ENERGY AUDIT REPORT

FOR

SOMERSET COUNTY BUSINESS PARTNERSHIP

LEADERSHIP • OPPORTUNITY • RESULTS

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PREPARED BY

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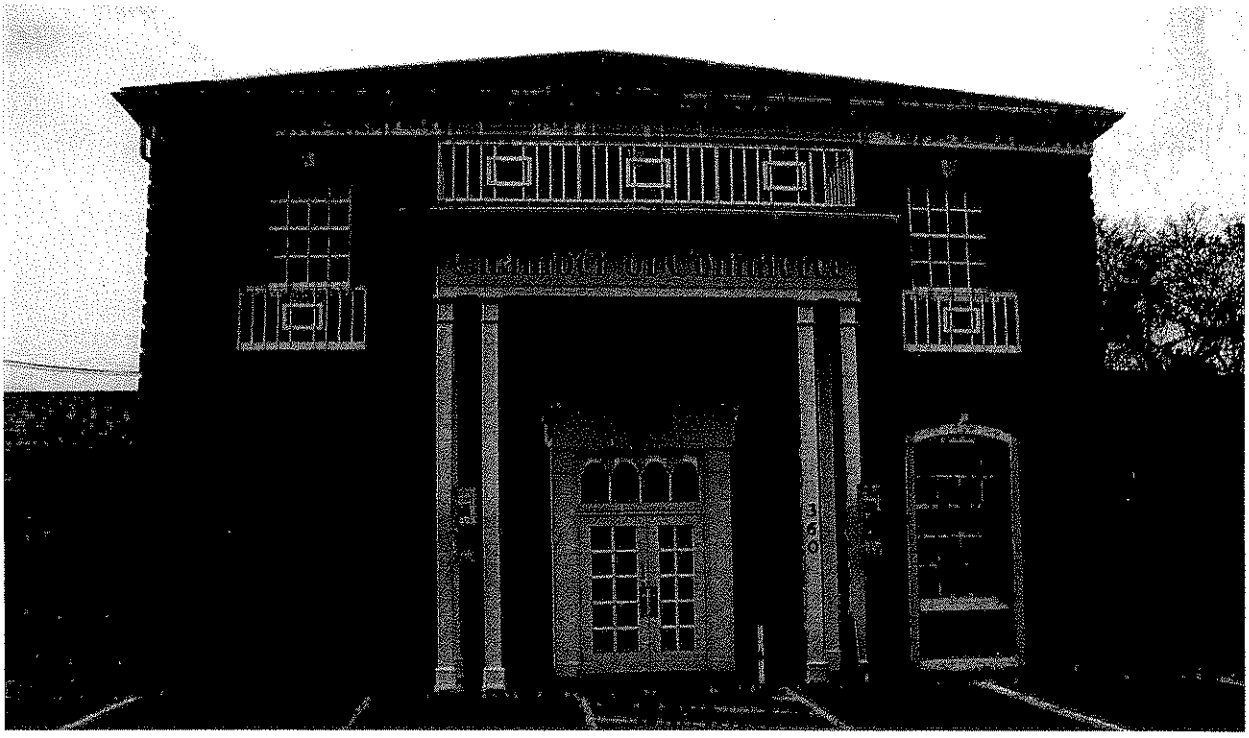
PURPOSE

The Somerset County Business Partnership is an office building encompassing approximately 8000 square feet of floor area. It is comprised of a series of offices, conference rooms and general work areas. There is an equipment room for the bulk of office equipment, a kitchen area and a general records storage area.

The purpose of this study is to evaluate the energy consumption of the building, and identify opportunities for cost-effective energy conservation measures and corresponding reduction of carbon emissions.



Somerset County Business Partnership

EXECUTIVE SUMMARY

Data for this building was difficult to obtain. The landlord, Advanced Realty, would not release energy bills for DeFeo Associates to review. Accordingly, we have relied upon data transferred to a spreadsheet by the Somerset County Business Partnership. Certain data is incomplete including therms of natural gas consumed, KW demand charges are somewhat questionable and price per therm breakdowns were not available. Accordingly, certain analysis within this report will be limited.

In addition, the Business Partnership has made it clear that financial considerations are critical at this location. Accordingly, this audit only includes low cost, rapid return recommendations. In depth analysis of high level energy conservation measures (ECM's) are not included within this report nor does the report contain any detailed ROI and savings calculations.

For the past year, the building consumed $990 in natural gas, and $16,854 in electricity, or a total energy cost of approximately $2.23 per square foot. This is 48% higher than the energy consumption per square foot for an office building according to the Energy Information Administration (EIA).

Additionally, EIA data estimates that 39% of the energy consumed by a typical office building is attributable to the heating, cooling and ventilation systems. Another 29% of the energy is consumed by lighting. Office equipment consumes 16% of the total energy.

Therefore, improving the efficiency and operating effectiveness of these systems has a significant potential impact on the overall energy use. This report presents the findings of our survey and analysis of these systems.

Several significant opportunities for reducing energy use within this building were identified, and are described in this report. These opportunities include no cost behavioral changes and changes in equipment that could lead to further savings.

Lighting within the building already consists of energy efficient T-8 fluorescent bulbs. However, there are a limited number of incandescent lights both inside and outside of the building that can be modified. The primary savings opportunity for lighting consists of behavior modification in relation to lighting usage and/or the installation of automated controls.

In regard to the HVAC Systems, there are several opportunities for improvement that are included in this report. Replacing the heating system provides the largest capital improvement opportunity for energy savings however cost considerations may preclude taking action on this ECM at this time.

The air conditioning systems are also dated and could be improved. Again, financial considerations may preclude this. However, it is recommended that additional analysis be performed to determine the opportunity for improved cost savings in this area.

For both heating and air-conditioning, the Business Partnership should consider negotiating improvements with the landlord should a lease renewal be imminent.

Thermal envelope changes (that is the walls of the building and certain window changes) offer limited energy savings from a cost effectiveness standpoint. However, as this report will outline, there are intangible comfort effects that certain improvements to the windows may confer which transcend simple ROI analysis.

METHODOLOGY

This report is a heavily modified Level 1 Energy Audit, as described in the *Procedures for Commercial Energy Audits* Manual RP-669, as published by the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE). This process normally includes the following tasks:

1. Physical survey
2. Basic equipment assessment
3. Capacity analysis
4. Energy consumption analysis
5. Benchmarking
6. Reduction analysis
7. Payback analysis

For the purpose of this report and in the interest of time, a benchmarking analysis, capacity analysis and reduction analysis were not conducted on this building. In addition, certain calculations were not performed in order to expedite the results of the survey.

Where feasible and timely, energy efficiency and cost analysis was performed to a limited degree. A full Level I Energy Audit would have required more time and resources than was available for this project.

PHYSICAL SURVEY

DeFeo Associates conducted physical inspections of the space occupied by the Business Partnership to determine the general arrangement, construction, usage, and types of HVAC Systems installed. Though outside the scope of the study, where the building envelope or other issues were obvious impediments to the building efficiency, these items have been noted. Likewise, analysis of the electrical power systems are beyond the scope of this study, but where obvious efficiencies can be gained, they are noted in this report.

EQUIPMENT ASSESSMENT

The inspections included visual observation of the mechanical systems to assess their relative age, type and efficiency. A description of these systems is included within the narrative of this report.

CAPACITY ANALYSIS

One contributing factor to energy waste is excess capacity. When systems are oversized, their standby losses and cycle-times waste energy, compared to "right-sized" systems. We compared the gross system capacities to the square footage of the building area, where possible, to assess whether the capacities seem appropriate.

EXISTING CONDITIONS

BUILDING CONSTRUCTION

The building consists of a two-story brick structure that includes two complete floors of office space for rent. The Business Partnership occupies the complete first floor of the building. Currently the second floor of the building is unoccupied.

The original use of the building was a bank. Based on similar buildings with similar uses in the area, the estimated age of the building is 40+/- years.

The business partnership has approximately 8000 ft^2 of total floor space. The office population is 14 people.

The building is wood framed, with brick walls and sloped roof. The roof is constructed of slate. Although a North – South orientation exists the slate roof currently precludes the installation of solar on this structure. The building was pre-existing before being rented by the Business Partnership; so original design documents are not available.

There is a post construction addition on the building that contains all of the private offices located within the business partnership.

The building has a number of windows. There is a mix of window quality present in the building based on the age of that portion of the building in use.

Window Distribution

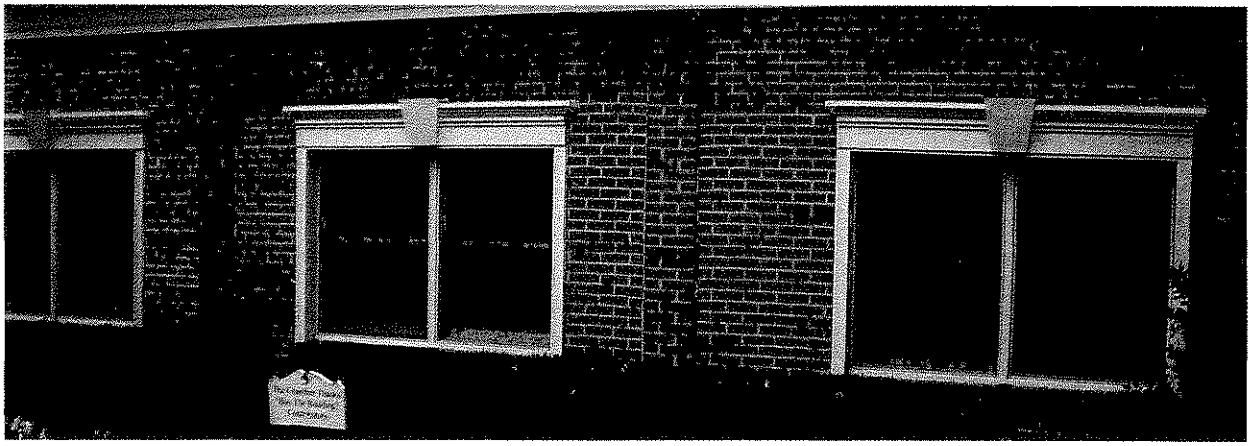
North	South	East	West
5	7	6	6

There are three door systems in the building; two on the north side of the building and one, the main entrance, on the south side of the building. Two of these entrances have an airlock system in place that allows for greater retention of conditioned air. However, the rear entrance is a simple double door that lacks any thermal protection. This door allows for substantial heat loss in the winter and heat gain in the summer. In addition, the door allows for increased drafts to enter the building and negatively effects worker comfort.

The original building has old style, poorly designed thermal windows. These windows have metal frames and lack thermal breaks in their construction. Accordingly, they demonstrate poor thermal protection. In addition, many of the window seals have failed. This results in condensation between the panes and increased thermal conductivity.


Note condensation in window frame

The newer portion of the building contains thermal windows that are of a more recent design. However, staff indicates that these windows have significant drafts present.



The building usage is approximately 40 hours per week, eight (8) hours per day, M-F. The facility consists of the following design areas:

1. Main Lobby
2. Conference Room
3. Entranceways
4. Offices (7)
5. Large open office spaces
6. Kitchen Area
7. Computer Room
8. Store Room

THERMAL ENVELOPE

The insulation thickness above the roof is unknown, but can be presumed to be marginal. Testing of the walls and infrared imaging are beyond the scope of this study.

However, preliminary results of a short-range scanner indicate that the walls are insulated to some degree. Nonetheless, there is little opportunity to improve the thermal performance of the walls in this building due to their construction.

Windows and doors are generally poor. While two of the door systems have air locks in place that help to control thermal comfort, weather-stripping is in generally poor condition and allows for substantial heat loss/gain.

Windows are thermally in poor condition and in several cases have failed seals that further degrade their efficiency. More importantly, the poor condition of the windows results in significant discomfort for office occupants. This results in employee behavior that includes raising thermostats and often results in decreased productivity.

LIGHTING/LIGHTING CONTROLS

The lighting systems throughout the building are predominately 32 watt - T8 Fluorescent bulbs in the office areas with several high-hat fluorescent fixtures using 23-watt pin lamp bulbs in the lobby/entrance area. These are generally efficient fixtures and bulbs and there are no recommendations for replacement at this time.

Outdoor building lighting consists of incandescent light fixtures attached to the building. The bulbs in these fixtures can be easily replaced with compact fluorescent bulbs to enhance energy savings.

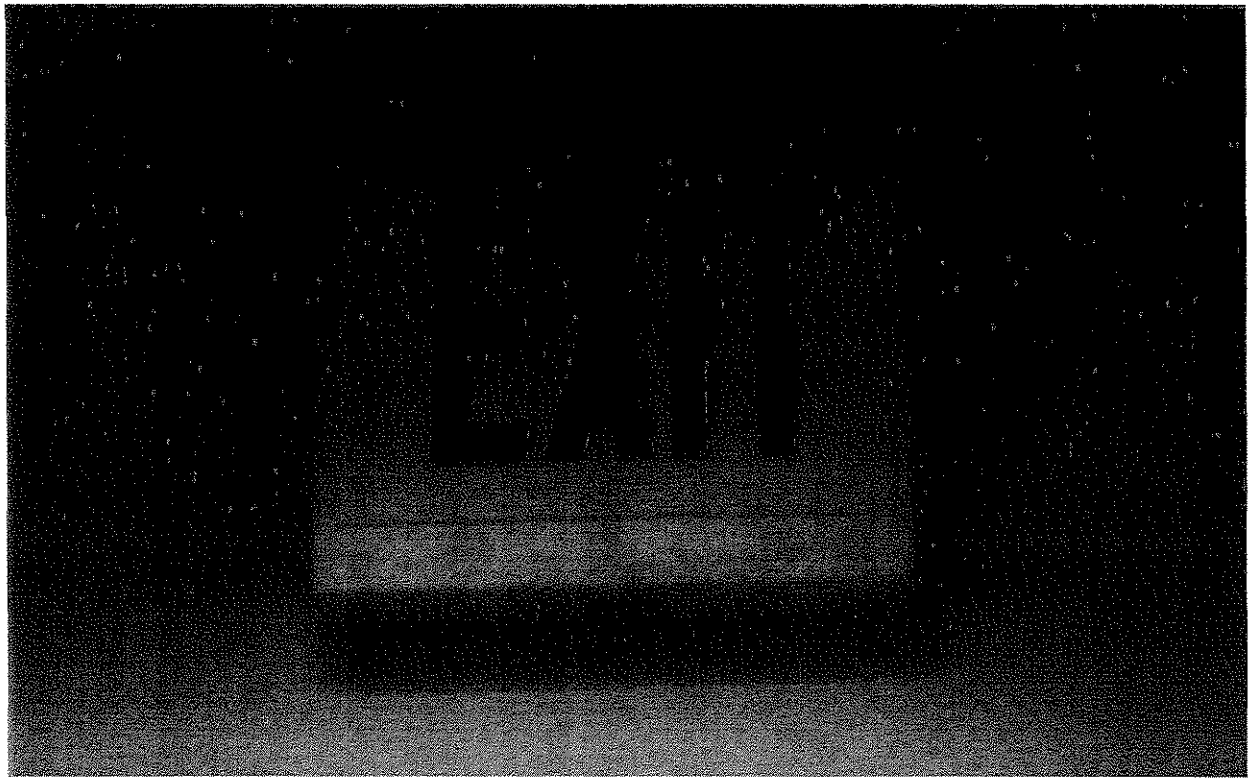
There is one motion sensor located in the storage room of the building. The remaining controls are manual light switches that rely on individual behavior to control the room lighting.

Manual controls often fail due to individual behavior. Note the sign below and the fact that although the room was not occupied, the lights were left on. Motions sensors would prevent this waste of electricity.

However, motion sensors also have an initial capital cost. With only 14 employees in the building, it may be possible to simply engage in Community Based Social Marketing training and modify people's behavior to correct this problem.

If employees can be trained to turn off lights when they are not needed, annual savings could easily accrue in excess of $1000.00/year through reduced electricity consumption.

The building contains several exit signs. Note that at least one sign was not operational during this audit. **THIS IS A SAFETY ISSUE AND SHOULD BE ADDRESSED IMMEDIATELY.**



All exit signs should be LED style in order to maximize energy savings. LED exit signs consume approximately 5 watts of power versus as many as 40 watts for conventional signs.

OFFICE EQUIPMENT

As is typical in a modern office, the Business Partnership has a large quantity of office equipment in place throughout the office complex. Equipment includes copiers, printers; fax machines, computers, monitors and miscellaneous equipment such as staplers and shredders.

Based on the general standard of energy consumption for office equipment, the total cost of operation for these items exceeds $2600.00 dollars per year.

The majority of the equipment is located in the business hub portion of the office. This space is a small room with copiers and large - scale printers.

Although much of the equipment is Energy Star rated, not all is so listed. Specifically, it does not appear that at least one printer several of the computer monitors are not Energy Star rated.

It also appears that most computers are left in the on position throughout the day and night. This equates to a 24 - hour electrical consumption of as much as 1000 kilowatts each year for simple idling time. Concurrently, peripheral equipment such as ink jet printers and monitors also appeared to be in the on position when staff was not using the equipment. This results in additional energy losses.

In addition, all of the office equipment was installed directly to electrical outlets or in standard surge protectors. This type of configuration subjects the office to "vampire" electrical usage.

Even surge protector/transformer strips consume as much as 35 kilowatts of energy per year.

HVAC SYSTEMS

The building is served by a single gas fired forced hot air heating system. The unit appears to be approximately 20 years in age. Based on the age and appearance of the unit, its estimated efficiency is less than 70%.

The central air conditioning system is currently 16 years old. Replacing this system with an energy star rated system could reduce cooling costs by approximately 30%.

For both systems, the common duct - work does not appear to be insulated or properly sealed. The failure to seal and insulate forced air system duct - work can result in cost increases exceeding more than 20% for the operation of the system.

OBSERVATIONS AND RECOMMENDATIONS

THERMAL ENVELOPE

Walls and Roof: Although the thermal envelope is marginal, in general the cost benefit of retrofitting existing walls is not economical. Insulating the roof would be economical for the building owner however; this is dependent on age and condition. Also, as the Business Partnership does not occupy the second floor, this type of repair falls outside of the scope of this audit.

Windows: The current windows in some areas of the building provide very little insulation due to their age and condition. The windows could be replaced with sealed double-pane windows with thermal breaks.

Where appropriate, the windows should also be tinted, coated and have interior shading control. Changing out the windows will reduce the amount heat transfer that occurs during the winter and summer months, reducing the load on the HVAC system. However, the payback period for new high-quality windows is lengthy. As the Business Partnership does not own the building, it would be difficult to justify this expense unless

a long - term lease (in excess of 15 years) is contemplated. Notwithstanding this finding, it would benefit the future condition of the building and its ability to secure long-term tenants if the building owner considered such a renovation.

An alternative is to install interior glazing panels, which can be field applied to improve the thermal efficiency. These systems do not achieve the efficiency levels available from sealed units, but are dramatically less expensive. Nonetheless, the payback period can be very lengthy and the same caveat applies as to new windows.

A third alternative is to install insulated window treatments that can be raised and lowered as needed. Aluminum mini-blinds such as those currently in use offer no insulating value. There are a number of insulated window treatments that are available for this type of application.

Note that as most window treatments do not allow for seals that completely prevent air infiltration, it is difficult to estimate cost-paybacks. Also, window treatments (with the exception of mechanical systems that are either controlled by timers or temperature sensors) require that staff be educated in their use. If these conditions are met, they can be very effective tools in achieving worker comfort and reducing heat loss form the building.

Recommendation:

Consider the installation of thermal window treatments that allow for sealed tracks. Train staff in their use and monitor on a continuous basis. This is a much lower cost alternative to new windows and the treatments can be moved to a new location when needed.

Example:

LIGHTING

The lighting levels in the open areas, offices and conference rooms were found to be high, between 60 and 100 foot-candles. Lighting levels should be about 40-50 foot-candles in these areas, based on the IESNA Lighting Handbook.

These areas consists mainly of 2'x4' - (3) lamp recessed parabolic fixtures with 32w T8 lamps and electronic ballasts. There are also a number of 2x2 - (2) lamp parabolic reflectors with (2) 31W T8 U lamps and electronic ballasts.

Two lights are left on twenty-four hours per day for security reasons. These lights consume approximately $240 more in energy per year than is necessary. By simply placing these lights on infrared or motion sensors, the Business Partnership can reduce total energy consumption and maintain the intent of security lighting.

It was noted during the site visit that several areas throughout the facility could benefit by using occupancy sensors to automatically control lighting. Our recommendation is to install occupancy sensors in the following areas:

1. All restrooms
2. All offices and conference rooms
3. Open areas
4. The break room
5. Hallways

Replace burned out exit sign lights with LED exit signs to both comply with fire safety standards and reduce energy consumption.

Recommendation:

Reduce foot-candle output in areas where recommended standards are exceeded by removing one (1) lamp per fixture. Re-measure lighting levels to determine acceptable standards are still in place. This will result in a significant savings in lighting costs with no capital outlay.

Encourage the use of energy efficient task lighting at workstations and desks. 13 - watt natural daylight bulbs should be sufficient for this task. Also, each desk area in the common work areas is supplied with an under-cabinet task light that would meet necessary standards.

Either engage in employee education at no cost to reduce lighting consumption, or install occupancy sensors in each of the above areas.

Installation of motion sensors in these areas can help reduce lighting costs by over 30%, or more than $660 each year. Paybacks for motion sensors are typically under three years. Total motion sensors required: 10+/-

Behavior changes with the same result will have an immediate payback.

OFFICE EQUIPMENT:

Given that the office equipment in the Business Partnership location accounts for over $2600 per year in electric consumption, any measure that can reduce such consumption should be considered. This includes the reduction of vampire losses.

RECOMMENDATIONS:

Insure that all office equipment purchased is Energy Star Rated. Also, instruct staff to turn all equipment off when they are leaving the office for extended periods.

Work with the IT Department to coordinate backup procedures either during normal business hours (at the close of the business day), or in the alternative, create a flexible time period when such work can be completed that allows for the equipment in the office to be turned off at the end of the day.

Leaving office equipment off when during non business hours can reduce electric usage for such equipment by nearly 60%, or in the case of the Business Partnership, save up to $1000 per year in electric costs (the lower dollar savings relates to a limited impact on demand charges).

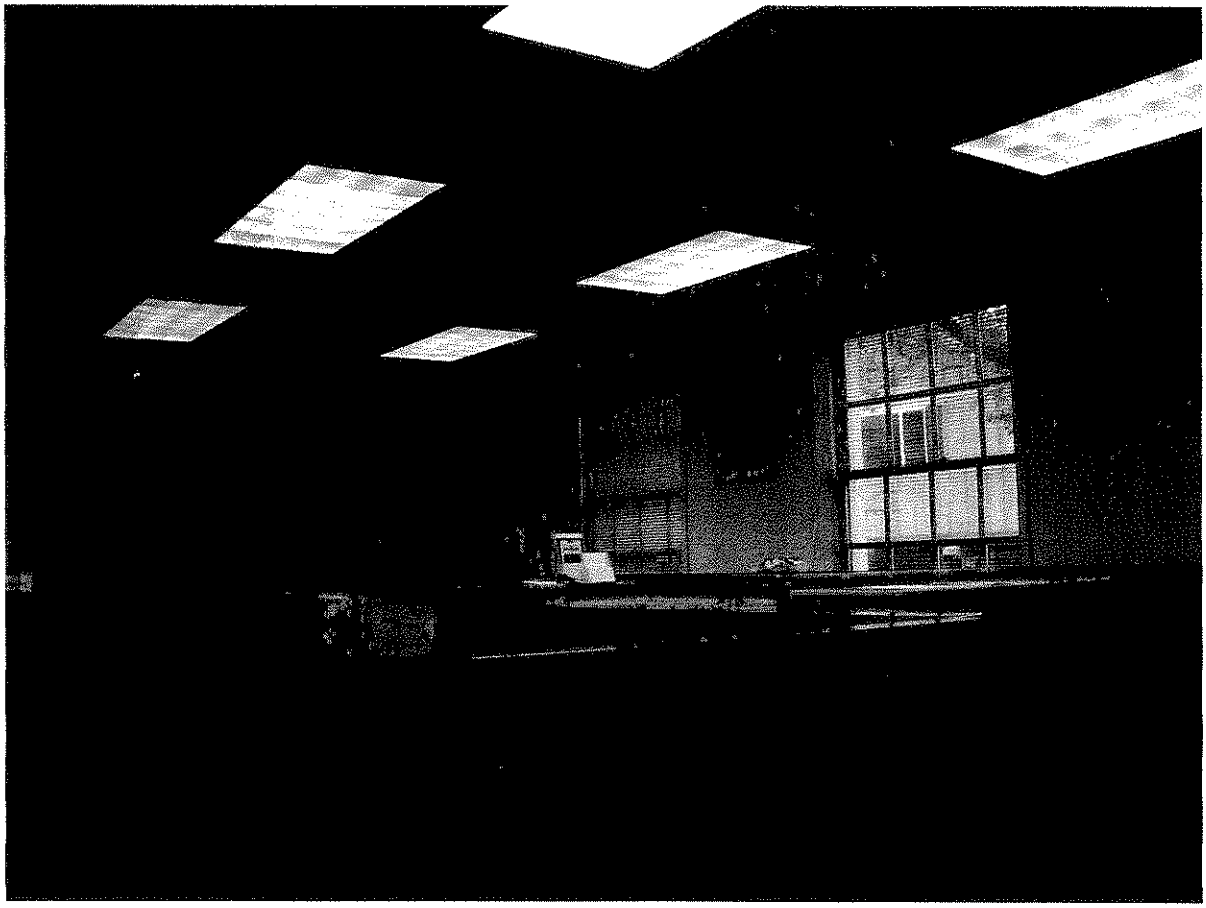
In addition, the Business Partnership should consider utilizing power strips that are "smart." This type of strip (available from multiple manufacturers) can reduce or nearly eliminate vampire losses.

In addition, they can be configured to shut down all peripheral equipment such as monitors and small printers when the main power is shut off to the computer. Such devices can have a payback of less than three months.

DAY LIGHTING

The use of natural daylight via windows can be an effective energy conservation measure while simultaneously improving the productivity and wellbeing of employees. The building is well situated to allow for more effective natural day - lighting of this workspace.

Each wall of the building has large windows that provide over 30 square feet of natural day lighting per window. Unfortunately, the current cubicle configuration in the open areas impedes accessibility to this light.



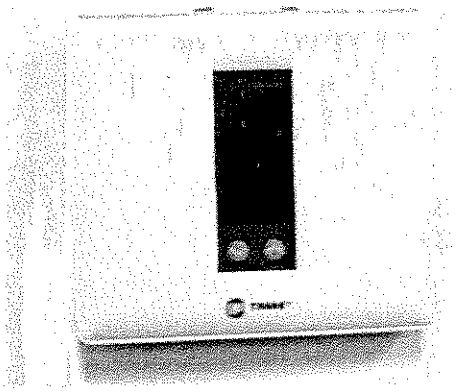
Recommendations:
Improve day-lighting distribution by reconfiguring cubicle layout and removing obstructions to windows. Utilize appropriate shading technology where needed to reduce solar heat gain while allowing natural light to enter the building.

HVAC SYSTEMS

General The air conditioning unit for this space should be considered for replacement if the Business Partnership expects to remain in this building for more than five years.

Thermostats Although the building is equipped with programmable thermostats, it was evident during the audit that each of the thermostats was set for a twenty-four hour heating cycle seven days per week at a constant temperature. This not only causes the heat to operate all of the time, it requires that the building be heated when it is not occupied. While surveying the building, it was found that building occupants had changed many of the settings on the thermostats.

In addition, the air conditioning system was engaged simultaneously during the heating season. This requires the air conditioning system to operate on warm winter days when the system is not actually needed to provide a comfortable work environment, as the setting is an arbitrary number on the thermostat.



During the audit, each of the thermostats was reconfigured by Business Partnership Staff to maximize energy savings. In addition, the air conditioning system was turned off for the season.

Recommendations:

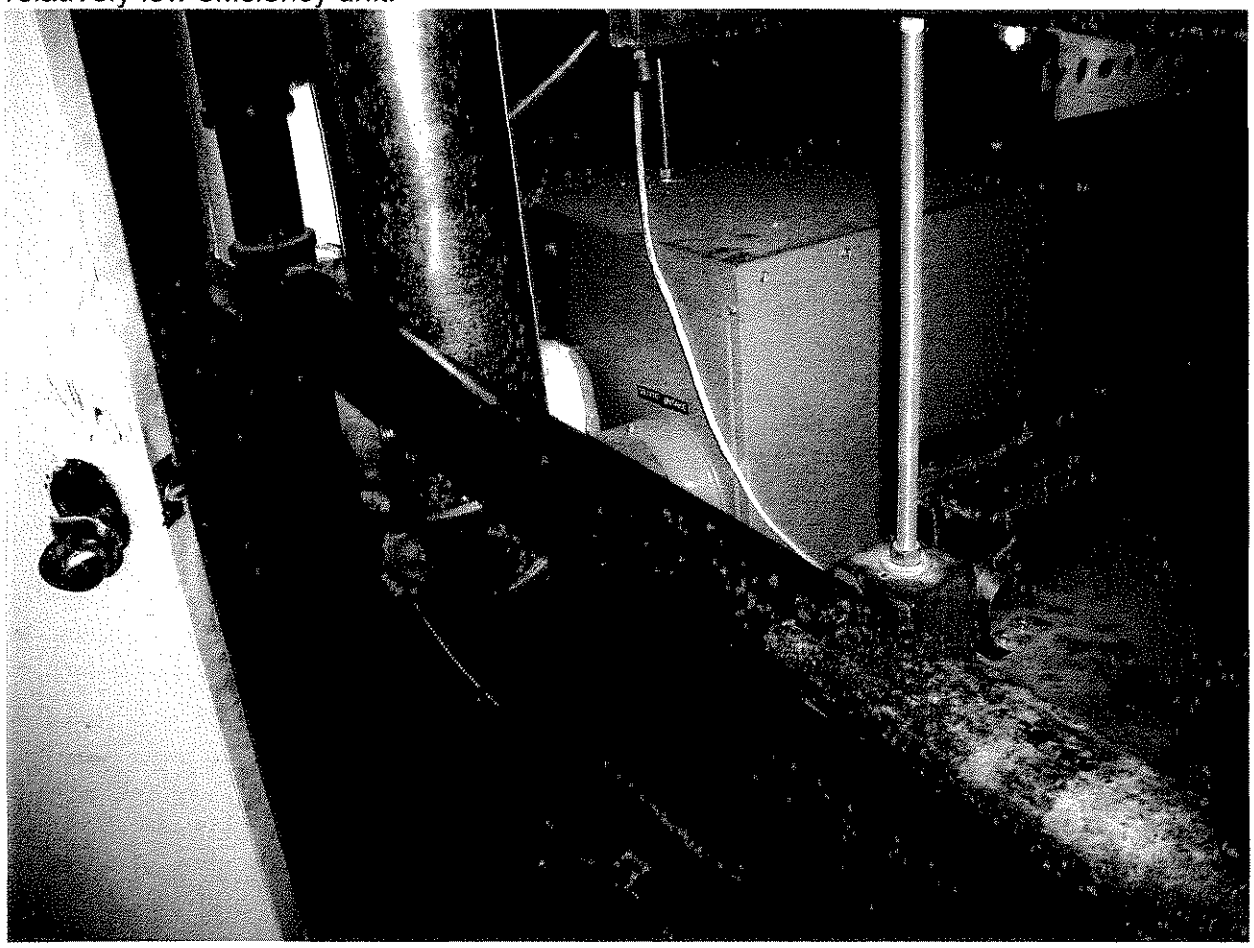
Complete resetting all thermostats to reflect occupancy use within the building. Educate staff as to the effect of improper thermostat use. Engage the heating system during the heating season and the air conditioning system during the cooling system only.

If necessary, install thermostat locks to prevent unauthorized access to the temperature settings.

Finally, it is important that staff be interviewed as to their comfort needs to determine why the thermostat is being manipulated. By gaining an understanding with regard to staff comfort needs, the Business Partnership can engage in employee education to mitigate future problems with thermostat settings.

Changes in thermostat settings have no cost associated to them and offer savings of up to 10% of gas costs or approximately $100/year with an immediate payback.

Furnace Replacement: The existing furnace is more than 16 years old and is a relatively low efficiency unit.



Recommendations:

Remove the existing furnace and install a new smaller, high-efficiency Furnace. However, this improvement falls outside the scope of tenant actions. The Tenant should consult with the building owner to determine whether the owner will assist in this matter.

HOT WATER

Hot water is currently supplied by an electric hot water heater located in the mechanical room on the second floor of the building. The unit is not insulated, nor are the pipes in the space insulated.

Based on the unit's energy label, its projected electric consumption is 4933kwh per year. This is relatively inefficient unit.

Utilizing an average electric cost of $.19/kwh, the unit is currently costing approximately $940/year.

Recommendations:

This unit should be heavily insulated and the pipes leading from the unit should be insulated to prevent standby heat loss.

Estimated savings is about $94/year. Cost of insulating a tank is typically no more than the cost of the insulating jacket (as this can be done in house) and this amounts to approximately $20. The payback on this measure should be approximately three (3) months. If an outside contractor must install the insulation, payback may be extended to 6 -12 months.