cn in the formulas for Internal Rate of Return and Net Present Value stands for the cash flow during each period.
2) The variable DR in the NPV equation stands for Discount Rate
3) For NPV and IRR calculations: From n=0 to N periods where N is the *lifetime of ECM* and Cn is the *cash flow during each period* .

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SmartStart Building Incentives

The NJ SmartStart Buildings Program offers financial incentives on a wide variety of building system equipment. The incentives were developed to help offset the initial cost of energy-efficient equipment. The following tables show the current available incentives as of February, 2010:

Electric Chillers

Water-Cooled Chillers	$12 - $170 per ton
Air-Cooled Chillers	$8 - $52 per ton

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Cooling

Gas Absorption Chillers	$185 - $400 per ton
Gas Engine-Driven Chillers	Calculated through custom measure path)

Desiccant Systems

$1.00 per cfm – gas or electric

Electric Unitary HVAC

Unitary AC and Split Systems	$73 - $93 per ton
Air-to-Air Heat Pumps	$73 - $92 per ton
Water-Source Heat Pumps	$81 per ton
Packaged Terminal AC & HP	$65 per ton
Central DX AC Systems	$40- $72 per ton
Dual Enthalpy Economizer Controls	$250
Occupancy Controlled Thermostat (Hospitality & Institutional Facility)	$75 per thermostat

Energy Efficiency must comply with ASHRAE 90.1-2004

Ground Source Heat Pumps

Closed Loop & Open Loop	$450 per ton, EER ≥ 16 $600 per ton, EER ≥ 18 $750 per ton, EER ≥ 20

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Heating

Gas Fired Boilers < 300 MBH	$300 per unit
Gas Fired Boilers ≥ 300 - 1500 MBH	$1.75 per MBH
Gas Fired Boilers ≥1500 - ≤ 4000 MBH	$1.00 per MBH
Gas Fired Boilers > 4000 MBH	(Calculated through Custom Measure Path)
Gas Furnaces	$300 - $400 per unit, AFUE ≥ 92%

Variable Frequency Drives

Variable Air Volume	$65 - $155 per hp
Chilled-Water Pumps	$60 per hp
Compressors	$5,250 to $12,500 per drive

Natural Gas Water Heating

Gas Water Heaters ≤ 50 gallons	$50 per unit
Gas-Fired Water Heaters > 50 gallons	$1.00 - $2.00 per MBH
Gas-Fired Booster Water Heaters	$17 - $35 per MBH
Gas Fired Tankless Water Heaters	$300 per unit

Prescriptive Lighting

Retro fit of T12 to T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	$15 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	$25 per fixture (1-2 lamps) $30 per fixture (3-4 lamps)
Replacement of incandescent with screw-in PAR 38 or PAR 30 (CFL) bulb	$7 per bulb
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	$10 per fixture
Hard-Wired Compact Fluorescent	$25 - $30 per fixture
Metal Halide w/Pulse Start	$25 per fixture
LED Exit Signs	$10 - $20 per fixture
T-5 and T-8 High Bay Fixtures	$16 - $284 per fixture
HID ≥ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	$50 per fixture
HID ≥ 100w Replacement with new HID ≥ 100w	$70 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	$42 per 5 foot $65 per 6 foot

Lighting Controls – Occupancy Sensors

Wall Mounted	$20 per control
Remote Mounted	$35 per control
Daylight Dimmers	$25 per fixture
Occupancy Controlled hi-low Fluorescent Controls	$25 per fixture controlled

Lighting Controls – HID or Fluorescent Hi-Bay Controls

Occupancy hi-low	$75 per fixture controlled
Daylight Dimming	$75 per fixture controlled
Daylight Dimming - office	$50 per fixture controlled

Premium Motors

Three-Phase Motors	$45 - $700 per motor
Fractional HP Motors Electronic Communicated Motors (replacing shaded pole motors in refrigerator/freezer cases)	$40 per electronic communicated motor

Other Equipment Incentives

Performance Lighting	$1.00 per watt per SF below program incentive threshold, currently 5% more energy efficient than ASHRAE 90.1-2004 for New Construction and Complete Renovation
Custom Electric and Gas Equipment Incentives	not prescriptive
Custom Measures	$0.16 KWh and $1.60/Therm of 1st year savings, or a buy down to a 1 year payback on estimated savings. Minimum required savings of 75,000 KWh or 1,500 Therms and a IRR of at least 10%.
Multi Measures Bonus	15%

Portfolio Manager "Statement of Energy Performance"

An Energy Performance Rating cannot be established for the Campus or individual buildings. The Energy Star program does not have enough bin data available to calculate a campus wide Energy Performance Rating at this time. Also, individual building ratings cannot be established due to the design of the Campus wide electric and gas distribution system. One year of utility data must be entered for each building or facility, since reliable building energy meters do not exist, this approach cannot be taken.

MAJOR EQUIPMENT LIST

Concord Engineering Group

"Meadowview Complex - Juvenile Detention Center"

Chillers

Tag	**CH-1**		
Type	Air Cooled		
Location	On Grade		
Area Served	Air Handling Units		
Manufacturer	Trane		
Qty.	1		
Model #	RTAA1854XG01A1D0 BDFKMR		
Serial #	U95E28119		
Nominal Tons	185		
Refrigerant	R22		
Service	Regular		
EWT	55		
LWT	45		
GPM	376		
Efficiency (kW/Ton)	1.11		
Efficiency (EER)	10.8		
Volt / Phase	460/3		
Approx. Age	15		
ASHRAE Service Life	20		
Remaining Life	5		
Notes			

MAJOR EQUIPMENT LIST

Concord Engineering Group

"Meadowview Complex - Juvenile Detention Center"

Air Handling Units

Tag	AHU - 1	AHU - 2	AHU - 3
Location	Roof	Roof	Roof
Area Served	Dining Area	Sallyport Area	Class Rooms
Manufacturer	Temtrol	Temtrol	Temtrol
Qty	1	1	1
Model #	WF-RZR8M	WF-RZR8M	WF-RZR20M
Serial #	60600	60601	60602
Cooling Coil	Chilled Water	Chilled Water	Chilled Water
Cooling Eff. (EER)	-	-	-
Cooling Capacity	138	150	369
Heating Type	Hot Water	Hot Water	Hot Water
Input (MBh)	160	162	420
Output (MBh)	-	-	-
Supply Air, CFM	3815	3975	10000
Return Air, CFM	3140	2955	9072
Supply Motor HP	5	5	15
Supply Motor Efficiency	89.5%	89.5%	91.7%
Volts / Phase	460/3	460/3	460/3
Approx. Age	15	15	15
ASHRAE Service Life	15	15	15
Remaining Life	0	0	0
Notes	3HP Return Fan	3HP Return Fan	5HP Return

MAJOR EQUIPMENT LIST

Concord Engineering Group

"Meadowview Complex - Juvenile Detention Center"

Air Handling Units

Tag	AHU - 4	AHU - 5	AHU - 6
Location	MER #3	MER #2	MER #2
Area Served	Admin Area	Housing Units 3,4,5	Housing Units 1,2
Manufacturer	Temprol	Temtrol	Temtrol
Qty	1	1	1
Model #	F-BZR8M	WF-B BZR20M	WF-BZR16M
Serial #	60603	60604	60605
Cooling Coil	Chilled Water	Chilled Water	Chilled Water
Cooling Eff. (EER)	-	-	-
Cooling Capacity (Mbh)	141	410	253
Heating Type	Hot Water	Hot Water	Hot Water
Input (MBh)	-	-	-
Output (MBh)	170	425	300
Supply Air, CFM	3925	9485	6865
Return Air, CFM	3396	7515	5525
Supply Motor HP	5	10	7.5
Supply Motor Efficiency	89.5%	91%	91.7%
Volts / Phase	460/3	460/3	460/3
Approx. Age	15	15	15
ASHRAE Service Life	15	15	15
Remaining Life	0	0	0
Notes	2 HP return fan	5 HP return fan	5 HP return fan

MAJOR EQUIPMENT LIST

Concord Engineering Group

"Meadowview Complex - Juvenile Detention Center"

Air Handling Units

Tag	AHU - 7	AHU - 8	AHU - 9
Location	MER #3	MER #3	Attic
Area Served	Gymnasium	Control Area/Corridor	Extension
Manufacturer	Temtrol	Temtrol	Temtrol
Qty	1	1	1
Model #	WF-BZR8M	WF-BZR8M	WF-B ZR8M
Serial #	60606	60607	60608
Cooling Coil	Chilled Water	Chilled Water	Chilled Water
Cooling Capacity, Mbh	361	125	131
Heating Type	Hot Water	Hot Water	Hot Water
Input (MBh)	400	164	158
Output (MBh)	-	-	-
Supply Air, CFM	8925	3375	3200
Return Air, CFM	8051	2921	3200
Supply Motor HP	10	5	5
Supply Motor Efficiency	91%	87.5%	89.5%
Volts / Phase	460/3	460/3	460/3
Approx. Age	15	15	15
ASHRAE Service Life	15	15	15
Remaining Life	0	0	0
Notes	5 HP return fan	3 HP return fan	2 HP return fan.

MAJOR EQUIPMENT LIST

Concord Engineering Group

"Meadowview Complex - Juvenile Detention Center"

Air Handling Units

Tag	**MAU**		
Location	Roof		
Area Served	Kitchen Hood		
Manufacturer	Temtrol		
Qty	1		
Model #	WF-RDT16M		
Serial #	60803		
Cooling Coil	-		
Cooling Capacity, Mbh	-		
Heating Type	Steam		
Input (MBh)	378		
Output (MBh)	-		
Supply Air, CFM	7000		
Return Air, CFM	None		
Supply Motor HP	5		
Supply Motor Efficiency	89.5		
Volts / Phase	460/3		
Approx. Age	15		
ASHRAE Service Life	15		
Remaining Life	0		
Notes	100% outside air supply to kitchen		

MAJOR EQUIPMENT LIST

Concord Engineering Group

"Meadowview Complex - Juvenile Detention Center"

Pumps

Tag	P1, P2	P3, P4	
Location	Mechanical Room #1	Mechanical Room #1	
Area Served	Air Handling units	Air Handling units	
Manufacturer	Peerless	Peerless	
Qty.	2	2	
Model #	-	-	
Serial #	-	-	
HP	15	15	
RPM	1,760	1,760	
GPM	400	350	
Ft. Hd	75	90	
Motor Frame Size	254T	254T	
Motor Efficiency	93%	93%	
Volts / Phase	460/3	460/3	
Approx. Age	15	15	
ASHRAE Service Life	20	20	
Remaining Life	5	5	
Notes	Constant volume pumps. 3-way valves on air handling units		

MAJOR EQUIPMENT LIST

Concord Engineering Group

"Meadowview Complex - Juvenile Detention Center"

Heat Exchangers

Tag	HX-1, HX-2	DHW Tank/Heaters #1, #2	
Location	MER #1	MER #1	MER #1
Area Served	Service Hot Water	Domestic Water	Domestic Water
Manufacturer	-	A.O. Smith	A.O. Smith
Qty	2	1	1
Model #	-	HWG48-750	HWG 140
Serial #	-	ASME# SC95-57153-75	C06R000073, ASME# SD06112082 Y3
Input (MBh)	3,100	-	-
Recovery Gal/h	-	-	-
Capacity (Gal)	-	-	-
Efficiency (%)	-	-	-
Fuel	None	None	None
Tube Surface Area (sqft)	86.7	-	-
Water (GPM)	300	-	-
Steam (lb/hr)	3092	-	-
Working pressure	150	150	125
Test Pressure	300		
Approx. Age	15	15	4
ASHRAE Service Life	24	24	24
Remaining Life	9	9	20
Notes	Converters for heating hot water	Tank is in poor condition with rust and leaks.	

MAJOR EQUIPMENT LIST

Concord Engineering Group

"Meadowview Complex - Juvenile Detention Center"

Duplex Condensate Pumps

Tag	CRU - 1	CRU - 2	
Location	MER #1	MER #1	
Area Served	Steam Converters, AHU 1,2,3, MAU and humidifiers	DHW Tank Heaters	
Manufacturer	Weinstein	Weinstein	
Qty.	1	1	
Model #	-	-	
Serial #	-	-	
HP	2 x 2HP	2 x 1/3HP	
RPM	3,450	1,750	
GPM	75	12	
Pumping Head (Feet)	40	10	
Motor Frame Size	K56Z	-	
Volts / Phase	460/3	-	
Approx. Age	15	15	
ASHRAE Service Life	15	15	
Remaining Life	0	0	
Notes	Poor condition with severe leaks and rust. Being replaced.	Near end of useful life.	

MAJOR EQUIPMENT LIST

Concord Engineering Group

"Meadowview Complex - Juvenile Detention Center"

Air Compressor

Tag	**Unit #1**		
Location	MER #1		
Area Served	HVAC Actuators		
Manufacturer	Quincy		
Qty.	1		
Model #	0C03012D		
Serial #	5055476		
HP	2 x 3		
Pressure, psig	100		
Capacity	~50 Gal		
Volts / Phase	460/3		
Approx. Age	15		
ASHRAE Service Life	20		
Remaining Life	5		
Notes	Duplex reciprocating compressor.		

Investment Grade Lighting Audit

CEG Job #: 9C09162
Project: HUDSON COUNTY IMPROVEMENT AUTHORITY ENERGY AUDIT — **Building** - 12 Juvenile Detention Center — **KWH COST:** $0.102
Address: 595 County Ave.
Secaucus, NJ. 07094
Building SF: 55,476

ECM: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING									SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
10	Vestabule	8760	6	1	4' Channel, (1) 40w T12	41	0.25	2,155.0	$219.81	6	1	1 Lamp, 32w T8, Elect. Ballast; retrofit, cost and wattage based on 2 fixtures wired in tadem	31	0.19	1629.36	$166.19	$80.00	$480.00	0.06	525.6	$53.61	8.95
602		8760	2	2	Exit Sign - (2) 7w CFL Lamp	16	0.03	280.3	$28.59	2	1	Exit Sign - LED	2	0.00	35.04	$3.57	$65.00	$130.00	0.03	245.28	$25.02	5.20
10	Entry/Control	8760	12	1	4' Channel, (1) 40w T12	41	0.49	4,309.9	$439.61	12	1	1 Lamp, 32w T8, Elect. Ballast; retrofit, cost and wattage based on 2 fixtures wired in tadem	31	0.37	3258.72	$332.39	$80.00	$960.00	0.12	1051.2	$107.22	8.95
9		8760	17	2	Recessed Down Light, (2) 13w PL Lamp	32	0.54	4,765.4	$486.07	17	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
602		8760	1	2	Exit Sign - (2) 7w CFL Lamp	16	0.02	140.2	$14.30	1	1	Exit Sign - LED	2	0.00	17.52	$1.79	$65.00	$65.00	0.01	122.64	$12.51	5.20
6	Men's Restroom	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
6	Women's Restroom	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
2.1	Administration Office	2600	25	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens	75	1.88	4,875.0	$497.25	25	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	1.20	3120	$318.24	$100.00	$2,500.00	0.68	1755	$179.01	13.97
602		8760	2	2	Exit Sign - (2) 7w CFL Lamp	16	0.03	280.3	$28.59	2	1	Exit Sign - LED	2	0.00	35.04	$3.57	$65.00	$130.00	0.03	245.28	$25.02	5.20
2.1	Office	2600	2	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens	75	0.15	390.0	$39.78	2	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.10	249.6	$25.46	$100.00	$200.00	0.05	140.4	$14.32	13.97
2.1	Assist. Office	2600	3	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens	75	0.23	585.0	$59.67	3	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.14	374.4	$38.19	$100.00	$300.00	0.08	210.6	$21.48	13.97
2.1	Copy Room	2600	4	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens	75	0.30	780.0	$79.56	4	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.19	499.2	$50.92	$100.00	$400.00	0.11	280.8	$28.64	13.97
2	Superintendant's Office	2600	2	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens	110	0.22	572.0	$58.34	2	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.17	447.2	$45.61	$100.00	$200.00	0.05	124.8	$12.73	15.71
6	Women's Restroom	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
6	Men's Restroom	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01

2	Supply Closet	2600	1	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens	110	0.11	286.0	$29.17	1	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.09	223.6	$22.81	$100.00	$100.00	0.02	62.4	$6.36	15.71
2	Records	2600	2	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens	110	0.22	572.0	$58.34	2	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.17	447.2	$45.61	$100.00	$200.00	0.05	124.8	$12.73	15.71
2.1		2600	2	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens	75	0.15	390.0	$39.78	2	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.10	249.6	$25.46	$100.00	$200.00	0.05	140.4	$14.32	13.97
2.1	Staff Training/Lounge	2600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens	75	0.08	195.0	$19.89	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	124.8	$12.73	$100.00	$100.00	0.03	70.2	$7.16	13.97
2		2600	4	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens	110	0.44	1,144.0	$116.69	4	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.34	894.4	$91.23	$100.00	$400.00	0.10	249.6	$25.46	15.71
602		8760	1	2	Exit Sign - (2) 7w CFL Lamp	16	0.02	140.2	$14.30	1	1	Exit Sign - LED	2	0.00	17.52	$1.79	$65.00	$65.00	0.01	122.64	$12.51	5.20
2	Male Lockers	8760	3	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens	110	0.33	2,890.8	$294.86	3	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.26	2260.08	$230.53	$100.00	$300.00	0.07	630.72	$64.33	4.66
6	Men's Restroom	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
4	Shower	2600	1	2	Recessed Down Light, (2) 9w PL Lamp	20	0.02	52.0	$5.30	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2	Female Lockers	8760	2	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens	110	0.22	1,927.2	$196.57	2	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.17	1506.72	$153.69	$100.00	$200.00	0.05	420.48	$42.89	4.66
2.1	Women's Restroom	2600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens	75	0.08	195.0	$19.89	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	124.8	$12.73	$100.00	$100.00	0.03	70.2	$7.16	13.97
4	Shower	2600	1	2	Recessed Down Light, (2) 9w PL Lamp	20	0.02	52.0	$5.30	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1	Sally Port	8760	1	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.11	963.6	$98.29	1	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.09	753.36	$76.84	$100.00	$100.00	0.02	210.24	$21.44	4.66
1	Private Visiting	5000	2	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.22	1,100.0	$112.20	2	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.17	860	$87.72	$100.00	$200.00	0.05	240	$24.48	8.17
1	Visiting	5000	15	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	1.65	8,250.0	$841.50	15	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	1.29	6450	$657.90	$100.00	$1,500.00	0.36	1800	$183.60	8.17
602		8760	1	2	Exit Sign - (2) 7w CFL Lamp	16	0.02	140.2	$14.30	1	1	Exit Sign - LED	2	0.00	17.52	$1.79	$65.00	$65.00	0.01	122.64	$12.51	5.20
1	Search	5000	1	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.11	550.0	$56.10	1	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.09	430	$43.86	$100.00	$100.00	0.02	120	$12.24	8.17
1	Control Corridor	8760	8	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.88	7,708.8	$786.30	8	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.69	6026.88	$614.74	$100.00	$800.00	0.19	1681.92	$171.56	4.66

602		8760	3	2	Exit Sign - (2) 7w CFL Lamp	16	0.05	420.5	$42.89	3	1	Exit Sign - LED	2	0.01	52.56	$5.36	$65.00	$195.00	0.04	367.92	$37.53	5.20
1	Supervisor's Office	2600	3	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.33	858.0	$87.52	3	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.26	670.8	$68.42	$100.00	$300.00	0.07	187.2	$19.09	15.71
1.1	Control Room	8760	4	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens, Secure	75	0.30	2,628.0	$268.06	4	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.19	1681.92	$171.56	$100.00	$400.00	0.11	946.08	$96.50	4.15
7		8760	4	1	Recessed Down Light, (1) 13w PL Lamp	16	0.06	560.6	$57.19	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
1	Classroom Corridor	8760	17	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	1.87	16,381.2	$1,670.88	17	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	1.46	12807.12	$1,306.33	$100.00	$1,700.00	0.41	3574.08	$364.56	4.66
602		8760	3	2	Exit Sign - (2) 7w CFL Lamp	16	0.05	420.5	$42.89	3	1	Exit Sign - LED	2	0.01	52.56	$5.36	$65.00	$195.00	0.04	367.92	$37.53	5.20
6	Women's Restroom	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
6	Men's Restroom	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
2	Educational Storage	2600	2	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens	110	0.22	572.0	$58.34	2	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.17	447.2	$45.61	$100.00	$200.00	0.05	124.8	$12.73	15.71
1	Classroom	2600	6	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.66	1,716.0	$175.03	6	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.52	1341.6	$136.84	$100.00	$600.00	0.14	374.4	$38.19	15.71
1	Classroom	2600	6	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.66	1,716.0	$175.03	6	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.52	1341.6	$136.84	$100.00	$600.00	0.14	374.4	$38.19	15.71
1	Classroom	2600	6	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.66	1,716.0	$175.03	6	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.52	1341.6	$136.84	$100.00	$600.00	0.14	374.4	$38.19	15.71
1	Classroom	2600	6	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.66	1,716.0	$175.03	6	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.52	1341.6	$136.84	$100.00	$600.00	0.14	374.4	$38.19	15.71
1	Classroom	2600	6	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.66	1,716.0	$175.03	6	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.52	1341.6	$136.84	$100.00	$600.00	0.14	374.4	$38.19	15.71
1	Vocational Shop	2600	20	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	2.20	5,720.0	$583.44	20	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	1.72	4472	$456.14	$100.00	$2,000.00	0.48	1248	$127.30	15.71
2	Educational Lab	2600	6	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens	110	0.66	1,716.0	$175.03	6	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.52	1341.6	$136.84	$100.00	$600.00	0.14	374.4	$38.19	15.71
2.1	Conference Room	2600	6	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens	75	0.45	1,170.0	$119.34	6	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.29	748.8	$76.38	$100.00	$600.00	0.16	421.2	$42.96	13.97

2.1	Corridor	8760	8	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens	75	0.60	5,256.0	$536.11	8	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.38	3363.84	$343.11	$100.00	$800.00	0.22	1892.16	$193.00	4.15
602		8760	4	2	Exit Sign - (2) 7w CFL Lamp	16	0.06	560.6	$57.19	4	1	Exit Sign - LED	2	0.01	70.08	$7.15	$65.00	$260.00	0.06	490.56	$50.04	5.20
2.1	Principal's Office	2600	2	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens	75	0.15	390.0	$39.78	2	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.10	249.6	$25.46	$100.00	$200.00	0.05	140.4	$14.32	13.97
2.1	Psychology Office	2600	2	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens	75	0.15	390.0	$39.78	2	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.10	249.6	$25.46	$100.00	$200.00	0.05	140.4	$14.32	13.97
2.1	Program Director	2600	2	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens	75	0.15	390.0	$39.78	2	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.10	249.6	$25.46	$100.00	$200.00	0.05	140.4	$14.32	13.97
2.1	Service Director	2600	2	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens	75	0.15	390.0	$39.78	2	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.10	249.6	$25.46	$100.00	$200.00	0.05	140.4	$14.32	13.97
2.1	Training Coordinator	2600	2	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens	75	0.15	390.0	$39.78	2	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.10	249.6	$25.46	$100.00	$200.00	0.05	140.4	$14.32	13.97
6	Women's Restroom	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
6	Men's Restroom	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
1	Intake	8760	10	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	1.10	9,636.0	$982.87	10	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.86	7533.6	$768.43	$100.00	$1,000.00	0.24	2102.4	$214.44	4.66
602		8760	1	2	Exit Sign - (2) 7w CFL Lamp	16	0.02	140.2	$14.30	1	1	Exit Sign - LED	2	0.00	17.52	$1.79	$65.00	$65.00	0.01	122.64	$12.51	5.20
1	Holding Room	8760	1	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.11	963.6	$98.29	1	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.09	753.36	$76.84	$100.00	$100.00	0.02	210.24	$21.44	4.66
1	Holding Room	8760	1	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.11	963.6	$98.29	1	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.09	753.36	$76.84	$100.00	$100.00	0.02	210.24	$21.44	4.66
1	Search	8760	1	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.11	963.6	$98.29	1	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.09	753.36	$76.84	$100.00	$100.00	0.02	210.24	$21.44	4.66
1.1	Restroom	2600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens, Secure	75	0.08	195.0	$19.89	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	124.8	$12.73	$100.00	$100.00	0.03	70.2	$7.16	13.97
H4	Vehicular Sallyport	8760	4	1	250w MH w/Qrtz Restrike, Surface Mnt.	290	1.16	10,161.6	$1,036.48	4	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Alum. Reflector, Wire Guard	148	0.59	5185.92	$528.96	$260.00	$1,040.00	0.57	4975.68	$507.52	2.05
1	Medical Corridor	8760	3	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.33	2,890.8	$294.86	3	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.26	2260.08	$230.53	$100.00	$300.00	0.07	630.72	$64.33	4.66

602		8760	1	2	Exit Sign - (2) 7w CFL Lamp	16	0.02	140.2	$14.30	1	1	Exit Sign - LED	2	0.00	17.52	$1.79	$65.00	$65.00	0.01	122.64	$12.51	5.20
1.1	Waiting/Reception	2600	4	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens, Secure	75	0.30	780.0	$79.56	4	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.19	499.2	$50.92	$100.00	$400.00	0.11	280.8	$28.64	13.97
602		8760	1	2	Exit Sign - (2) 7w CFL Lamp	16	0.02	140.2	$14.30	1	1	Exit Sign - LED	2	0.00	17.52	$1.79	$65.00	$65.00	0.01	122.64	$12.51	5.20
1.1	Restroom	2600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens, Secure	75	0.08	195.0	$19.89	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	124.8	$12.73	$100.00	$100.00	0.03	70.2	$7.16	13.97
1.1	Medical Corridor	5000	5	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens, Secure	75	0.38	1,875.0	$191.25	5	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.24	1200	$122.40	$100.00	$500.00	0.14	675	$68.85	7.26
602		8760	1	2	Exit Sign - (2) 7w CFL Lamp	16	0.02	140.2	$14.30	1	1	Exit Sign - LED	2	0.00	17.52	$1.79	$65.00	$65.00	0.01	122.64	$12.51	5.20
1.1	Medical Admin	2600	4	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens, Secure	75	0.30	780.0	$79.56	4	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.19	499.2	$50.92	$100.00	$400.00	0.11	280.8	$28.64	13.97
6	Staff Restroom	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
1.1	Exam Room	2600	4	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens, Secure	75	0.30	780.0	$79.56	4	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.19	499.2	$50.92	$100.00	$400.00	0.11	280.8	$28.64	13.97
6	Women's Restroom	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
6	Men's Restroom	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
1	Medical Storage	2600	2	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.22	572.0	$58.34	2	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.17	447.2	$45.61	$100.00	$200.00	0.05	124.8	$12.73	15.71
2	Maintenance Corridor	8760	5	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens	110	0.55	4,818.0	$491.44	5	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.43	3766.8	$384.21	$100.00	$500.00	0.12	1051.2	$107.22	4.66
602		8760	1	2	Exit Sign - (2) 7w CFL Lamp	16	0.02	140.2	$14.30	1	1	Exit Sign - LED	2	0.00	17.52	$1.79	$65.00	$65.00	0.01	122.64	$12.51	5.20
2	Laundry	5000	2	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens	110	0.22	1,100.0	$112.20	2	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.17	860	$87.72	$100.00	$200.00	0.05	240	$24.48	8.17
2	Personal Property Storage	5000	1	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens	110	0.11	550.0	$56.10	1	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.09	430	$43.86	$100.00	$100.00	0.02	120	$12.24	8.17
2	Housekeeping Storage	5000	3	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens	110	0.33	1,650.0	$168.30	3	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.26	1290	$131.58	$100.00	$300.00	0.07	360	$36.72	8.17
1	Dining Corridor	8760	6	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.66	5,781.6	$589.72	6	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.52	4520.16	$461.06	$100.00	$600.00	0.14	1261.44	$128.67	4.66

602		8760	3	2	Exit Sign - (2) 7w CFL Lamp	16	0.05	420.5	$42.89	3	1	Exit Sign - LED	2	0.01	52.56	$5.36	$65.00	$195.00	0.04	367.92	$37.53	5.20
1	Dining Room	5000	8	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.88	4,400.0	$448.80	8	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.69	3440	$350.88	$100.00	$800.00	0.19	960	$97.92	8.17
602		8760	2	2	Exit Sign - (2) 7w CFL Lamp	16	0.03	280.3	$28.59	2	1	Exit Sign - LED	2	0.00	35.04	$3.57	$65.00	$130.00	0.03	245.28	$25.02	5.20
1	Kitchen	5000	19	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	2.09	10,450.0	$1,065.90	19	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	1.63	8170	$833.34	$100.00	$1,900.00	0.46	2280	$232.56	8.17
1.1		5000	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens, Secure	75	0.08	375.0	$38.25	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	240	$24.48	$100.00	$100.00	0.03	135	$13.77	7.26
602		8760	2	2	Exit Sign - (2) 7w CFL Lamp	16	0.03	280.3	$28.59	2	1	Exit Sign - LED	2	0.00	35.04	$3.57	$65.00	$130.00	0.03	245.28	$25.02	5.20
1	Dry Storage	5000	4	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.44	2,200.0	$224.40	4	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.34	1720	$175.44	$100.00	$400.00	0.10	480	$48.96	8.17
1	Women's Restroom	2600	1	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.11	286.0	$29.17	1	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.09	223.6	$22.81	$100.00	$100.00	0.02	62.4	$6.36	15.71
1	Men's Restroom	2600	1	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.11	286.0	$29.17	1	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.09	223.6	$22.81	$100.00	$100.00	0.02	62.4	$6.36	15.71
1	Sallyport	8760	2	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.22	1,927.2	$196.57	2	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.17	1506.72	$153.69	$100.00	$200.00	0.05	420.48	$42.89	4.66
1.1	Cook's Office	2600	2	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens, Secure	75	0.15	390.0	$39.78	2	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.10	249.6	$25.46	$100.00	$200.00	0.05	140.4	$14.32	13.97
H3	Loading Dock	5000	4	1	250w MH w/Qrtz Restrike, Surface Mnt.	290	1.16	5,800.0	$591.60	4	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Alum. Reflector, Wire Guard	148	0.59	2960	$301.92	$260.00	$1,040.00	0.57	2840	$289.68	3.59
5	Mechanical Room	8760	6	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Pendant Mnt. w/Reflector	75	0.45	3,942.0	$402.08	6	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.37	3258.72	$332.39	$100.00	$600.00	0.08	683.28	$69.69	8.61
602		8760	1	2	Exit Sign - (2) 7w CFL Lamp	16	0.02	140.2	$14.30	1	1	Exit Sign - LED	2	0.00	17.52	$1.79	$65.00	$65.00	0.01	122.64	$12.51	5.20
5	Switchgear Room	8760	5	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Pendant Mnt. w/Reflector	75	0.38	3,285.0	$335.07	5	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.31	2715.6	$276.99	$100.00	$500.00	0.07	569.4	$58.08	8.61
2	Conference Room	2600	3	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens	110	0.33	858.0	$87.52	3	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.26	670.8	$68.42	$100.00	$300.00	0.07	187.2	$19.09	15.71
2	Office	2600	1	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens	110	0.11	286.0	$29.17	1	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.09	223.6	$22.81	$100.00	$100.00	0.02	62.4	$6.36	15.71
2	Maintenance Shop	5000	6	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens	110	0.66	3,300.0	$336.60	6	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.52	2580	$263.16	$100.00	$600.00	0.14	720	$73.44	8.17

Investment Grade Lighting Audit

1	South Housing Corridor	8760	14	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	1.54	13,490.4	$1,376.02	14	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	1.20	10547.04	$1,075.80	$100.00	$1,400.00	0.34	2943.36	$300.22	4.66
602		8760	4	2	Exit Sign - (2) 7w CFL Lamp	16	0.06	560.6	$57.19	4	1	Exit Sign - LED	2	0.01	70.08	$7.15	$65.00	$260.00	0.06	490.56	$50.04	5.20
1	North Housing Corridor	8760	12	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	1.32	11,563.2	$1,179.45	12	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	1.03	9040.32	$922.11	$100.00	$1,200.00	0.29	2522.88	$257.33	4.66
602		8760	4	2	Exit Sign - (2) 7w CFL Lamp	16	0.06	560.6	$57.19	4	1	Exit Sign - LED	2	0.01	70.08	$7.15	$65.00	$260.00	0.06	490.56	$50.04	5.20
		Housing Unit 1																				
H2	Dayroom	5000	4	1	250w MH w/Qrtz Restrike, Surface Mnt.	290	1.16	5,800.0	$591.60	4	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Alum. Reflector, Wire Guard	148	0.59	2960	$301.92	$260.00	$1,040.00	0.57	2840	$289.68	3.59
3		5000	16	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	1.20	6,000.0	$612.00	16	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.77	3840	$391.68	$100.00	$1,600.00	0.43	2160	$220.32	7.26
1.1		5000	3	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens, Secure	75	0.23	1,125.0	$114.75	3	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.14	720	$73.44	$100.00	$300.00	0.08	405	$41.31	7.26
602		8760	3	2	Exit Sign - (2) 7w CFL Lamp	16	0.05	420.5	$42.89	3	1	Exit Sign - LED	2	0.01	52.56	$5.36	$65.00	$195.00	0.04	367.92	$37.53	5.20
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	1st Floor Restroom w/Shower	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
6	1st Floor Restroom w/Shower	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	2nd Floor Restroom w/Shower	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01

3	Storage	600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	45.0	$4.59	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	28.8	$2.94	$100.00	$100.00	0.03	16.2	$1.65	60.52
3	Janitor's Closet	600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	45.0	$4.59	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	28.8	$2.94	$100.00	$100.00	0.03	16.2	$1.65	60.52
3	Staff Restroom	2600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	195.0	$19.89	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	124.8	$12.73	$100.00	$100.00	0.03	70.2	$7.16	13.97
3	Laundry	2600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	195.0	$19.89	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	124.8	$12.73	$100.00	$100.00	0.03	70.2	$7.16	13.97
3	Counseling	2600	2	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.15	390.0	$39.78	2	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.10	249.6	$25.46	$100.00	$200.00	0.05	140.4	$14.32	13.97
7	Stairway to 2nd Floor Storage and Penthuose - Units 1 & 2	600	1	1	Recessed Down Light, (1) 13w PL Lamp	16	0.02	9.6	$0.98	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
3		600	3	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.23	135.0	$13.77	3	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.14	86.4	$8.81	$100.00	$300.00	0.08	48.6	$4.96	60.52
6		600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	45.0	$4.59	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	37.2	$3.79	$100.00	$100.00	0.01	7.8	$0.80	125.69
602		8760	2	2	Exit Sign - (2) 7w CFL Lamp	16	0.03	280.3	$28.59	2	1	Exit Sign - LED	2	0.00	35.04	$3.57	$65.00	$130.00	0.03	245.28	$25.02	5.20
5	Storage Rooms	600	2	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Pendant Mnt. w/Reflector	75	0.15	90.0	$9.18	2	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.12	74.4	$7.59	$100.00	$200.00	0.03	15.6	$1.59	125.69
5	Penthouse	600	9	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Pendant Mnt. w/Reflector	75	0.68	405.0	$41.31	9	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.56	334.8	$34.15	$100.00	$900.00	0.12	70.2	$7.16	125.69
Housing Unit 2																						
H2	Dayroom	5000	6	1	250w MH w/Qrtz Restrike, Surface Mnt.	290	1.74	8,700.0	$887.40	6	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Alum. Reflector, Wire Guard	148	0.89	4440	$452.88	$260.00	$1,560.00	0.85	4260	$434.52	3.59
3		5000	12	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.90	4,500.0	$459.00	12	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.58	2880	$293.76	$100.00	$1,200.00	0.32	1620	$165.24	7.26
1.1		5000	7	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens, Secure	75	0.53	2,625.0	$267.75	7	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.34	1680	$171.36	$100.00	$700.00	0.19	945	$96.39	7.26
602		8760	3	2	Exit Sign - (2) 7w CFL Lamp	16	0.05	420.5	$42.89	3	1	Exit Sign - LED	2	0.01	52.56	$5.36	$65.00	$195.00	0.04	367.92	$37.53	5.20
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95

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6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	2nd Floor Restroom w/Shower	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
3	Janitor's Closet	600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	45.0	$4.59	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	28.8	$2.94	$100.00	$100.00	0.03	16.2	$1.65	60.52
3	Storage	600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	45.0	$4.59	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	28.8	$2.94	$100.00	$100.00	0.03	16.2	$1.65	60.52
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	1st Floor Restroom w/Shower	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
6	1st Floor Restroom w/Shower	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
3	Staff Restroom	2600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	195.0	$19.89	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	124.8	$12.73	$100.00	$100.00	0.03	70.2	$7.16	13.97

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3	Laundry	2600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	195.0	$19.89	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	124.8	$12.73	$100.00	$100.00	0.03	70.2	$7.16	13.97
3	Counseling	2600	2	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.15	390.0	$39.78	2	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.10	249.6	$25.46	$100.00	$200.00	0.05	140.4	$14.32	13.97
		Housing Unit 3																				
H2	Dayroom	5000	6	1	250w MH w/Qrtz Restrike, Surface Mnt.	290	1.74	8,700.0	$887.40	6	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Alum. Reflector, Wire Guard	148	0.89	4440	$452.88	$260.00	$1,560.00	0.85	4260	$434.52	3.59
3		5000	12	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.90	4,500.0	$459.00	12	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.58	2880	$293.76	$100.00	$1,200.00	0.32	1620	$165.24	7.26
1.1		5000	7	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens, Secure	75	0.53	2,625.0	$267.75	7	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.34	1680	$171.36	$100.00	$700.00	0.19	945	$96.39	7.26
602		8760	3	2	Exit Sign - (2) 7w CFL Lamp	16	0.05	420.5	$42.89	3	1	Exit Sign - LED	2	0.01	52.56	$5.36	$65.00	$195.00	0.04	367.92	$37.53	5.20
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	2nd Floor Restroom w/Shower	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
3	Janitor's Closet	600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	45.0	$4.59	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	28.8	$2.94	$100.00	$100.00	0.03	16.2	$1.65	60.52
3	Storage	600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	45.0	$4.59	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	28.8	$2.94	$100.00	$100.00	0.03	16.2	$1.65	60.52
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95

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6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	1st Floor Restroom w/Shower	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
6	1st Floor Restroom w/Shower	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
3	Staff Restroom	2600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	195.0	$19.89	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	124.8	$12.73	$100.00	$100.00	0.03	70.2	$7.16	13.97
3	Laundry	2600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	195.0	$19.89	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	124.8	$12.73	$100.00	$100.00	0.03	70.2	$7.16	13.97
3	Counseling	2600	2	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.15	390.0	$39.78	2	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.10	249.6	$25.46	$100.00	$200.00	0.05	140.4	$14.32	13.97
7	Stairway to 2nd Floor Storage and Penthuose - Units 3 & 4	600	1	1	Recessed Down Light, (1) 13w PL Lamp	16	0.02	9.6	$0.98	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
3		600	3	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.23	135.0	$13.77	3	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.14	86.4	$8.81	$100.00	$300.00	0.08	48.6	$4.96	60.52
6		600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	45.0	$4.59	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	37.2	$3.79	$100.00	$100.00	0.01	7.8	$0.80	125.69
602		8760	2	2	Exit Sign - (2) 7w CFL Lamp	16	0.03	280.3	$28.59	2	1	Exit Sign - LED	2	0.00	35.04	$3.57	$65.00	$130.00	0.03	245.28	$25.02	5.20
5	Storage Rooms	600	2	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Pendant Mnt. w/Reflector	75	0.15	90.0	$9.18	2	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.12	74.4	$7.59	$100.00	$200.00	0.03	15.6	$1.59	125.69
5	Penthouse	600	9	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Pendant Mnt. w/Reflector	75	0.68	405.0	$41.31	9	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.56	334.8	$34.15	$100.00	$900.00	0.12	70.2	$7.16	125.69
Housing Unit 4																						

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H2	Dayroom	5000	6	1	250w MH w/Qrtz Restrike, Surface Mnt.	290	1.74	8,700.0	$887.40	6	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Alum. Reflector, Wire Guard	148	0.89	4440	$452.88	$260.00	$1,560.00	0.85	4260	$434.52	3.59
3		5000	12	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.90	4,500.0	$459.00	12	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.58	2880	$293.76	$100.00	$1,200.00	0.32	1620	$165.24	7.26
1.1		5000	7	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens, Secure	75	0.53	2,625.0	$267.75	7	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.34	1680	$171.36	$100.00	$700.00	0.19	945	$96.39	7.26
602		8760	3	2	Exit Sign - (2) 7w CFL Lamp	16	0.05	420.5	$42.89	3	1	Exit Sign - LED	2	0.01	52.56	$5.36	$65.00	$195.00	0.04	367.92	$37.53	5.20
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	2nd Floor Restroom w/Shower	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
3	Janitor's Closet	600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	45.0	$4.59	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	28.8	$2.94	$100.00	$100.00	0.03	16.2	$1.65	60.52
3	Storage	600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	45.0	$4.59	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	28.8	$2.94	$100.00	$100.00	0.03	16.2	$1.65	60.52
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95

6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	1st Floor Restroom w/Shower	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
6	1st Floor Restroom w/Shower	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
3	Staff Restroom	2600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	195.0	$19.89	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	124.8	$12.73	$100.00	$100.00	0.03	70.2	$7.16	13.97
3	Laundry	2600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	195.0	$19.89	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	124.8	$12.73	$100.00	$100.00	0.03	70.2	$7.16	13.97
3	Counseling	2600	2	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.15	390.0	$39.78	2	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.10	249.6	$25.46	$100.00	$200.00	0.05	140.4	$14.32	13.97
		Housing Unit 5																				
H2	Dayroom	5000	6	1	250w MH w/Qrtz Restrike, Surface Mnt.	290	1.74	8,700.0	$887.40	6	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Alum. Reflector, Wire Guard	148	0.89	4440	$452.88	$260.00	$1,560.00	0.85	4260	$434.52	3.59
3		5000	12	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.90	4,500.0	$459.00	12	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.58	2880	$293.76	$100.00	$1,200.00	0.32	1620	$165.24	7.26
1.1		5000	7	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens, Secure	75	0.53	2,625.0	$267.75	7	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.34	1680	$171.36	$100.00	$700.00	0.19	945	$96.39	7.26
602		8760	3	2	Exit Sign - (2) 7w CFL Lamp	16	0.05	420.5	$42.89	3	1	Exit Sign - LED	2	0.01	52.56	$5.36	$65.00	$195.00	0.04	367.92	$37.53	5.20
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95

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6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	2nd Floor Restroom w/Shower	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
3	Janitor's Closet	600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	45.0	$4.59	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	28.8	$2.94	$100.00	$100.00	0.03	16.2	$1.65	60.52
3	Storage	600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	45.0	$4.59	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	28.8	$2.94	$100.00	$100.00	0.03	16.2	$1.65	60.52
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	1st Floor Restroom w/Shower	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
6	1st Floor Restroom w/Shower	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
3	Staff Restroom	2600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	195.0	$19.89	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	124.8	$12.73	$100.00	$100.00	0.03	70.2	$7.16	13.97
3	Laundry	2600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	195.0	$19.89	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	124.8	$12.73	$100.00	$100.00	0.03	70.2	$7.16	13.97
3	Counseling	2600	2	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.15	390.0	$39.78	2	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.10	249.6	$25.46	$100.00	$200.00	0.05	140.4	$14.32	13.97

7	Stairway to 2nd Floor Storage and Penthuose - Units 5 & 6	600	1	1	Recessed Down Light, (1) 13w PL Lamp	16	0.02	9.6	$0.98	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
3		600	3	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.23	135.0	$13.77	3	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.14	86.4	$8.81	$100.00	$300.00	0.08	48.6	$4.96	60.52
6		600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	45.0	$4.59	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	37.2	$3.79	$100.00	$100.00	0.01	7.8	$0.80	125.69
602		8760	2	2	Exit Sign - (2) 7w CFL Lamp	16	0.03	280.3	$28.59	2	1	Exit Sign - LED	2	0.00	35.04	$3.57	$65.00	$130.00	0.03	245.28	$25.02	5.20
5	Storage Rooms	600	2	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Pendant Mnt. w/Reflector	75	0.15	90.0	$9.18	2	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.12	74.4	$7.59	$100.00	$200.00	0.03	15.6	$1.59	125.69
5	Penthouse	600	9	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Pendant Mnt. w/Reflector	75	0.68	405.0	$41.31	9	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.56	334.8	$34.15	$100.00	$900.00	0.12	70.2	$7.16	125.69
	Housing Unit 6																					
H2	Dayroom	5000	6	1	250w MH w/Qrtz Restrike, Surface Mnt.	290	1.74	8,700.0	$887.40	6	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Alum. Reflector, Wire Guard	148	0.89	4440	$452.88	$260.00	$1,560.00	0.85	4260	$434.52	3.59
3		5000	12	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.90	4,500.0	$459.00	12	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.58	2880	$293.76	$100.00	$1,200.00	0.32	1620	$165.24	7.26
1.1		5000	7	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens, Secure	75	0.53	2,625.0	$267.75	7	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.34	1680	$171.36	$100.00	$700.00	0.19	945	$96.39	7.26
602		8760	3	2	Exit Sign - (2) 7w CFL Lamp	16	0.05	420.5	$42.89	3	1	Exit Sign - LED	2	0.01	52.56	$5.36	$65.00	$195.00	0.04	367.92	$37.53	5.20
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	2nd Floor Restroom w/Shower	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01

Investment Grade Lighting Audit

3	Janitor's Closet	600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	45.0	$4.59	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	28.8	$2.94	$100.00	$100.00	0.03	16.2	$1.65	60.52
3	Storage	600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	45.0	$4.59	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	28.8	$2.94	$100.00	$100.00	0.03	16.2	$1.65	60.52
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	Bedroom	3600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	270.0	$27.54	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	223.2	$22.77	$100.00	$100.00	0.01	46.8	$4.77	20.95
6	1st Floor Restroom w/Shower	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
6	1st Floor Restroom w/Shower	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
3	Staff Restroom	2600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	195.0	$19.89	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	124.8	$12.73	$100.00	$100.00	0.03	70.2	$7.16	13.97
3	Laundry	2600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.08	195.0	$19.89	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	124.8	$12.73	$100.00	$100.00	0.03	70.2	$7.16	13.97
3	Counseling	2600	2	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Surface Mnt., Polycarb. Lens, Secure	75	0.15	390.0	$39.78	2	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.10	249.6	$25.46	$100.00	$200.00	0.05	140.4	$14.32	13.97
1	Gymnasium Corridor	8760	3	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.33	2,890.8	$294.86	3	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.26	2260.08	$230.53	$100.00	$300.00	0.07	630.72	$64.33	4.66
602		8760	2	2	Exit Sign - (2) 7w CFL Lamp	16	0.03	280.3	$28.59	2	1	Exit Sign - LED	2	0.00	35.04	$3.57	$65.00	$130.00	0.03	245.28	$25.02	5.20
1	Women's Restroom	2600	1	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.11	286.0	$29.17	1	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.09	223.6	$22.81	$100.00	$100.00	0.02	62.4	$6.36	15.71
1.1		2600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens, Secure	75	0.08	195.0	$19.89	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	124.8	$12.73	$100.00	$100.00	0.03	70.2	$7.16	13.97

1	Men's Restroom	2600	1	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.11	286.0	$29.17	1	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.09	223.6	$22.81	$100.00	$100.00	0.02	62.4	$6.36	15.71
1.1		2600	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens, Secure	75	0.08	195.0	$19.89	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	124.8	$12.73	$100.00	$100.00	0.03	70.2	$7.16	13.97
1	Rec. Sallyport	8760	4	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.44	3,854.4	$393.15	4	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.34	3013.44	$307.37	$100.00	$400.00	0.10	840.96	$85.78	4.66
602		8760	1	2	Exit Sign - (2) 7w CFL Lamp	16	0.02	140.2	$14.30	1	1	Exit Sign - LED	2	0.00	17.52	$1.79	$65.00	$65.00	0.01	122.64	$12.51	5.20
2	Muster	5000	6	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens	110	0.66	3,300.0	$336.60	6	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.52	2580	$263.16	$100.00	$600.00	0.14	720	$73.44	8.17
1	Equipment Storage	600	2	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.22	132.0	$13.46	2	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.17	103.2	$10.53	$100.00	$200.00	0.05	28.8	$2.94	68.08
1	Rec. Supervisor	2600	2	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.22	572.0	$58.34	2	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.17	447.2	$45.61	$100.00	$200.00	0.05	124.8	$12.73	15.71
6	Women's Restroom	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
6	Men's Restroom	2600	1	2	1x4, 2 Lamp, 40w T12, Elect. Ballast. Surface Mnt., Poly Carb Lens, Vandalproof	75	0.08	195.0	$19.89	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	62	0.06	161.2	$16.44	$100.00	$100.00	0.01	33.8	$3.45	29.01
H1	Gym	5000	16	1	400w MH w/Qrtz Restrike, Pendant Mnt.	452	7.23	36,160.0	$3,688.32	16	6	2x4, 6 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Alum. Reflector, Wire Guard	218	3.49	17440	$1,778.88	$280.00	$4,480.00	3.74	18720	$1,909.44	2.35
1		5000	5	3	2x4, 3 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb Lens, Secure	110	0.55	2,750.0	$280.50	5	3	3 Lamp, 32w T8, Elect. Ballast; retrofit	86	0.43	2150	$219.30	$100.00	$500.00	0.12	600	$61.20	8.17
1.1		5000	1	2	2x2, 2 Lamp, 40w T12, Elect. Ballast, Recessed, Polycarb. Lens, Secure	75	0.08	375.0	$38.25	1	3	3 Lamp, 17w T8, Elect. Ballast, Specular Reflector; retrofit	48	0.05	240	$24.48	$100.00	$100.00	0.03	135	$13.77	7.26
602		8760	4	2	Exit Sign - (2) 7w CFL Lamp	16	0.06	560.6	$57.19	4	1	Exit Sign - LED	2	0.01	70.08	$7.15	$65.00	$260.00	0.06	490.56	$50.04	5.20
H5	Exterior	5000	9	1	250w HPS Wallpack	295	2.66	13,275.0	$1,354.05	9	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
	Totals		824				81.6	394,921	$40,282	824				52.8	250178	$25,518	$27,635	$85,725	25.47	126009	$12,853	6.67

NOTES: 1. Simple Payback noted in this spreadsheet does not include Maintenance Savings and NJ Smart Start Incentives.

2. Lamp totals only include T-12 tube replacement calculations

Project Name: LGEA Solar PV Project - Hudson County - Meadowview Psychiatric Hospital
Location: Secaucus, NJ
Description: Photovoltaic System - Direct Purchase

Simple Payback Analysis

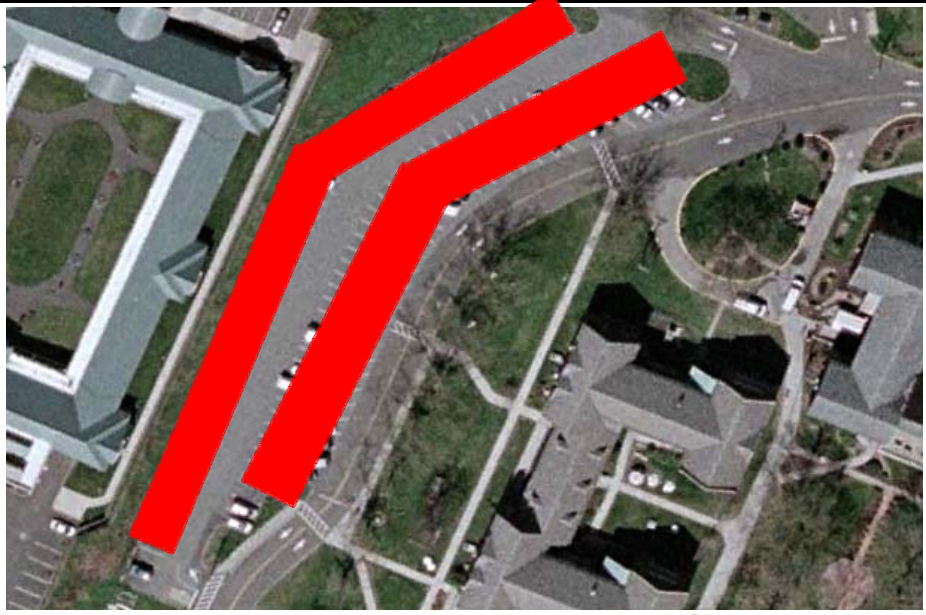
	Photovoltaic System - Direct Purchase
Total Construction Cost	$2,200,640
Annual kWh Production	317,868
Annual Energy Cost Reduction	$32,423
Annual SREC Revenue	$111,254
First Cost Premium	**$2,200,640**
Simple Payback:	**15.32** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.102**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/kWh)	$0.350

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Net Cash Flow	Cumulative Cash Flow
0	$2,200,640	0	0	0	$0	(2,200,640)	0
1	$0	317,868	$32,423	$0	$111,254	$143,676	($2,056,964)
2	$0	316,279	$33,395	$0	$110,698	$144,093	($1,912,871)
3	$0	314,697	$34,397	$0	$110,144	$144,541	($1,768,330)
4	$0	313,124	$35,429	$0	$109,593	$145,022	($1,623,308)
5	$0	311,558	$36,492	$3,209	$109,045	$142,328	($1,480,979)
6	$0	310,000	$37,587	$3,193	$108,500	$142,894	($1,338,086)
7	$0	308,450	$38,714	$3,177	$107,958	$143,495	($1,194,591)
8	$0	306,908	$39,876	$3,161	$107,418	$144,132	($1,050,459)
9	$0	305,374	$41,072	$3,145	$106,881	$144,807	($905,651)
10	$0	303,847	$42,304	$3,130	$106,346	$145,521	($760,130)
11	$0	302,327	$43,573	$3,114	$105,815	$146,274	($613,857)
12	$0	300,816	$44,880	$3,098	$105,286	$147,068	($466,789)
13	$0	299,312	$46,227	$3,083	$104,759	$147,903	($318,886)
14	$0	297,815	$47,614	$3,067	$104,235	$148,781	($170,105)
15	$0	296,326	$49,042	$3,052	$103,714	$149,704	($20,401)
16	$0	294,844	$50,513	$3,037	$103,196	$150,672	$130,271
17	$0	293,370	$52,029	$3,022	$102,680	$151,687	$281,958
18	$0	291,903	$53,590	$3,007	$102,166	$152,749	$434,707
19	$0	290,444	$55,197	$2,992	$101,655	$153,861	$588,568
20	$0	288,992	$56,853	$2,977	$101,147	$155,024	$743,591
21	$1	287,547	$58,559	$2,962	$100,641	$156,238	$899,830
22	$2	286,109	$60,315	$2,947	$100,138	$157,507	$1,057,336
23	$3	284,678	$62,125	$2,932	$99,637	$158,830	$1,216,167
24	$4	283,255	$63,989	$2,918	$99,139	$160,210	$1,376,377
25	$5	281,839	$65,908	$2,903	$98,644	$161,649	$1,538,026
	Totals:	7,487,683	$1,182,102	$64,125	$2,620,689	$3,738,666	($7,414,574)
				Net Present Value (NPV)			**$1,538,051**
				Internal Rate of Return (IRR)			**4.5%**

Building	PV Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW_{DC}	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
Juvenile Detention Center	23920	Sunpower SPR230	1,196	20.0	23,920	275.08	317,868	39,468	11.50



PVWatts

AC Energy & Cost Savings

Cautions for Interpreting the Results

Station Identification	
City:	Newark
State:	New_Jersey
Latitude:	40.70° N
Longitude:	74.17° W
Elevation:	9 m
PV System Specifications	
DC Rating:	275.1 kW
DC to AC Derate Factor:	0.810
AC Rating:	222.8 kW
Array Type:	Fixed Tilt
Array Tilt:	10.0°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	10.2 ¢/kWh

Results			
Month	Solar Radiation (kWh/m²/day)	AC Energy (kWh)	Energy Value ($)
1	2.39	16504	1683.41
2	3.17	20009	2040.92
3	4.07	28003	2856.31
4	4.83	31026	3164.65
5	5.70	36912	3765.02
6	5.94	36070	3679.14
7	5.77	35789	3650.48
8	5.38	33149	3381.20
9	4.65	28520	2909.04
10	3.61	23477	2394.65
11	2.35	14974	1527.35
12	2.01	13436	1370.47
Year	4.16	317868	32422.53

.= Proposed PV Layout

Notes:

1. Estimated kWH based on the National Renewable Energy Laboratory PVWatts Version 1 Calculator Program.

MELINK CORPORATION

INTELLI-HOOD VARIABLE EXHAUST CONTROLLER

ENERGY SAVINGS REPORT

COMPANY: CEG

RETROFIT

ADDRESS: Hudson County Juvenile Detention Center

Secaucus, NJ Mar-18-09

APPLICATION: Main Kitchen

- MOTOR OPERATING SAVINGS:	$607	/YEAR
- HEATING SAVINGS:	$966	/YEAR
- COOLING SAVINGS:	$1,237	/YEAR
- TOTAL SAVINGS:	$2,810	/YEAR
- INSTALLED COST:	$27,055	
- PAYBACK PERIOD:	9.6	YEARS
- RATE OF RETURN - 5 YEARS:	-16.8	%
10 YEARS:	3.2	%

The projected savings shown above are based on the above store's operating hours, HVAC system, cooking load, and geographic location.

I. MOTOR OPERATING SAVINGS

INPUT DATA:

A Operating Hours Per Day	14	HRS/DAY
B Operating Days Per Week	7	DAYS/WK
C Operating Weeks Per Year	52	WKS/YR
D Horsepower of Fan Motor(s)	3	HP
E Load Factor of Fan Motor(s)	0.88	
F Cost Per Kilowatt Hour	0.102	$/KWHR

CONSTANT EXHAUST VOLUME ANALYSIS:

G Total Time (A x B x C)	5096	HRS/YR
H Total KWHR/HP/YR (0.746/0.9 x G)	4224.0	KWHR/HP/YR

VARIABLE EXHAUST VOLUME ANALYSIS:

% Rated RPM H	% Run Time I	Time HRS/YR J=FxI	Output KW/HP K	System Effic. L	Input KW/HP M=K/L	KWHR/ HP/YR N=JxM
100	18.75	955.5	0.746	0.9	0.829	792.0
90	12.5	637	0.544	0.9	0.604	385.0
80	25	1274	0.382	0.9	0.424	540.7
70	0	0	0.256	0.9	0.284	0.0
60	18.75	955.5	0.161	0.9	0.179	170.9
50	12.5	637	0.093	0.9	0.103	65.8
40	0	0	0.048	0.9	0.053	0.0
30	12.5	637	0.020	0.9	0.022	14.2
20	0	0	0.015	0.9	0.017	0.0
10	0	0	0.010	0.90	0.011	0.0
O Total KWH/HP/YR (Total of Column N)						1968.7

CALCULATION:

SAVINGS = (H - O) x D x E x F = $607 /YEAR

==========

II. CONDITIONED MAKE-UP AIR - HEATING

INPUT DATA:

A Previous Net Exhaust Volume	12000	CFM
B New Net Exhaust Volume (1)	8550	CFM
C Winter Building Temperature	68	F
D Previous Net Heat Load (2)	544320	kBTU
E New Net Heat Load (2)	387828	kBTU
F Operating Hours Per Day	14	HRS/DAY
G Operating Days Per Week	7	DAYS/WK
- Heating Fuel Type	Steam	
H Cost Per Fuel Unit (3)	7.2	$/UNIT
J BTU Per Fuel Unit (4)	1,000	kBTU/UNIT
K System Efficiency (4)	0.7	

CALCULATION:

SAVINGS = (D - E) x 0.6 x H / (J x K)

= $966 /YEAR
==========

NOTES:

(1) Determine the New Exhaust Volume by completing TABLE 1. The New Exhaust Volume equals the AVG % RPM x the Previous Exhaust Volume.

(2) Using design weather data via the Outdoor Airload Calculator and multiplied by days/year ratio.

(3) Using local energy costs.

(4) Using typical system efficiency.

TABLE 1

% Rated RPM (F)	% Run Time (I)	F x I
100	19	19
90	13	11
80	25	20
70	0	0
60	19	11
50	13	6
40	0	0
30	13	4
20	0	0
10	0	0
	AVG % RPM =	71%

III. CONDITIONED MAKE-UP AIR SAVINGS - COOLING

INPUT DATA:

A Previous Net Exhaust Volume	12000	CFM
B New Net Exhaust Volume (1)	8550	CFM
C Previous Net Cooling Load (2)	240000	kBTU
D New Net Cooling Load (2)	171000	kBTU
E AC Correction Factor (3)	1	
F Cost Per Fuel Unit (5)	0.102	$/kWH
G COP (6)	1	

CALCULATION:

SAVINGS = (C - D) x 0.6 x E x F / (3.413 x G)

= $1,237 /YEAR

NOTES:

(1) Using New Exhaust Volume from CONDITIONED MAKE-UP AIR SAVINGS - HEATING on page 2. See Note 1.

(2) Obtained from Outdoor Airload Calculator

(3) Using design weather data.

(4) The multiplier corrects for actual % outside air.

(5) Using local energy costs.

(6) Using typical system efficiency.

AFTER-TAX CASH FLOW ANALYSIS

INPUT DATA:

FIRST YEAR SAVINGS	$2,810 /YEAR
INITIAL COST PLUS INSTALLATION	$27,055
MARGINAL TAX RATE	0%
ESTIMATED ANNUAL INCREASE IN ENERGY COSTS	3%

YEAR	SAVINGS	COST	DEPREC. %	DEPREC. $	NET AFTER-TAX CASH FLOW
0		-27,055			-27,055
1	2810	-	29	7846	2810
2	2895	-	20	5411	2895
3	2982	-	13	3517	2982
4	3071	-	10	2705	3071
5	3163	-	9	2435	3163
6	3258	-	9	2435	3258
7	3356	-	9	2435	3356
8	3456	-			3456
9	3560	-			3560
10	3667	-			3667

CALCULATIONS:

NET PRESENT VALUE = 5 YEARS @ 15%	-$14,899 ;	INTERNAL RATE OF RETURN (IRR) =	-16.8 %
NET PRESENT VALUE = 10 YEARS @ 15%	-$9,926 ;	INTERNAL RATE OF RETURN (IRR) =	3.2 %

NOTE:

Net After-tax Cash Flow is calculated as follows:
NATCF = SAVINGS - COSTS - TAX RATE(SAVINGS - COSTS - DEPRECIATION)

Net Present Value is calculated as follows:
NPV = C(0) + C(1)/(1 + r) + C(2)/(1 + r)^2 + ... + C(n)/(1 + r)^n
(where C(n) is the net cash flow for the nth year
and r is the opportunity cost of capital)

IRR is calculated by trial and error using the formula:
NPV = C(0) + C(1)/(1 + IRR) + C(2)/(1 + IRR)^2 + ... + C(n)/(1 + IRR)^n