ATTACHMENT A
PREVIOUS ENERGY RELATED STUDIES

1. Philadelphia Museum of Art- Report of Energy Conservation Opportunities- May 2008
2. Additional Reports will be provided at a later date

COPY

PHILADELPHIA
MUSEUM
OF ART

Box 7646, Philadelphia, PA 19101-7646 · 215 763-8100 · Fax 215 236-4465 · www.philamuseum.org

29 May 2008

Kent R. Miller, Executive Director
Municipal Energy Office
1401 JFK Blvd., Suite 1000
Philadelphia, PA 19102

Re: Report on Energy Conservation Possibilities at the Museum

Dear Kent:

As always, it has been terrific to partner with you and the City, and the Museum is eager to participate in the Municipal Energy Office's current program for advancing energy conservation in City facilities. To quickly take the next step in moving forward with your program, given the complexity of the Museum's facilities, we hired Altieri Sebor Wieber Consulting Engineers, which is one of the country's leading engineering firms with a specialization in museums and the requirements associated with the storage and display of precious art. We are attaching Altieri's preliminary draft report, which begins to identify energy conservation possibilities at the Museum in response to the April 28, 2008 Philly Stat session and the goal to reduce energy use by 2.5%in each of the next four years from the baseline usage of FY08.

As you know, the City owns the Museum's 80-year-old main building, the Perelman Building, and other buildings, and provides for the Museum's energy needs. The enclosed report indicates a substantial return on investment associated with projects that would reduce energy consumption, and I would draw your attention to the executive summary chart on page 2. As we proceed, we are encouraged that there may be City funds that would support the additional needed studies and the necessary capital investment.

Please also note that the Museum's integrated Master Plan is a ten-to-fifteen year project to renovate, upgrade, and expand the Museum facility in order to allow for growth of the Museum's public service. As the Master Plan moves forward, we will implement far-reaching infrastructure improvements, including the replacement of antiquated utility systems, and this will significantly improve the Museum's energy efficiency. At the same time, we are eager to participate as proactively as possible in the more immediate goals of your current energy-reduction program as an important step toward shared long-term goals.

With the Perelman Building opening last fall but still not fully occupied and commissioned, one of the most important and difficult tasks for this energy conservation program will be to establish realistic benchmarks for energy usage for FY09 and beyond for our two major facilities. Although recently a steam usage meter for

PHILADELPHIA MUSEUM OF ART

Perelman has been installed as part of the Perelman project, separate metering for electric and chilled water is not currently available. More complete and detailed energy usage data for our facilities will need to be collected and studied, in order to establish the realistic benchmarks, identify practical targets for effective energy conservation, demonstrate to you and to the Managing Director the return on investment for the capital investments required, and monitor the progress of initiatives toward those targets.

We have focused the preliminary study on the Main building and the Perelman Building which are not only the largest buildings on our campus but are also linked together by two direct burial utility trenches (one with steam and chilled water and the other with high voltage electric and fiber optic communications) which cross Kelly Drive and Pennsylvania Avenue from the main building to Perelman. As you know, the trench was part of an energy conservation effort that came out of studies related to our Engineering Master Plan. Your participation in that plan was of great value, and as you will recall, the intention was to develop a central plant approach for our main buildings which would afford greater efficiencies relative to the option of building separate cooling plants with electric and steam feeds at each building. At the very least it would allow for single peak loads versus multiple ones. A key aspect of this was a CPO project to replace an aging chiller in the main museum with one that could handle the new load from Perelman. Although we have had use of the chiller for both the Main Museum and Perelman for the last two years, the CPO project has not been sufficiently completed to allow us the ability for free cooling; you will see that Altieri's report indicates a 300,000 kWH/year savings will be achieved with the successful completion of this project.

As you will see in the Altieri report, there is no shortage of preliminary ideas on ways in which meaningful energy-use reductions over the short term can be achieved at the Museum. Some of them can be done with little or no capital investment. That being said, the meaningful work ahead will be to undertake the further engineering study needed to identify and pursue the most feasible and cost-effective targets for this program.

Again, we are very glad to have your support in these efforts and we look forward to a discussion of the enclosed findings and the Museum's continuing involvement in this MEO program. Please let us know if you have any immediate questions, and we thank you for your ongoing commitment to the Museum.

Sincerely,

Robert Morrone
Director of Facilities and Operations

cc:
James Bryan
Rich Reinert
[redacted]
James Sutton
William Valerio

AltieriSeborWieber LLC

Philadelphia Museum of Art

Report of Energy Conservation Opportunities

Issue Date: May 29, 2008

Consulting Engineers 31 Knight Street Norwalk, CT 06851 203.866.5538 fax: 203.866.5243

I. Objective:

This report was commissioned by the Philadelphia Museum of Art in response to the Municipal Energy Office mandate for reduction in energy consumption at all City-owned buildings. An initial meeting was held on May 5, 2008, followed by discussions between representatives of **AltieriSeborWieber** LLC and the Philadelphia Museum of Art (PMA). On May 15, 2008, engineers from **AltieriSeborWieber** LLC conducted a walk through inspection of the PMA for the purpose of identifying immediate and short-term opportunities for electrical energy conservation, and as part of this exercise, a brief review of the recently completed Perelman Building was conducted, also for the purpose of identifying energy savings measures.

This study did not, at the request of the Museum, consider measures that would substantially affect the preservation of the collection or the operating hours of the Museum.

It is also important to establish the appropriate energy benchmarks by which energy consumption reductions under the MEO program would be measured. Current usage history alone (e.g., FY08 energy usage data as noted in the MEO April 28 presentation materials) is not sufficient. For example, the recent operating history of the Perelman Building includes a period during which the building systems were undergoing the commissioning process, and there are areas of the Perelman Building that are not yet fully occupied; as staff continues to move in, it can be expected that energy consumption for the areas affected will increase. Generally speaking, therefore, for a successful energy-use reduction program to be developed for the PMA facilities, more detailed usage data should be collected and studied, to better understand what actual "out of range" conditions exist, to develop practical and effective reduction targets, and to monitor the progress of initiatives toward those targets. For this, the following would be required:

- New electric metering on the Perelman Service.
- Chilled water flow and temperature differential monitoring of the cooling required at Perelman.
- New programming and software may be required to coordinate the chilled water usage with the operation of the economizer system.

In order to provide the MEO with a museum-specific frame of reference, we include below a comparison of the PMA to two peer institutions for which we have recent energy information. Important factors that would affect energy use are (1) age of building and systems, (2) building envelope, and (3) operating schedule and visitorship.

	GSF	kWh/GSF/Yr	Steam/Gas Therms/GSF/Yr.
Philadelphia Art Museum	754,313	26.43	94695
Museum of Modern Art	630,000	32.01	140071
Walters Art Museum	159,400	36.57	53234

This report should be considered preliminary. At the direction of the Museum, we have focused our attention in two areas.

Category I. Elimination of waste, deferred maintenance, or changes in operating strategy that will yield immediate savings, with little or no capital investment.

Category II. Low capital cost initiatives, which have an anticipated payback of three years or less.

We have also identified projects, which would require significant capital expenditure for further study.

Category III. Initiatives requiring substantial capital investment with a payback period of 5 years or higher.

II. Executive Summary

Cat'	Bldg	Work Item	Payback	Energy Savings Goal	Order of Magnitude Capital Cost
I	All	Study, develop, and institute inhouse employee energy policy	immediate	to be determined	in house labor
I	MB	Demand control of ventilation - Unoccupied	<1 year	5,000 M-lbs steam 95,000 kWh/year	$50,000
I	MB	Demand control of ventilation - Occupied	<1 year	900 M-lbs/year 48000 kWh/year	$50,000
I	MB	Re-activate water economizer	immediate	300,000 kWh per year	Completion of existing City Contract on chillers
I	MB	Repair steam expansion Joint(s)	immediate	unknown	$40,000
I	P	HVAC system post commissioning adjustment	immediate	to be determined	study and consulting fees
I	P	Shorten Perelman Bldg exterior lighting schedule	immediate	10% to 15% of current use	study and consulting fees
I	P	Minimize Zone Humidifier Use	unknown	300 M-lbs/year	study and consulting fees
I	P	Optimize lighting occupancy schedule	immediate	4% of current use	study and consulting fees
II	All	Install occupancy sensors for lighting control	<3 years	10% to 20% of current use	more study required
II	MB	Modernize lighting controls	<3 years	225,000 kWh/year	more study required
II	MB	Extend lighting controls to all sections	<3 years	300,000 kWh/year	more study required
II	MB	Modernize lay lighting systems	<5 years	10% to 15% of current use	more study required
II	MB	Retire all incandescent lighting		70,000 kWh/year	more study required
II	MB	HVAC fan drive replacement	<3 years	1,000,000 kWh/year	$150,000 - $250,000
III	MB	Extraction of low grade heat from condensate	5 - 15 years	10% of steam use	>$1,000,000
III	MB	Radiation system losses	unknown	to be determined	$250,000
III	P	Install dimming ballasts	5 - 10 years	10% to 15% of current use	to be determined
III	P	Conservation system energy recovery	5 - 10 years	350 M-lbs/year 1500 kWh per year	$75,000 - $100,000
III	P	Minimize window heating	Unknown	to be determined	study and consulting fees
III	P	Energy recovery from cooling load	7 - 10 years	to be determined	$100,000 - $200,000

The above energy savings goals are very coarse estimates based upon a brief study. It is recommended that a more detailed study be commissioned to confirm these initial projections.

III. Energy Conservation Measures - Main Museum Building

A. Demand Control of Ventilation Air [Category I]:

Outdoor air is required to offset the effects of human occupancy. ASHRAE Standard 62 has varied over the years with the per person requirement varying between 7-1/2 and 15 CFM per occupant.

The latest ASHRAE Standard 62.1 of 2004 split the requirement into two components; the "people rate" and the "area rate." This calculation results in between 8 and 9 CFM per person.

Building Codes and LEED standards permit the measurement of CO_2 levels for the purpose of controlling the outside air quantity to match occupancy. The Building Automation System monitors the CO_2 level and adjusts the outside air dampers accordingly.

From a review of the original 1974 Air Conditioning and Humidification documents, we have concluded that the engineers at that time allowed for considerably more outdoor air than is required by current standards.

Moreover, the outdoor air quantity is constant, irrespective of the building occupancy. By our estimation, the several systems serving the Museum introduce an average of 25,000 CFM on a continuous basis.

Unoccupied Operation:

Preliminary Analysis:

Currently the outside air dampers for the Museum are in a fixed position and remain open 24/7. The Museum is open to the public 46 hours per week. For the remaining 122 hours the outside air dampers can remain shut..

During winter months, this unnecessary outdoor air must be heating and humidified to maintain the gallery conditions. It is our estimation that closing the outdoor air dampers during unoccupied periods will result in a reduction in steam consumption of **5,000 M-lbs** per year or between 5% and 7% of FY 2007 consumption.

In summer, we have estimated that the Museum's cooling system performs over 100,000 ton-hours of unnecessary cooling, consuming approximately **95,000 kWh** of electricity.

Implementation:

At some point the dampers operators were removed and the damper positions fixed. For each of 14 major systems, new damper operators will be required. Several BAS control points will be required to operate the dampers in accordance with the Museum's operating schedule. The anticipated payback would be **<u>less than 6 months</u>.**

Occupied Operation:

Preliminary Analysis:

Records maintained by the Museum indicated an average occupancy of 750. From this we would anticipate a need for ventilation air (outside air) of 7,500 CFM (10 CFM per person).

Based upon the over supply of ventilation air (outdoor air) we estimate a potential savings of **900 M-lbs** of steam in reduced humidification and **48,000 kWh** per year due to reduced cooling and dehumidification of outdoor air.

Implementation:

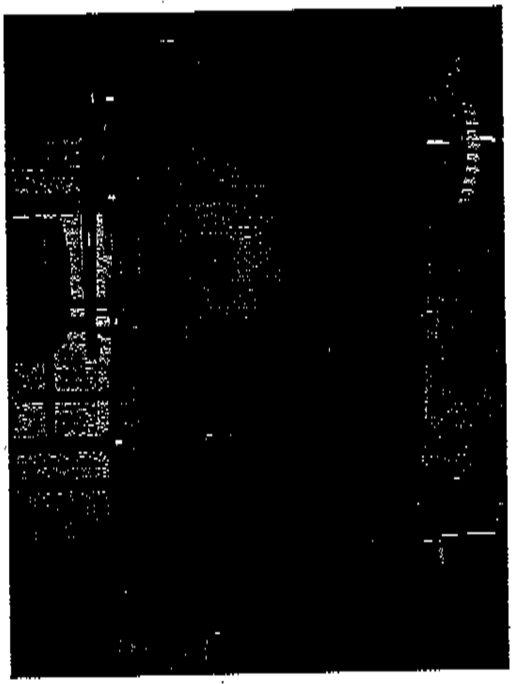
The same damper operator that controls the ventilation air dampers during unoccupied periods may be used to meter the amount of outdoor air necessary for occupancy at any particular time. Additional control instrumentation will be necessary to real time measure CO2 levels in various areas of the building.

B. Completion of Capital Project – [Category I]

1. Operation of Water Economizer:

We have been told that the water economizer system employed by the Museum for many years has not operated at the Museum over the last two winters. This appears to be due to the City-funded project to modernize the Museum's existing chiller plant not yet having been successfully completed.

This situation is certainly responsible for considerable energy use. During the months of November through February, there are more than 2000 hours during which the water economizer would operate. Even a conservative estimate of 300 tons of cooling would result in savings of more than 300,000 kWh per year.



Water Side Economizer Savings Could be Substantial Once Repairs are Complete

C. Deferred Maintenance – [Category I]

1. Repair of existing steam expansion joints.

We have been advised that the Museum is in the process of repairing the second of two large expansion joints, which had developed leaks. The Museum believes that this situation is partly responsible for the increased use of steam over the most recent 18 months.

D. Modernization of the HVAC Fan Drive System – [Category II]:

Preliminary Analysis:

Most of the major air-handling systems serving the museum are equipped with variable pitch vane-axial fans. The aggregate motor horsepower of the several systems is approximately 700 HP.

The systems are of the variable air volume type. To control system volume with a vane-axial fan, the blade pitch is adjusted. Fan horsepower is approximately proportional with system CFM. For example if system volume is reduced from 100% to 80% the fan horsepower also reduces by 20%.

Beginning in the early 1980's variable frequency drive technology has been used to control air system volume. The effect of fan speed reduction is a much more powerful energy conservation tool. If fan speed is reduced by 20%, so does the system air volume. Fan brake horsepower however reduces as a cube function, resulting in an energy reduction of almost 50% $[\mathbf{1 - (0.8)^3}]$.

Since the Museum operates in unoccupied mode for 6344 hours per year, it is reasonable to assume that a fan energy reduction of 30% during this period is achievable.

We estimate the energy savings potential during occupied and unoccupied modes to be **in excess of 1,000,000 kWh per year**.

Implementation:

Fan motors would require replacement in each case with new higher efficiency motors rated for VFD duty. The new variable frequency drives will replace existing motor starters. New BAS points will be needed to measure system static pressure and modulate fan speed.

E. More efficient use of the Trigen's steam service – [Category III].

1. Heat Extraction Process – Preliminary Analysis:

The Museum receives Trigen Steam service at 150 psig. The pressure is reduced to 5 psig and used by the several building HVAC appliances. Once the latent energy is removed, liquid steam condensate is collected at 210°F then sent to several condensate cooling systems where the temperature is reduced to below 140°F. This process uses domestic water for cooling. The cooled condensate is then discharged into the sanitary sewer.

The energy contained in the steam purchased by the City on behalf of the Museum is approximately 1200 Btu per pound. The HVAC appliances use approximately 985 Btu per pound. Once in the form of condensate, approximately 150 Btu per pound that is available from the condensate is wasted down the drain. In summary, the process for extracting the usable energy from steam is inherently wasteful, using only 82% of the energy in the steam supplied. This does not even consider the losses from the pressure reduction process and the transportation of the energy around the museum.

In the main museum, steam is universally used for humidity, heating coils, and perimeter radiation.

2. Perimeter Radiation:

The perimeter radiation system in the Museum is in a partial state of failure. There are leaks in the system in some location, which cannot be reached for repair. In other locations, steam energy is wasted due to hand valves that cannot regulate the flow of steam to radiation. In other areas radiation runs year round because the Museum does not have the ability to control or shut it down.

The radiation system was designed to offset losses at the buildings monolithic windows and minimize the formation of condensation in winter.

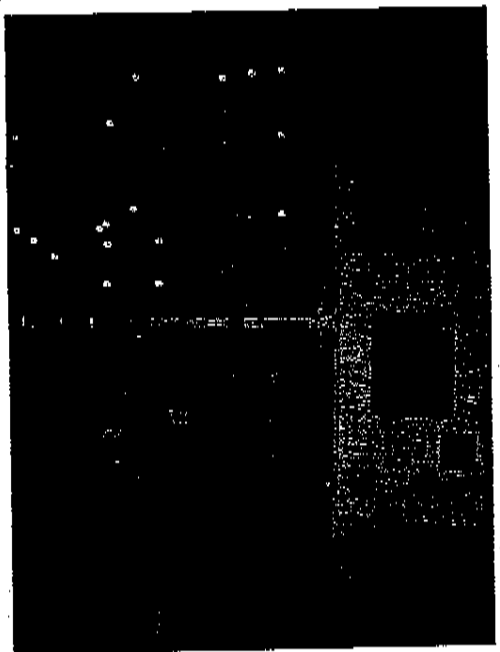
F. Electrical

1. Lighting Controls – [Category II]

The Museum lighting is switched by a 17 year old GE TLC relay system in Sections 3,5,6,7 and includes a Micro Light controller. Parts and support are diminishing, as both systems are no longer manufactured. Lights are typically energized daily at 7 am and remain on until 7 pm. Then security manually switches lighting back on until about 8:30 pm for cleaning staff. Night lighting remains energized throughout the evening for security watchman rounds. If a watchman activates and fails to switch off lighting, the entire section remains energized. Alternatively, if someone works late in his or her office, the entire section remains on. Four energy saving options are proposed:

- Reduce operating hours 15-30 minutes in each section to match arrival/departure of staff and cleaning activities. Potential savings: 4 sections, 500 – 1000 kWH/day or 150,000 – 300,000 kWH/year.
- Replace and expand the lighting control system to include all seven sections of the Museum. Savings: 225,000 – 450,000 kWH/year.
- Re-zone the lighting controls to allow reduced lighting levels for non-public hours and to automatically shutdown lighting if left on.

- Replace local light switches with occupancy sensors. Examples include: offices, restrooms, storage, mechanical/electrical rooms, back of house corridors. Also, Loft lighting in most sections typically remains on regardless of occupancy. Savings: 2 w/sf x 100,000 sf x 3 hours/day = 180,000 kWH/year.



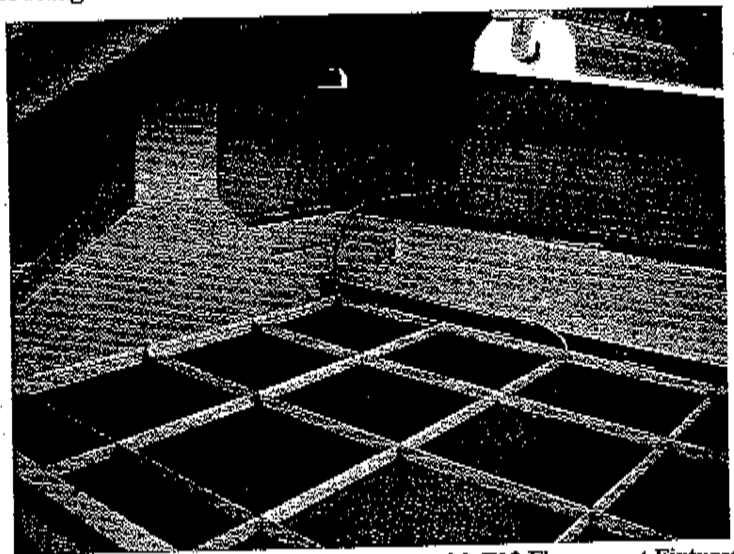
Museum recognizes the need to replace the existing obsolete GE TLC/Micro Light control system

2. Lighting

A 1991 renovation upgraded the majority of fluorescent lighting from T12 magnetic ballasted fixtures to T8 electronic ballasted types. As these fixtures fail, typically after 10-15 years, several replacement options can be considered. Some options involve achieving target or lower light levels for a lower fixed wattage. Examples include energy-saving T8 lamps in 25W, 28W and 30W models operated on low (0.71-0.78) and normal (0.87-0.88) ballast factor instant-start or programmed-start ballasts.

Other options involve using high-lumen lamps with low ballast factor ballast or using a high-lumen system and then reducing the size of the system (delamping). Examples include high-lumen T8 ("Super T8") lamps with a low, normal or high (1.14-1.20) ballast factor ballast, or dimming ballast. Specific opportunities include:

- Upgrades to Laylighting - Much of the laylighting (artificial skylights and backlit windows) were not converted in 1991and continue operating with less efficient T12 5000°K sunshine full spectrum lamps. Conversion would entail accessing the fixtures from below via mechanical lift during non-public hours. Upgrade would involve replacing lamps and ballasts; the existing lamp sockets and fixture housings could remain.



Typical Artificially Illuminated Laylight with T12 Fluorescent Fixtures

- Although many incandescent lamps have been replaced, added opportunities were noted during our field survey including cafeteria & dining rooms, restroom vestibules and back of house corridors. Replacement with self-ballasted fluorescent lamps typically results in payback less than six months. Other examples include the elevator car lighting that may operate as much as 24 hours per day. Savings: Est. 200 lamps x 100 w each = 72,000 kWH/year.

3. **Miscellaneous**

- Upgrade elevator motors (typically 50 hp) to premium efficiency with variable frequency drives.
- Provide thermostatic controls on electrical and mechanical room exhaust fans that presently run continuously. Examples: Electrical substation rooms (1 hp).
- Add variable frequency drives to Fairmount Park fountain pumps before pumps are turned on July '08. Savings: Est. 20 hp & 20% reduction = 1000 kWH/year.
- Upgrade aging twin 15 hp air compressors in the chiller room that supply building tool and laboratory air. Optimizing a compressed air system can provide energy-efficiency improvements of 20-50%. Simple measures for saving energy include detecting and fixing air leaks. Installing variable-speed drives on compressors can also save energy.

When intaking cooler air, which is more dense, compressors use less energy to produce the required pressure. For example, if 90°F intake air is tempered with cooler air from another source to 70°F, the 20°F temperature drop will lower operating costs by almost 3.5 percent.

- Ceiling mounted electric space heaters at exit vestibules were noted alongside hot water cabinet unit heaters to provide supplemental comfort heating. Recommend eliminating the electric units and replacing or repairing the hydronic units to restore proper operation.
- Adjust computer workstations to enable screensavers after 30 seconds. The use of dark screen savers can mitigate bright backgrounds, reducing monitor power up to 20%. Configure monitors to turn off after 20 minutes of inactivity, hard drives to turn off after 30 minutes of inactivity, and desktop computers or laptops to go into a standby or sleep mode after 90 minutes of inactivity. Potential savings based on 200 workstations: 20,000 kWH/year.

IV. Energy Conservation Measures - Perelman Building:

A. Overview:

The Perelman Building is currently at the end of the commissioning process. It is not yet fully occupied. There are numerous systems, which have been designed based upon allowances for lighting, population, and schedule, which have not been tested of confirmed. We believe it would be prudent to install additional monitoring devices to establish the appropriate benchmark for the energy consumption of the newly renovated building. Not only would this allow the Museum to establish energy benchmarks, it would provide better data to monitor the continued operation of the main building.

B. Energy Conservation Opportunities

1. Zone Performance Archiving – [Category I]

The Perelman Building systems serve areas requiring close temperature humidity tolerances. To that end, the design team specified numerous constant variable and volume reheat systems with central and zone humidification capability.

Over time, the minimum flow setting of individual zones can be tested with the knowledge of recorded operating performance. Over time zone terminal minimum set points may be adjusted and savings of both cooling and reheat achieved.

2. Energy Recovery – [Category III]

The conservation areas of the building are served by systems, which provided 80% outside air. No energy recovery mechanism was specified. The installation of a sensible energy recovery two-coil system could save as much as 40% of the winter heating cost. Estimated savings would be 350 M-lbs of steam and 1500 kWh per year.

3. **Minimize the use of zone humidifiers – [Category I]:**

   The zone humidifiers are of the type that maintains a heated dispersion tube jacket to minimize any condensation carry over in the duct. This has two effects

   - Steam is continuously consumed whether or not the humidifier is operating.
   - The jacket imparts heat to the air stream, which must be compensated for by the cooling system.

   The zone humidifiers steam supply should be shut off at all times except when needed in mid winter to achieve specified humidity levels.

4. **Operate the window dehumidification system only in the coldest weather (T_o below 40°F) – [Category I]**

   The Perelman Building is provided with a system to dissipate any moisture, which leaks into the cavity between the new insulating windows and the original steel frame single glass windows. This system should only be necessary to remove condensation, which accumulates if the inner insulated window is opened for cleaning. It is implicit that the original window will be less tightly sealed than the new, so it is possible that any leakage from the humidified environment during "normal" operation will leak out naturally.

5. **Recover cooling system waste heat during summer – [Category III].**

   The Perelman Building systems require heat for humidity control on a year round basis. Steam is consumed to produce heating hot water for use in zone VAV terminal reheat coils. 130°F hot water can be produced without the need for steam consumption in summer such that the entire steam service to the Perelman Building might be shut down.

   Using this system, the heating equivalent of one net M-lb of steam (approximately 1,100,000 Btu) can be produced using between 40 and 50 kWh of electrical energy, a net COP of approximately 7.5.

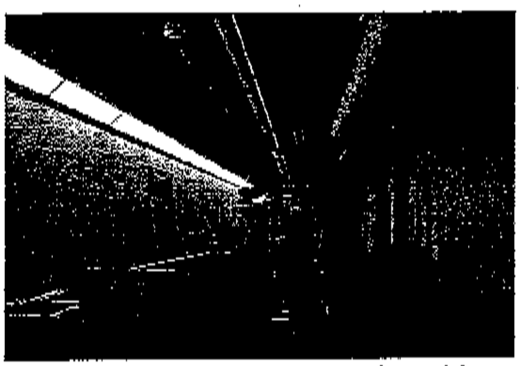
6. **Daylight harvesting – [Category III].**

   Moreover, the large amount of fenestration in the Perelman Building invites daylight harvesting. The addition of ceiling-mounted room photosensors connected to the dimming ballasts in existing fluorescent fixtures can reduce instantaneous electric lighting energy use as much as 50%. The prediction of annual savings will require additional study. Examples of areas naturally illuminated during our survey include: general offices, library, lobbies and the 4th floor Pennsylvania Avenue offices.

Existing Fenestration Offers Opportunities for Daylight Harvesting

7. **Illumination level reduction.**

   We were told about and observed many T8 fluorescent fixtures throughout the Perelman Building that were retrofitted with screened lamp tubes to reduce brightness. Lamp screens effectively reduce brightness and glare but do nothing to conserve energy. Installing dimming ballasts would reduce both brightness and save energy. Examples include: back of house lighting in the basement corridors screened lighting fixtures in offices, library, laboratories, and public spaces. Another option for over lit spaces is to replace existing T8 lamps and ballasts with Super T8 lamps and high efficiency ballasts as failures occur. Replacing 32-watt T8 lamps and standard electronic ballasts with 25, 28 or 30-watt lamps and high efficiency ballasts will capture 18-30% savings. However since the Perelman building occupancy experience has been short, we recommend deferral of this item until more occupancy experience can be gathered.



Opportunity to Reduce Fixture Quantities

8. Occupancy sensors.

No occupancy sensors were found in the Perelman Building. Occupancy sensors automatically turn off lighting in unoccupied spaces such as offices, conference rooms, public spaces, offices and back of house storage and mechanical/electrical equipment rooms. The typical office spends 29% of its electrical energy costs for lighting. Occupancy sensors can reduce these charges by 50% or more, at an energy savings of 5¢ - 20¢ per square foot. These sensors, which are usually infrared and/or ultrasonic, are most effective in those areas, which are often unoccupied, such as corridors and conference rooms. Initial investment is minimized by replacing local light switches with occupancy sensors. This item should be deferred until the building is fully occupied.

9. Lighting control systems.

The Perelman Building is partially equipped with a Lutron lighting control system. The Lutron processor includes an astronomic timeclock and exterior photosensor to regulate lighting according to time of day and daylight savings including established and custom holidays. Reducing operating time by only 30 minutes in a 12-hour day would result in 4% savings. Notable during our survey were the constantly 'on' exterior incandescent (MR16) recessed lighting fixtures for the Loading Dock. These fixtures could be circuited to the Lutron control system to achieve automation via timeclock/photosensor, or provided with its own independent system.

10. Exterior lighting reduction.

Building exterior lighting has been designed to mark the building as an important cultural resource. The lighting schedule is currently from dusk until dawn. The Museum should consider changing the lighting schedule go dark during the early morning hours to save energy.