North Park Branch Library
235 Delaware Ave
Buffalo, New York

Building Evaluation Report

Prepared For:

Buffalo & Erie County Public Library
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1.1 INTRODUCTION

The Buffalo and Erie County Public Library (BECPL) contracted with Watts Architecture and Engineering, P.C. (Watts) to provide a building condition survey report of the North Park Branch Library, 235 Delaware Avenue, Buffalo New York. The North Park Branch of the Buffalo and Erie County Public Library is in need of structural, civil and mechanical/electrical/plumbing (MEP) repairs and improvements. In addition, various environmental issues such as asbestos-containing material (ACM), lead-based paint (LBP) and mold are of concern.
This building condition survey report will provide the following information:

- Environmental issues – Results of sample analyses and field investigation for the presence of ACM, LBP and mold in the building.

- Structural/Civil issues—Assessment of site grading issues that have created drainage problems. Results of structural review with respect to building settlement resulting in cracked floors and walls.

- Architectural issues—Review of the building interior and exterior features with respect to general construction aspects of the building including: windows, doors, steps, finishes and other features of the building.

- MEP issues—Review of the building MEP infrastructure and recommendations for systems upgrades. Specifically review of various heating and air conditioning options and associated benefits. MEP code review information and heating, cooling and air conditioning load estimates.

- Estimates of probable construction costs for all disciplines.

1.2 Evaluation of Existing Conditions

A. Environmental

Watts Architecture & Engineering (Watts) personnel performed asbestos, lead and mold inspections and testing throughout the building's interior and exterior in an effort to quantify environmental conditions that may have an impact on the future viability of the North Park Library.

Testing and observations reveal that there are asbestos-containing materials (ACM) and lead-based paint (LBP) throughout the facility. Asbestos materials include: 9"x 9" vinyl asbestos floor tile (VAT) and associated mastic in the basement and first floor (some of this floor tile is underneath recently installed non-asbestos 12"x 12" floor tile in the basement); thermal system insulation (TSI)

on piping in the basement; and exterior perimeter window caulk. The VAT and TSI are in fair to good condition.

The walls and ceilings throughout the building are coated with LBP. The LBP in the basement Conference Room is in poor condition (i.e., blistering and peeling). Complicating the condition of the paint is the deteriorating condition of the plaster walls and ceilings in this area. These conditions also exist on the first floor with respect to the walls. The ceiling paint on the first floor is in poor condition but the plaster appears to be intact.

The exterior window components are coated with LBP that is in poor condition. Because of this and the possibility that excavation will need to occur to address structural and drainage issues, Watts collected soil samples in selected areas under windows with lead-coated components. Two samples were collected in each of four locations at depth intervals of 0-6 inches and 12-18 inches. The soil samples were analyzed for total lead and by the Toxicity Characteristic Leaching Procedure (TCLP) to determine if special handling and/or disposal procedures would be required.

The range of total lead concentrations varied from 85.3 ppm to 3,280 ppm. Although background levels for lead in soil vary widely, typical levels in undeveloped rural areas may range from 4-61 parts per million (ppm) and background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm. The New York State Department of Environmental Conservation (NYSDEC) has established an unrestricted soil cleanup objective for lead at 63 ppm, whereas values for the protection of human health from restricted residential settings have been set at 400 ppm. None the eight samples exhibited a concentration below 63 ppm, whereas five of the samples exceeded the 400 ppm level. The 400 ppm level is often considered the concentration at which a potential health hazard may be present if exposure is to occur. Soils removed from within the proximity of building components covered by lead-based paint should be considered a solid waste and not reused. If excavated, they will require off-site disposal in a NYS Part 360 regulated landfill. Excavation, transport and disposal costs will range on the order of $55-$80 per ton.

The TCLP characterization testing indicates that the lead in the soil is below the Resource Conservation and Recovery Act (RCRA) hazardous waste level of 5.0 mg/l in all 8 samples. This means none of the soil, should it be excavated, will need to be transported off-site and disposed of as a RCRA hazardous waste.

Refer to the following Table 1 for a description of the samples and a summary of the laboratory results.

Table 1
North Park Library
Building Conditions Survey
Soil Testing for the Presence of Lead

Sample Number	Sample Location	Type of Sample	Laboratory Analysis (Total Lead or TCLP Lead)	Result	Regulatory Level
Y8061-1 0"-6"	Under S Widow on W Side - S of Entrance	Soil	Total Lead TCLP Lead	85.3 mg/kg 0.023 mg/l	* 5.0 mg/l
Y8061-2 12"-18"	Under S Widow on W Side - S of Entrance	Soil	Total Lead TCLP Lead	3,280 mg/kg 0.14 mg/l	* 5.0 mg/l
Y8061-3 30"-36"	Not Used				
Y8061-4 0"-6"	Under N Widow on W Side - S of Entrance	Soil	Total Lead TCLP Lead	189 mg/kg 0.050 mg/l	* 5.0 mg/l
Y8061-5 12"-18"	Under N Widow on W Side - S of Entrance	Soil	Total Lead TCLP Lead	335 mg/kg 0.095 mg/l	* 5.0 mg/l
Y8061-6 30"-36"	Not Used				
Y8061-7 0"-6"		Soil	Total Lead TCLP Lead	3,180 mg/kg 2.1 mg/l	* 5.0 mg/l
Y8061-8 12"-18"		Soil	Total Lead TCLP Lead	1,760 mg/kg 2.3 mg/l	* 5.0 mg/l
Y8061-9 30"-36"	Not Used				
Y8061-10 0"-6"		Soil	Total Lead TCLP Lead	623 mg/kg 0.10 mg/l	* 5.0 mg/l
Y8061-11 12"-18"		Soil	Total Lead TCLP Lead	667 mg/kg 0.40 mg/l	* 5.0 mg/l
Y8061-12 30"-36"	Not Used				

Notes:
* Site background. Typical levels for metropolitan or suburban areas or near highways range from 200-500 parts per million (ppm or mg/kg).

Under a previous contract, Watts conducted an investigation for the presence of mold and collected microbial air samples in an effort to determine possible causes

of employee health complaints. At that time, there were no visible signs of mold growth in the basement or on the first floor and the levels of mold spores detected by the sampling would not normally be indicative of conditions conducive to allergic reactions. However, the building has been out of use for several weeks since that testing occurred and the humidity level has increased noticeably inside the building, therefore increasing the potential for mold formation. Subsequent field observations performed during this building survey identified mold growth on the wall of the basement large conference room and the lavatory. The site, civil and HVAC improvements proposed in this report, along with the proposed environmental remediation should, if implemented, eliminate future mold as a concern.

B. Architectural

In addition to the cracked and spalling condition of the exterior stairs, the stairs themselves are not up to New York State Building Code in terms of required rise and run of each step. The existing metal handrails of the exterior stairs and the handrail of the interior stairs leading to the main room of the library are also not up to code.

The doors from the entrance vestibule to the library as well as the doors from the vestibule to the basement are too narrow to be accepted as part of a means of egress by the state building code.

The window frames throughout the building that contain glass panes are single glazed, meaning there is only one layer of thin glass separating the interior and exterior of the building. Some of the windows in the main library are composed of smaller, diamond shaped individual lites. These small pieces of glass appear to be original to the building and the stiles or joints between them also appear to be poorly sealed. All of the windows on the main floor of the library are poorly sealed and allow the exterior elements to penetrate within, as evidenced by the attempt to insulate the windows with thick plastic sheeting. The majority of the windows in the basement are boarded up due to cracked, broken or missing glazing. In one instance the glass has been replaced with perforated peg board. All of the windows have hardware indicating that they were at one time fully operable (i.e., able to be opened), but the addition of insulating plastic sheets has made their operation impossible, thus eliminating any possible ventilation through the building by opening windows. While the interior faces of the window frames and sashes appear to be in fair condition, the exterior faces are severely weathered in multiple locations.

It has also been reported that the area around all of the door and window frames are poorly sealed, allowing for air infiltration during all seasons.

C. Civil/Structural

1. Civil

The North Park Library is located on the corner of Hertel Ave. and Delaware Ave. in the City of Buffalo. A topographic study of the North Park Library lot depicts a site with the existing building located on the northeast corner of the property which is the high point of the property. To the south and the west of the building, the land slopes down and away from the building towards Delaware Ave and Hertel Ave. Behind the building towards the easterly and northerly property lines, the land is either flat or slopes toward the building. In studying the topographic survey and the conditions of the land in these areas, it is apparent water is not being drained away from the building but is instead being trapped against the foundation walls.

There are new gutters and down spouts on the building. At some point in the past the old downspouts were removed and no provisions were made for the roof drainage. Water was allowed to drain onto the ground adjacent to the building, and with the lack of slope in some areas pond against the foundations. The new downspouts drain into the existing sanitary sewer system. Personnel have noted problems in the past with this existing sewer system backing up during rain events in which the downspouts were present.

2. Structural

Watts observed a number of structural issues with the building. The foundation has several cracks through the foundation wall. The building addition on the northeast corner of the building has settled, resulting in cracking at various locations throughout the building, and there are some miscellaneous masonry problems.

The cracks throughout the foundation wall have been measured and noted on the existing conditions survey included in Appendix A. In many locations the cracks are the full height of the foundation wall and are leaking water into the basement. The water leaching through these cracks is being trapped behind the plaster on the wall causing the plaster to separate from the foundation wall. In some locations the plaster has fallen off the wall and mold has been observed growing on the foundation wall. About 75% of the plaster in the large conference room of the basement is separating from the wall. Approximately 50% of the south wall of the room adjacent the stairway has plaster that is hollow sounding, possibly indicating separation from the wall. The exterior wall of the lavatory has mold appearing on it which likely indicates constant moisture.

The one story addition on the north east corner of the building has settled resulting in step cracking in exterior brick walls and a crack in the foundation wall directly

below this location. The concrete floor behind the reference desk, at the entrance to the office, has cracked and the floor has heaved.

The masonry, treads, and risers of the exterior stairs have been previously repaired. At present the treads are spalling and are in need of repair. The lintel above the exterior door into the exit stairway of the large conference room in the basement has a lintel that is "rust jacking" (i.e., heaving due to rust formation on the steel surface) and causing the existing brick above and adjacent the door to heave and crack.

D. Mechanical, Electrical & Plumbing

1. Mechanical

Heating system

The existing heating system is a one pipe, gravity return, low pressure steam system. The steam is supplied to floor mounted cast iron radiators on the first floor and wall or ceiling mounted cast iron radiators in the basement. Steam and condensate are supplied through a common piping system which must be provided with proper pitch to ensure the condensate flows back to the boiler. The system is controlled from a thermostat located on the first floor. The cast iron radiators are also equipped with throttling valves to control the heat to each radiator.

The boiler is a Weil-McLain low pressure (15 psi), gas fired, natural draft, 7 section cast-iron boiler. The gas input is 780 MBH and the output is 631 MBH. The boiler is approximately 20 years old and is approaching the end of its useful life. The cast iron radiators and steam supply and condensate return piping appear to be in good condition, however these items have far exceeded their useful life. The age and visible condition of the system lends us to believe that there is internal pipe corrosion.

The one pipe steam system does not provide very good control of space temperatures. The whole building is controlled as one large heating zone and spaces located away from the thermostat may over-heat or under-heat. This condition has been reported by facility maintenance personnel. Throttling the individual radiators has historically had marginal success in providing reasonable comfort. Most one pipe steam systems, when replaced, have been replaced with circulating hot water systems.

Wall mounted electric heaters are located in each of the basement restrooms, as well as at the bottom of the rear stairs. The restrooms have 1500W units while the stair is served with a 1000W unit. These all are in fair, working condition and we would recommend their continuation of use.

Air Conditioning and Ventilating Systems.

The building is air conditioned (cooled and ventilated) by four split system, direct expansion air conditioning units (AC Units). Two AC Units handle the library proper, the third is located in the basement meeting room and the fourth is located in the basement hallway.

The first floor has two ceiling hung units located (one each) in both wings of the library. These units are (one) three ton and (one) three and one half ton unit. Ventilation is provided to these units by a small outdoor intake duct which terminates at the exterior with a vent cap similar to a dryer vent. These intakes do not provide adequate outside air ventilation as required by code. The basement meeting room has (one) ceiling hung three and one half ton unit with a similar ventilation duct to the exterior. A three quarter ton split system with no ventilation duct serves the basement hallway. The condensers for these four units are located in the rear of the building on a concrete pad. The condensate disposal for these units also exits the rear of the building. These units appear to be in good condition; however with the units being reported to be 20 years old they are far past their useful life.

Exhaust fans are located in each toilet room and exit to the back of the building. They appear to be in fair condition.

2. Electrical

The existing electrical utility service is rated at 120/208 volt, 3 phase, 4 wire, 225 amp. The service entrance conductors are from an overhead utility pole located at the north east corner of the lot. The utility meter (58-568-110) is located on the back side of the building and the service entrance conductors continue into the main distribution panel located in the basement. The existing MDP (Main Distribution Panel) was manufactured by Westing House. There are two sub distribution panels PP-1, and LP-1 that were manufactured by Square D. The power distribution through out the building is original except for minor surface raceways and floor poke thru devices to general use duplex receptacles and computers.

The existing lighting in the basement is primarily 1 ft.by 4 ft. pendant mounted 2 lamp T-8 wrap around fluorescent lighting fixtures. There are a few areas that have porcelain lamp holders still in use. The wrap around lighting fixtures were still operational but the lenses were discolored and dirty. The lighting fixtures on the first floor in the office and desk area were the same wrap around lighting fixtures used in the basement. These lenses were also discolored and dirty. The library stack area was illuminated from recessed can, compact fluorescent down lights and large pendant opal metal halide chandeliers. All of these fixtures were still operational and in good shape.

The emergency lighting for the basement and first floor are surface mounted thermoplastic emergency units. They emergency lights were tested and all were operational. The exit lights are all LED (light emitting diode) thermoplastic exit signs. The exit signs were also tested and all were operational.

The existing lighting on the perimeter of the building consists of surface mounted high pressure sodium wall packs. All of these fixtures had discolored lens and all were cracked and or missing sections.

The existing fire alarm system is an EST non-addressable 12 zone panel. The building is fully monitored for smoke detection with manual devices at all exits and notification appliances placed according to NFPA 72 - National Fire Alarm Code. The EST fire alarm system is also used for the elevator recall function. The EST panel is serviced by Fire Safety System and parts are readily available.

The existing security system is by Silent Knight, Regency panel. The security system currently monitors all egress doors, and has motion sensing devices on all floors. The main motion sensor on the first floor has been vandalized and should be replaced.

The existing CCTV system currently has two cameras. One camera monitors the rear entrance to the library and the other camera is exterior mounted on the south corner of the building. The cameras are relayed back to a 7-inch black and white monitor viewable from the main desk. The cameras are displayed separately and switched manually by a video selector.

3. Plumbing

The plumbing systems for the building are as follows:

A. Natural Gas – The natural gas is provided through a meter set in the front of the building. Natural gas steel piping enters the boiler room and is distributed to the steam boiler and water heater. This installation is in good condition.

B. Domestic Cold Water – A 1-inch domestic cold water line enters the building in the boiler room and is distributed to all plumbing fixtures, boiler and water heater. The water line is not equipped with a reduced pressure backflow preventer which is required by code. The piping insulation in the boiler room is in poor condition and should be replaced.

C. Domestic Hot Water – The domestic hot water piping consists of a 50 gallon gas fired water heater and distribution piping to the plumbing fixtures. The insulation in the boiler room is in poor condition and should be replaced.

D. Waste and Vent – Waste and vent piping serve all plumbing fixtures and are essentially the original piping. What was visible appeared to be in good condition. Most of this pipe however is hidden from view and its condition could be a concern due to the age of the pipe.

E. Plumbing Fixtures – The plumbing fixtures for the two basement toilet rooms appear to be in good condition.

1.3 Code Review

A. Mechanical

A review of the New York State Building Codes was conducted based on building use and the proposed mechanical systems. In general, the following key code items must be met for all new mechanical systems that are installed at the Library:

Part 1 - Outside Air Ventilation must be provided to meet the minimum amounts specified by code. As the windows are not operable, the New York State Mechanical Code requires mechanical ventilation in the amount of 20 CFM per person. Based on the net area of the library spaces, the following minimum outside air quantities must be provided:

A. Library and first floor office -- 400 CFM
B. Basement Meeting Room -- 200 CFM

Part 2 - Piping and duct insulation must meet the requirements of the New York State Energy Conservation Construction Code with respect to insulation thickness and thermal value.

Part 3 - The new gas fired boiler, circulating pumps and air conditioning equipment must meet minimum efficiencies as required by the New York State Energy Conservation Construction Code.

Part 4 - Ductwork must be installed in conformance to the New York State Mechanical Code Chapter 6 with respect to duct construction, and installation. Duct sealing must be in conformance with the New York State Energy Conservation Construction Code.

Part 5 - Hydronic piping must be installed in conformance with the New York State Mechanical Code Chapter 12 with respect to pipe material, insulation and installation.

B. Electrical

A review of the New York State Building Code and the 2008 National Electrical Code was conducted for the Buffalo Public North Branch Library. According to NEC article 110.26 *Spaces about Electrical Equipment,* the panelboard on the first floor does not meet the working space requirements. The sub-distribution panelboard and MDP in the basement do not meet the required readily accessible requirements, because the branch circuit breaker handles are more than 6'-0" above the finished floor.

1.4 Summery of Work

A. Environmental

The investigation of the North Park Library has determined that new heating and ventilation systems will be required, foundation and drainage modifications will need to be made and architectural items such as windows and finishes on walls, ceilings, floors will need to be replaced. These modifications will necessarily lead to the disturbance of the identified ACM and LBP in the building. Therefore, it is recommended that complete abatement of ACM and remediation/stabilization of LBP be part of the overall renovation of the facility.

Asbestos abatement is strictly regulated by the U.S. Environmental Protection Agency, Occupational Safety and Health Administration and the New York State Department of Labor under Industrial Code Rule 56 (ICR 56). The procedures and, to some degree, the costs are well established.

The requirements for remediation and/or stabilizing the LBP is less well defined by the federal regulatory agencies and even less so by New York State. The crucial determination in calculating the cost of activities that disturb LBP is whether the action taken inside a building is strictly for remediation of a lead hazard or for renovation purposes where LBP is simply an incidental concern. Because lead hazards have been identified inside the building and the North Park Library is populated by children, Watts has assumed that LBP remediation /stabilization inside the building will be considered a lead hazard abatement project.

B. Architectural

In order to satisfy the requirements of the building code, the exterior stairs will need to be demolished and completely rebuilt with an acceptably designed rise and run. The new stairs will also require new metal hand rails of the correct height, diameter and extension at top and bottom to meet code. The interior handrail will also need to be replaced with a handrail of the correct diameter

mounted at a height and with a projection from the wall and extension at the top and bottom of the stair acceptable by the building code.

To satisfy building code requirements, the two sets of double doors off of the entrance vestibule will need to be replaced with double doors containing one swinging leaf that provides the required clear width.

To insulate the windows, all single glazed windows will need to be replaced with double glazed (insulated) glass panes. All of the windows in the basement will also need double glazed glass panes. Security glass is recommended if vandalism is a problem. All window frames and sashes throughout the building should also be restored or replaced in order to eliminate areas of air infiltration as well as to accommodate the thicker, double glazed panes as required. All counterbalancing, hinges, handles and other operational hardware will need to be restored or replaced in order to return the windows to an operable state. In addition, all areas of plaster damage on the ceilings will need to be patched. Also, walls where lead paint is being removed will need to be furred-out with gypsum plaster boards. The conference room in the basement will require a new drop ceiling, and the majority of the basement will require new VCT flooring to replace removed tiles found to be asbestos containing. All areas of repair and new construction will require paint. Areas of graffiti on the exterior of the building will also require masonry cleaning.

C. Civil/Structural

1. Civil

Given the problems with the existing sewer, we recommend installing a new perimeter drain line connecting all of the downspouts around the building. This line would convey the storm water to either Hertel Ave. or Delaware Ave. which each have dedicated storm sewers. This drainage feature would require the installation of approximately two hundred and fifty lineal feet of polyvinyl chloride piping, connections to the existing downspouts, and connections into the public sewer. In the process of installing the new perimeter drains, the adjoining areas directly north and east of the building need to be re-graded so they drain away from the building.

2. Structural

Cracks in the foundation walls should be repaired to prevent water from infiltrating into the building and help prevent further cracking of the masonry. Repair of the cracks can be accomplished by epoxy or urethane injection into the cracks from the interior of the building. All hollow sounding, loose and fallen plaster must first be removed from the foundation wall and the vicinity of the foundation cracks. The cracks then need to be cleaned out and injected with epoxy

or urethane. Any cracks which can not be filled from the basement need to be filled from the exterior of the building.

The foundation repairs for the settled building addition can be accomplished using epoxy or urethane injection but will need to be done from the exterior of the building. The brick will need to be repointed and cracked or broken bricks replaced. The cracked and heaved floor on the interior of the building at this location needs special consideration. The flooring in this area will need to be removed in addition a radiator will need to be temporarily displaced. Upon completing these tasks a portion of the concrete floor will need to be removed and then recast to adjust for the elevation difference between the addition and the main building.

The exterior of the cast in place foundation walls will be exposed during the installation of the perimeter drains. The surface of the walls will need to be cleaned and prepared for application of two coats of coal tar epoxy waterproofing prior to installation of the perimeter drainage pipe and select backfill.

The lintel above the exterior steel door to the basement needs to be replaced with a new galvanized steel lintel. This will involve removing the steel lintel and the brick above the door and temporarily supporting the roof above. Then replace the lintel and masonry that was removed. All loose or deteriorating brick needs to be replaced and repointed.

D. Mechanical, Electrical & Plumbing

1. Mechanical

Heating system

A heating load was calculated for the building to determine optimum boiler size. A copy of the heat loss calculations is in the appendix. The total heating load for the building is estimated to be 436,000 BTU/HR.

The building type, configuration and construction would dictate a perimeter hot water heating system. The walls are poorly insulated and it would be recommended to provide terminal convectors or fin tube radiation in the approximate location of the existing cast iron radiators to handle the perimeter losses. The existing pipe routing for the steam would be used for the new hot water system supply and return piping. Some floor openings used for the existing steam supply system would be reused as appropriate for the new system.

The Boiler plant would consist of a packaged low pressure, gas fired, hot water boiler with two circulating pumps (one standby), valves and specialties, insulation and temperature controls. The individual spaces would be zoned for separate

heating control as follows: library, basement meeting room, first floor office, basement lobby, vestibules.

The temperature control system would provide for night set back and normal business hours operation. A low temperature alarm system would be provided via an auto dialer to provide remote monitoring.
Two options for boiler replacement were reviewed:

Option # 1 – Gas Fired High Efficient Condensing Boiler. These boilers are recommended due to their high efficiency and ability to operate the system with varying supply water temperatures (indoor\outdoor control) without harming the boiler. These systems operate at efficiencies of over 90 percent depending on the return water temperature.

Option #2 –Gas Fired Sectional Cast Iron Boiler. This boiler is similar to the boiler that presently exists. This boiler would be less efficient (80 to 85%) than a condensing boiler, but would also cost less. These boilers have been employed for this type of building for many years; however they must be operated at high (180 deg. F) supply water temperature which further reduces efficiency.

Our recommendation is to provide a condensing, high efficiency gas fired boiler.

Air Conditioning and Ventilating Systems.

Options were reviewed to provide air conditioning and ventilation for the first floor library and basement meeting room. The total cooling load for the building was calculated to be 17.9 Tons. A copy of the total building block load plus individual loads for the library, basement meeting room and basement lobby have been included in the appendix.

The building offers many challenges to providing a proper air conditioning and ventilation system. The attic does not appear to be a good choice for equipment location due to poor access of this area. Also the chosen system must be incremental so it can provide for the two zones (library and meeting room).

Option #1 -- Classroom Unit Ventilator. This system would be similar to the existing split system presently installed in the space. Two units would be installed in the library and one would be installed in the meeting room. These units would be equipped with fan, filter, outside air connection and would be provided with heating (hot water) and cooling (direct expansion) coils and a remote condensing unit. These units would be hung below the ceiling in the library and would be mounted below the exposed deck in the basement meeting room. The outside air would be routed to the unit from the exterior of the building and condensate would be drained also to the exterior. Hot water coils would be provided to each unit to provide the winter ventilation requirement. The Unit ventilators are

historically noisy and would not be recommended for the spaces. We have included cut sheets of this equipment in the appendix.

Option #2 -- Split System Air Conditioning with Ventilation Air Handling Unit. This system would also be similar to what is presently installed with the exception of the ventilating units. The new split system air conditioning units would be placed where they presently exist. Two new ventilation air handling units would be provided for the basement meeting room and the first floor library. The units would both be located in the north stairhall and would have supply and return ducted to each space. These units would be provided with hot water coils for winter ventilation requirements. This system would carry a lower installed cost than option #1 and would be a quieter option. We have included cut sheets of this equipment in the appendix.

We recommend Option #2 for providing air conditioning and ventilation for the spaces.

The restroom ventilation is in fair, working condition, but has been painted. The fans and grille could be cleaned while the flex duct needs to be replaced due to age. It would be recommended that both exhaust fans also be replaced

2. Electrical

The following items are recommended to comply with local codes, provide energy saving and provide general safety issues up to date.

1) Provide new panelboard location on first floor and extend existing branch circuits to new location meeting required working clearances.
2) Re-locate existing panelboards in the basement to a lower readily accessible location to allow for operation of branch and main circuit breakers.
3) Replace existing exterior building lighting fixtures around perimeter of public library.
4) Replace damaged motion sensor for security system.
5) Provide new CCTV system with color PTZ cameras and DVR for storage of multiple events and days of storage.
6) The large deep metal halide lamp lighting fixtures on the first floor of the library should be replaced with an indirect fluorescent lighting fixture to produce the same illumination level and decrease the consumed wattage. The additional advantage of the fluorescent lighting is instant illumination and not having to wait for metal halide lamps to warm up.

3. Plumbing

The plumbing system for this building is in good condition overall. Some recommended modifications are listed below.

A. Natural Gas – This system is in good condition and there are no proposed modifications.

B. Domestic Cold Water – A reduced pressure backflow preventer which is required by code should be installed in the boiler room where the domestic cold water supply enters the building. All of the piping insulation in the boiler room is in poor condition and should be replaced.

C. Domestic Hot Water – All of the piping insulation in the boiler room is in poor condition and should be replaced. All other components are in fair, working condition.

D. Waste and Vent – This system is in good condition where accessible and there are no proposed modifications, unless a problem is uncovered while the building is being renovated.

E. Plumbing Fixtures – The fixtures are in good condition and there are no proposed modifications.

1.5 Conclusions and Recommendations

The following conclusions and recommendations are the result of our review of the various building and site components. It was found that the building is in need of major repair and remediation work.

Environmental:
Testing and observations reveal that there are asbestos containing material (ACM) and lead based paint (LBP) throughout the facility. These materials should be remediated. The remediation has a large impact on the architectural renovations throughout the building.

Architectural:
Due to the asbestos and lead remediation, as well as the need to upgrade the heating and ventilation system, renovations should include replacement of windows and steps as well as repair work to many surfaces throughout the building.

Structural/Civil:
Numerous structural issues include foundation cracks and building settling that must be repaired. The buildings storm sewer also is in need of alterations to prevent future water infiltration to the basement.

Mechanical, Electrical and Plumbing:
The heating and air conditioning systems are old and obsolete, and we recommend replacement of these systems. Providing the code required ventilation amounts should also be addressed. Other considerations include replacement of pipe insulation on domestic and hydronic piping as well as various electrical alterations.

The estimated costs for the above recommended renovations at the North Park Library Branch of the Buffalo and Erie County Library is $870,000. A detailed estimate of probable construction costs is presented in the following Section 1.6.

1.6 Cost Estimate

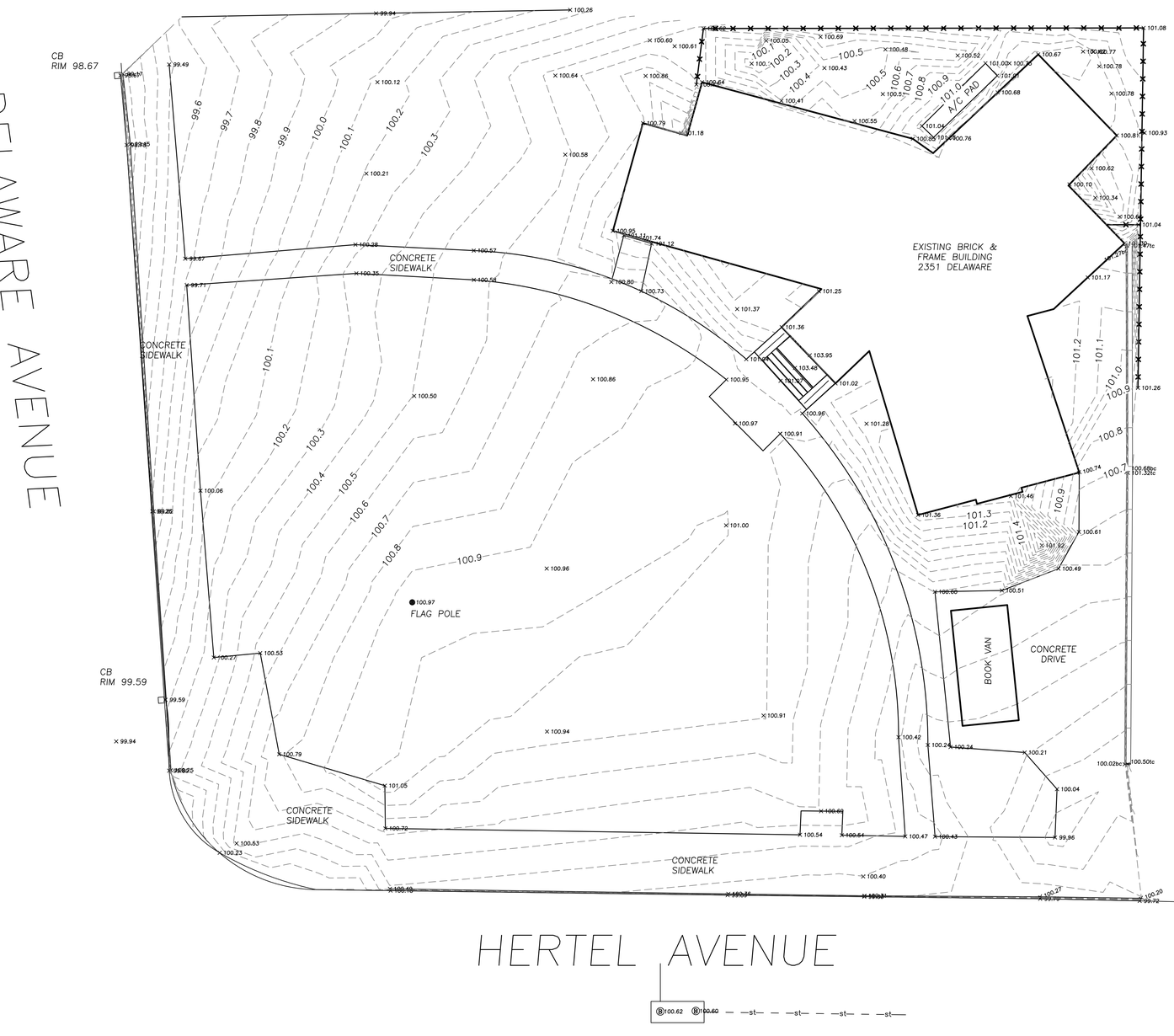
Cost estimates were prepared for each major work item and are considered an opinion of probable costs. Cost estimates were formulated from a variety of resources including: 2008 RS Means Cost Data Books, equipment vendors, contractors and similar projects. These cost estimates would be valid for one year, beyond which an escalation rate needs to be applied. Watts has added a 20% contingency and architectural /engineering fees to provide a total project cost.

	WORK ITEM	ESTIMATED COST
A.	Environmental	
	1 Asbestos Remediation	$69,000
	2 Lead Remediation	$225,000
	3 Excavation and Disposal of Lead Contaminated Soil	$58,000
B.	Architectural	
	1 Concrete Front Stair Removal & Replacement	$4,600
	2 Handrail Replacement	$6,500
	3 Entry Door Removal & Replacement	$8,300
	4 Window Removal & Replacement	$35,000
	5 Ceiling Plaster Repair	$18,600
	6 Painting of new and repaired surfaces	$2,000
	7 New Gypsum Board Walls	$14,900
	8 Drop Ceiling in Basement Conference Room	$3,800
	9 VCT Flooring	$9,900
	10 Brick Cleaning	$2,500
C.	Structural/Civil	
	1 Storm Drainage Modifications & Site Re-grading	$35,000
	2 Structural Repairs, Modifications and Waterproofing	$40,000
D.	Mechanical, Electrical & Plumbing	
	1 Heating System Replacement	$85,500
	2 Cooling and Ventilation system replacement	$31,000
	3 Backflow Preventer Installation	$2,800
	4 Hot and Cold Water Piping Insulation	$4,800
	5 Electrical Alterations	$19,500
	Sub-Total	$676,700
	20% Contingency	$135,340
	8% A/E Design Fees	$54,136
	Total Project Cost	$866,176

Say $ 870,000.00

1.7 Appendix

Existing Conditions Survey



LEGEND – EXISTING

- PROPERTY LINE
- EXISTING GRADE CONTOUR
- EXISTING FENCE
- EXISTING FIRE HYDRANT
- EXISTING WATER VALVE
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN
- EXISTING STORM MANHOLE
- EXISTING UTILITY POLE

EXISTING CONDITIONS SURVEY

SCALE: 1" = 10'-0"

project:

Buffalo & Erie County Public Library
North Park Branch
2351 Delaware Ave.
City of Buffalo

WATTS ARCHITECTURE & ENGINEERING, P.C.
3826 Main Street
Buffalo, New York 14226
p: 716.836-1540 f: 716.836.2402

signature and seal

proprietary notes:

drawing history

number	date	description

sheet title

EXISTING CONDITIONS SURVEY

project number:	Y8061
drawn by:	SMM
checked by:	DMS
date:	July 1, 2008
scale:	1"=10'

sheet number

C-100

LEGEND – EXISTING

- PROPERTY LINE
- EXISTING GRADE CONTOUR
- EXISTING FENCE
- EXISTING FIRE HYDRANT
- EXISTING WATER VALVE
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN
- EXISTING STORM MANHOLE
- EXISTING UTILITY POLE
- 0.000" FOUNDATION CRACK WIDTHS

ENLARGED EXISTING CONDITIONS SURVEY

SCALE: 1" = 4'-0"

project:

Buffalo & Erie County Public Library
North Park Branch
2351 Delaware Ave.
City of Buffalo

WATTS ARCHITECTURE & ENGINEERING, P.C.
3826 Main Street
Buffalo, New York 14226
p: 716.836-1540 f: 716.836.2402

signature and seal

proprietary notes:

drawing history

number	date	description

sheet title

ENLARGED EXIST. CONDITIONS SURVEY

project number:	Y8061
drawn by:	SMM
checked by:	DMS
date:	July 1, 2008
scale:	1"=4'

sheet number

C-101

Photographic Log

Photo 1: Water damage has caused lead-based paint (LBP) and plaster above circulation desk area to deteriorate.

Photo 2: Asbestos containing tile (ACT) shown over apparent floor cracking outside of office area.

Photo 3: Damaged ceiling in basement meeting room. Lead based paint and plaster are falling.

Photo 4: Water damage to basement walls have caused plaster and lead based paint to deteriorate. Foundation walls are also cracking at numerous locations.

Photo 5: Front stair handrail and chipping paint.

Photo 6: Single pane windows covered with plastic throughout the building.

Photo 7: Damaged chase wall in basement below front stairs. Also shown are VCT tiles located on the basement floor.

Photo 8: Various windows replaced with plywood or peg-board. Shown is the basement window of the boiler room.

Photo 9: Front entrance stairs showing non-code compliant handrails and step damage.

Photo 10: West end of building exterior showing stairwell entrance that will be used to house proposed ventilation air units. Note the poor conditions of the facia board and wind frames.

Photo 11: North wall at building addition showing cracking and boarded basement window. Note the peeling paint and poor condition of the window frames.

Photo 12: Foundation wall cracking that was previously repaired and poor condition of window frames.

Photo 13: Existing Weil-McLain steam boiler.

Photo 14: Steam radiators mounted in the horizontal position near the ceiling in the basement.

Photo 15: Wall mounted steam radiator located in the basement meeting room. Note the poor wall conditions as well as the boarded window and deteriorating frame.

Photo 16: North wing of library showing steam radiators, plastic over windows and ceiling hung air conditioning split system.

Photo 17: Ceiling mounted air conditioning split system located in the basement meeting room. Unit isn't supplying the code required ventilation rate.

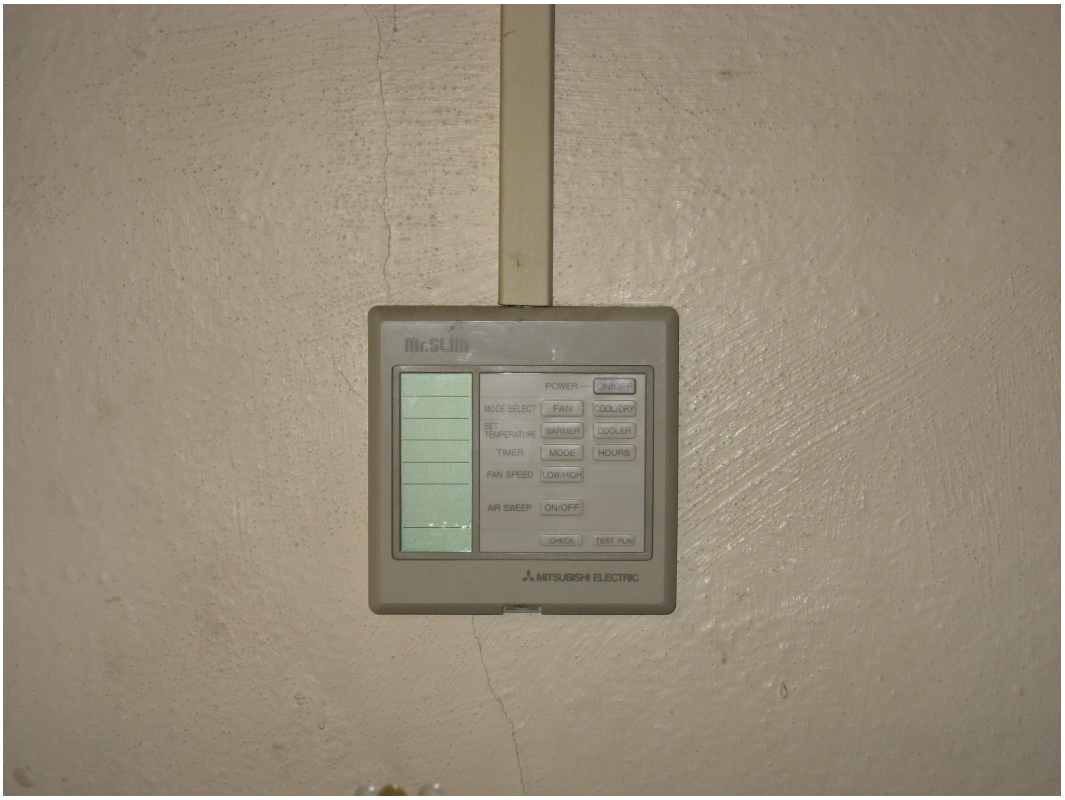


Photo 18: Control for split systems. This is typical of ceiling hung units, one in basement meeting room and one in the library area controlling both units on the main floor.

Photo 19: Wall hung split system in basement corridor area.


Photo20: Typical exhaust fan for each basement restroom.

Photo 21: Wall mounted electric heater typical of both restrooms and bottom of stairs in rear stairwell.

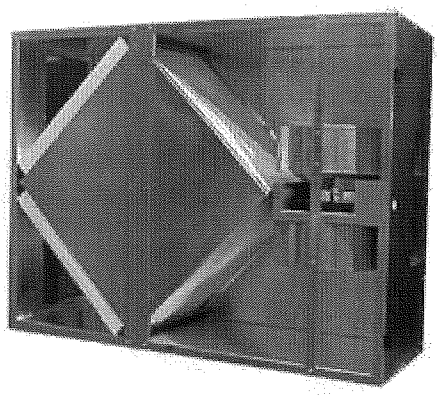
Photo22: Basement electrical panels with steam and refrigerant piping routed directly over panels.

Catalog Cut Sheets

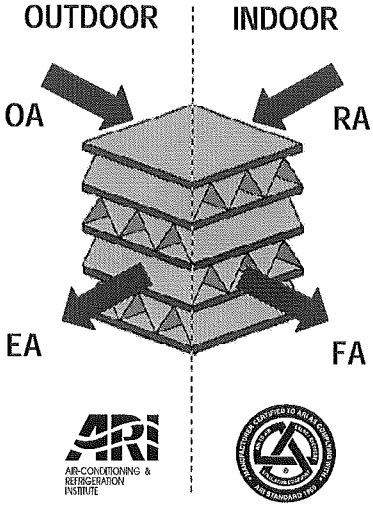
EV450IN Indoor Unit

Submittal Data

Job Name:			
Job Location:			
Job Reference Number:			
Unit Reference Number:			
Engineer:			
Distributor:			
Contractor:			
For Reference: ✓	For Approval: ✓	For Construction: ✓	
Requested Delivery Date:			
Submitted by:		Date:	
Address:			
Tel:	Fax:		



Winter	Summer	Units
		DB °F
		WB °F
		RH %
		Enthalpy BTU/Lb



Winter	Summer	Units
		Airflow CFM
		DB °F
		WB °F
		RH %
		Enthalpy BTU/Lb

Design Ventilation Load		
Winter	Summer	BTU/Hr
	BTUs Tons	Without RenewAire
	BTUs Tons	With RenewAire
	BTUs Tons	**Renewaire Savings**

Winter	Summer	Units
		Airflow CFM
		DB °F
		WB °F
		RH %
		Enthalpy BTU/Lb

ARI-1060 Certified Performance - Model Number L85			
Type	Tilt Angle	Nominal Airflow	Pressure Drop
Plate	N/A	100% - 450 SCFM 75% - 338 SCFM	0.6 in. H_2O 0.5 in. H_2O

Leakage Ratings				
	Pressure Differential	EATR	OACF	Purge Angle or Setting
Test 1	-1 in. H_2O	1.5%	1.0	N/A
Test 2	0 in. H_2O	0.0%	1.02	N/A
Test 3	1 in. H_2O	0.0%	1.05	N/A

Thermal Effectiveness Ratings at 0" Pressure Differential								
Nominal Airflow		Sensible	Latent	Total	Net Airflow	Net Sensible	Net Latent	Net Total
450 CFM	Heating	72%	47%	64%	450 CFM	72%	47%	64%
	Cooling	76%	28%	44%		71%	28%	44%
338 CFM	Heating	71%	53%	68%	338 CFM	76%	53%	68%
	Cooling	75%	34%	50%		75%	34%	50%

NOTE: SCFM = Standard Cubic Feet per Minute OACF = Outdoor Air Correction Factor EATR = Exhaust Air Transfer Ratio N/A = Not Applicable

Energy recovery component certified in accordance with ARI standard 1060 - 2000. Actual performance in packaged equipment may vary.

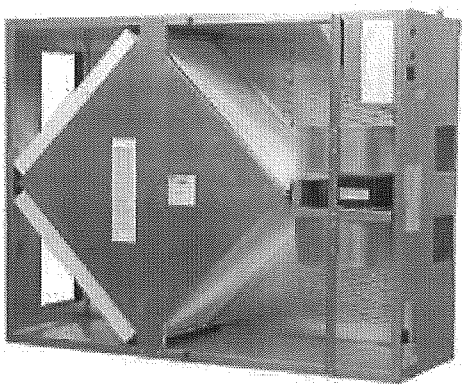
EV450IN

K (G4)		D (Direct)	P	V
Core	**Wall**	**Drive**	**Phase**	**Voltage**

L (UL Listed)

* Every option is not available on every model.

Contactor **Disconnect** **Transformer** **Other** **UL**



G4 Performance

Airflow CFM	ESP in H20	Watts 1P	Watts 3P	Temp EFF%	Total EFF% Winter/Summer*
225	1.25	335	181	81	73/61
338	1.00	420	278	77	69/56
380	0.90	470	340	76	68/54
450	0.65	550	430	73	65/50
540	0.25	640	540	70	62/46
575	0.00	690	610	69	61/45
600	-0.25	735	664	68	60/43

*At ARI 1060 standard conditions
(See certified data on page 68 for core components).

Specifications

Ventilation Type: Static Plate, Heat and Humidity Transfer
Typical Airflow Range: 200-500 CFM
ARI 1060 Certified Core: One L85
Airflow Rating Points (for ARI): 450 CFM and 338 CFM
Motors: One, 0.6 hp (Single Phase) One, 0.5hp (Three Phase)
Field Selectable Voltage

V	HZ	Phase	FLA
115	60	Single	7.0
208-230	60	Single	3.5
277	60	Single	2.4
208-230	60	Three	1.7-1.5
460	60	Three	0.8

Control Voltage: 24 VAC
Filters: Two total, MERV 8, 2" pleated, 14" x 20" nominal size
Weight: 141 lbs (unit), 160 lbs (in carton), up to 3 units on 50 lb pallet
Shipping Dimensions: 37 1/2" W x 48" L x 17" H
Options: 45EVHB - Hanging Bracket, Foot Kit 45EVDF - Rectangular 12" x 8" Flange Kit (2 in kit) 45EVT10 - 10" Round Transition Kit (2 in kit)

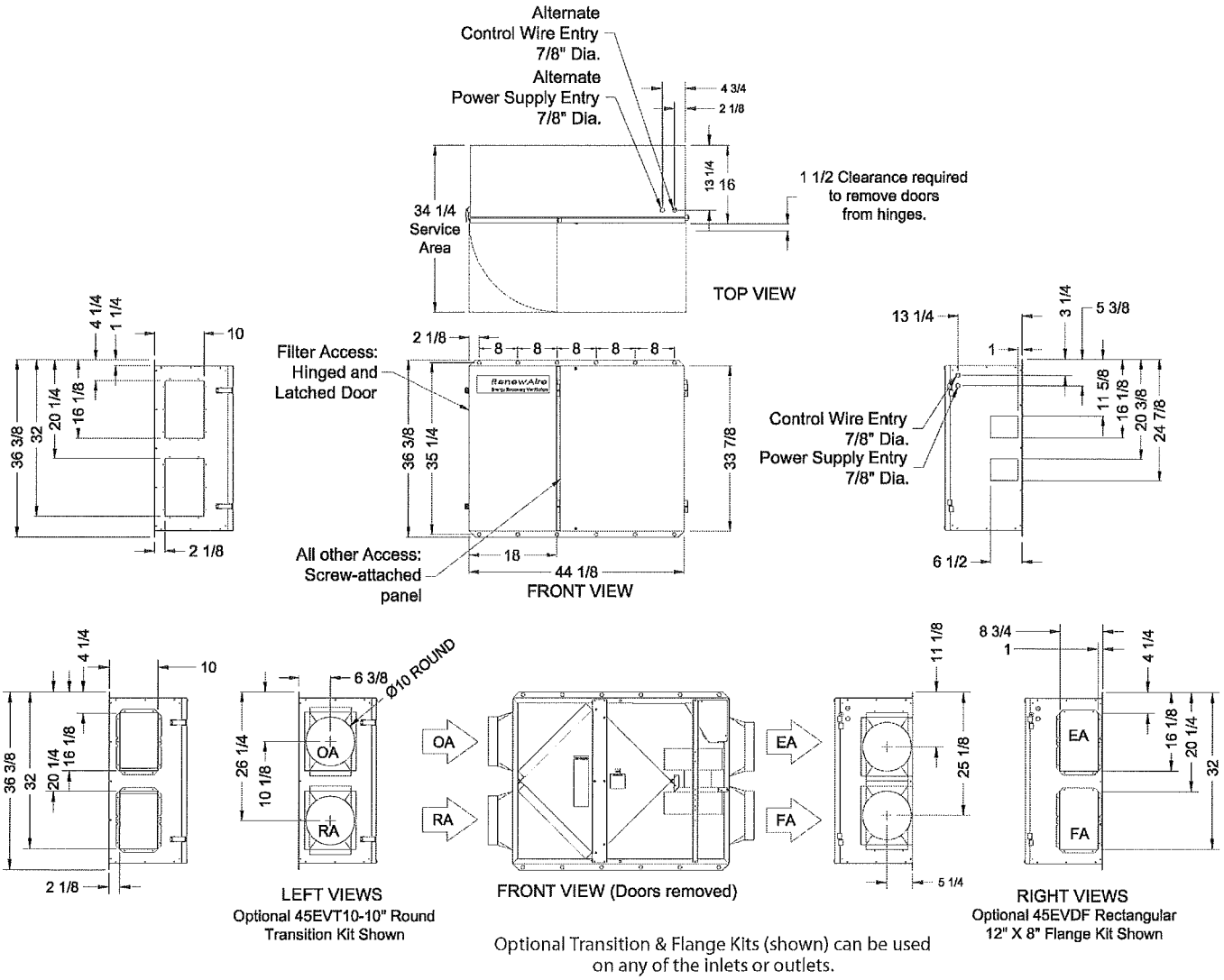
ARI PERFORMANCE CERTIFIED™

c UL us LISTED DUCTED HEAT RECOVERY VENTILATOR 8955

RenewAire
Energy Recovery Ventilators

EV450IN
Unit Dimensions

EA:	Exhaust Air to outdoors
OA:	Outdoor Air intake
RA:	Room Air to be exhausted
FA:	Fresh Air to inside

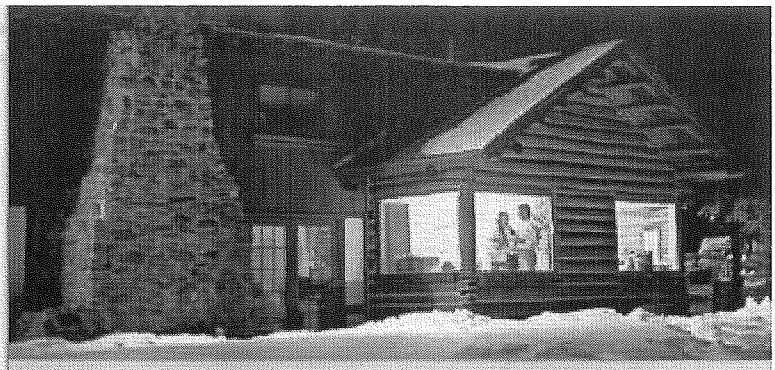


Optional Transition & Flange Kits (shown) can be used on any of the inlets or outlets.

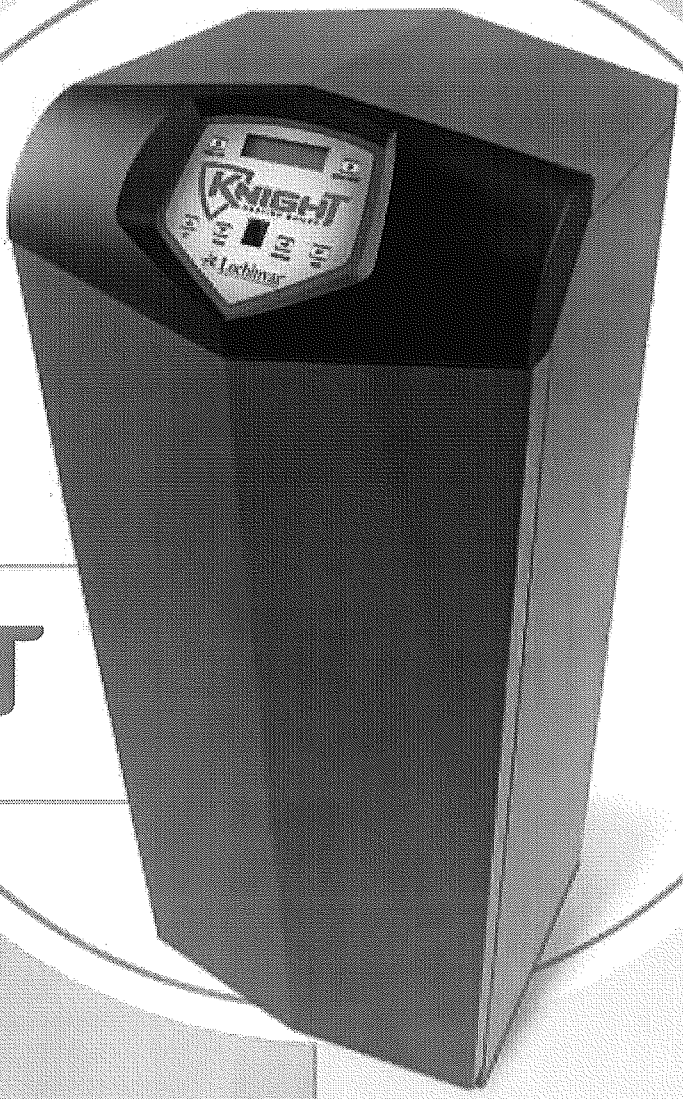
Model Configuration EV450IN...

Core	Wall	Drive	Phase	Voltage	Contactor	Disconnect	Transformer	Other	UL
K (G4)	S (Single)	D (Direct)	P1	V1 (115)	N (None)	- (None)	- (None)	- (None)	L (UL Listed)
	D (Double)		P3	V4 (460)	A (24VAC)	N (Nonfused)	A (TR40)	PA (Paint)	
				V5 (208-230)		F (Fused)			
				V6 (115/208-230)					
				V7 (208-230/460)					
				V9 (277)					

RenewAire
Energy Recovery Ventilators

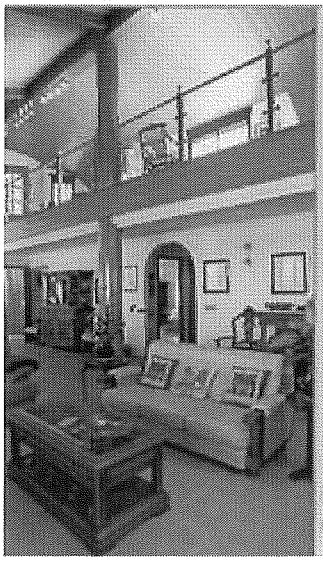


get legendary comfort
and Heroic Energy savings



ENERGY STAR

KNIGHT
HEATING BOILER

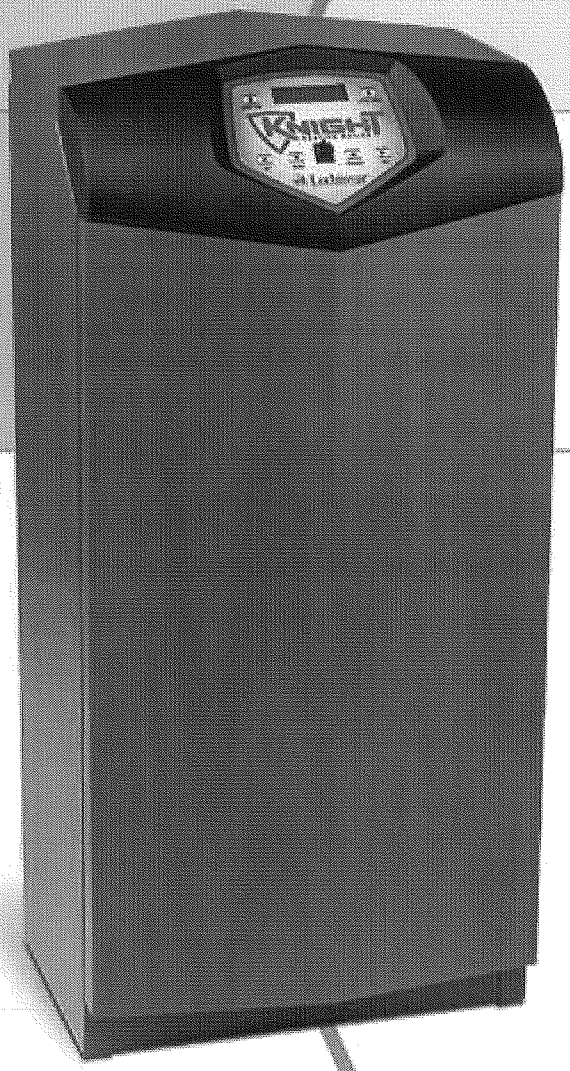


LOW NOx Certified

Lochinvar®
High Efficiency Water Heaters, Boilers and Pool Heaters

www.knightheatingboiler.com

introducing The KNIGHT Heating Boiler from Lochinvar



The KNIGHT's high-tech design and high-efficiency performance make it the smartest way to heat your home.

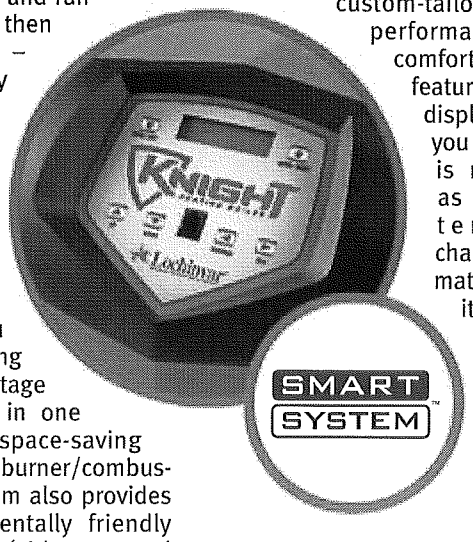
There's a new champion in home heating — the KNIGHT high-efficiency condensing boiler from Lochinvar. With a 93% Annual Fuel Utilization Efficiency (AFUE) rating, you can rest assured that 93¢ out of every energy dollar goes directly into heating your home. That's well above ENERGY STAR® standards, and its efficiency goes up to an astounding 98.6% in low-temperature radiant applications, saving you hundreds of dollars each heating season! *(See the savings chart on back.)*

Greater Comfort That's Environmentally Friendly

The KNIGHT's burner and combustion system features the industry's most advanced modulation for unsurpassed comfort. Ordinary boilers turn on at full power and run for a few minutes, then shut completely off – repeating this many times throughout the day. In contrast, the KNIGHT boiler will modulate from 20% to maximum input in steady increments so that you always get the comfort level you desire. It's like having the efficiency advantage of multiple boilers in one compact, space-saving unit. The burner/combustion system also provides environmentally friendly operation (either natural gas or LP), with air quality emissions so low that they exceed the toughest environmental standards.

SMART SYSTEM:™ Comfort Control At Your Fingertips

The KNIGHT's unique SMART SYSTEM™ Control includes an energy-saving setback function that lets you custom-tailor the boiler's performance to your comfort needs. It also features a 2-line LCD display that alerts you when servicing is required. And as the outside temperature changes, the automatic energy monitor adjusts the KNIGHT's output for maximum comfort and energy savings.



Like the cruise control in your car, the KNIGHT's SMART SYSTEM™ Control automatically adjusts the boiler temperature as the outside temperature changes to provide ultimate indoor comfort.

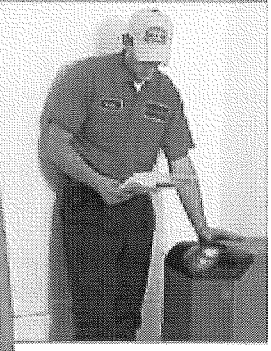
You can count on the KNIGHT for years of dependable operation. That's why we back it with a 12-year limited warranty.

Your family deserves the trusted performance of a KNIGHT.

Optimum indoor comfort. Remarkable energy efficiency. All backed by Lochinvar's proven performance, durability and dependability. In every category, the KNIGHT is the champion that belongs in your home.

This hero is handsome and dependable.

The KNIGHT's compact size enables it to fit where other heating units won't. And because it's made with commercial-grade materials, it's one of the most durable residential boilers ever built. Lochinvar engineers put the KNIGHT through thousands of hours of grueling, nonstop testing to make sure you get today's most reliable heating boiler. That's why it's backed by an outstanding 12-year limited warranty.



The ENERGY STAR Advantage

The KNIGHT has earned the ENERGY STAR by meeting strict energy efficiency guidelines set by the Department of Energy and Environmental Protection Agency. The ENERGY STAR is your assurance that you're getting a product that maximizes energy efficiency to lower your fuel bills while protecting the environment.

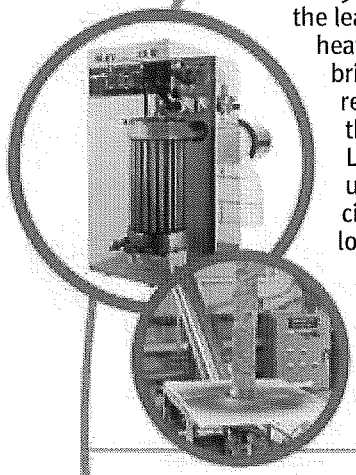
Higher Efficiency Means Lower Energy Bills

Because energy costs are rising rapidly, you'll really appreciate the KNIGHT's remarkable 93% AFUE efficiency rating. It delivers about twice the energy savings of 75% AFUE units found in many older homes — and much greater fuel efficiency than the 80% AFUE minimum required in new housing. Let the KNIGHT shield you from today's skyrocketing energy bills.

Powerful, compact, easy to install and simple to set up.

This is one "Silent Knight." You'll be amazed at how quietly the KNIGHT heats your home. Its unique modulating design eliminates the noisy on/off cycling heard in most forced-air heating systems.

An 85-Year Commitment To Innovation



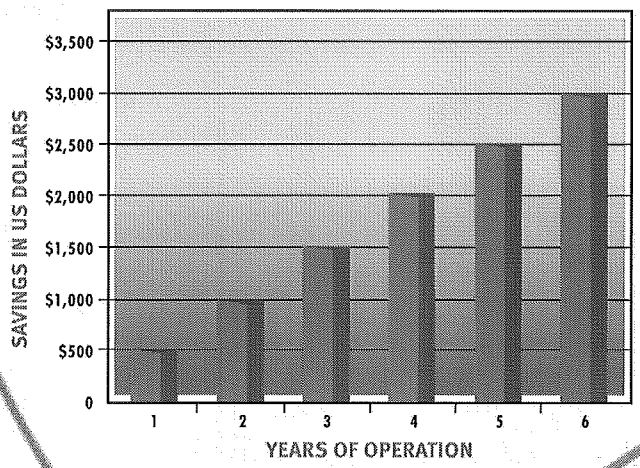
Since 1919, Lochinvar has been the leader in commercial water heating solutions. Now we're bringing that innovation to residential heating with the KNIGHT. For decades, Lochinvar has offered a unique blend of commercial expertise and technological leadership. Our manufacturing facility features today's most cutting-edge technologies—from computer-controlled machining to advanced robotics.

There are seven KNIGHT models to choose from. Your Lochinvar dealer can help you select the one that's ideal for your home.

MODEL NUMBER	Btu / Hr INPUT MODULATION*
KBN080	16,000–80,000
KBN105	21,000–105,000
KBN150	30,000–150,000
KBN210	42,000–210,000
KBN285	57,000–285,000
KBN399	80,000–399,999
KBN500	100,000–500,000

**Typically, boilers are sized for the coldest days of the heating season, which only occur a few times a year. Traditional on/off boilers only fire at 100% capacity, which often results in overshooting ideal temperature and can lead to operational problems. The KNIGHT modulates down to 20% of its maximum input for a closer match to actual heating load, producing optimum comfort and energy efficiency.*

TOTAL FUEL SAVINGS vs. 75% AFUE



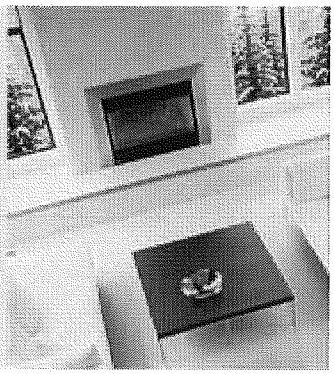
This chart shows what you'll save with the KNIGHT heating boiler compared to older units with 75% AFUE efficiencies. Operating costs are based on an 80,000 Btu heating load and 2,000 hours of operation with a fuel cost of $1.13 per therm.

In-floor radiant heating further increases your fuel savings because efficiencies increase to an impressive 98.6% with the KNIGHT heating boiler.

Your home is your castle...and now there's a heating boiler that delivers the legendary performance you need.
To learn more about the new KNIGHT from Lochinvar,

visit us online at www.knightheatingboiler.com today.

KNIGHT HEATING BOILER



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High Efficiency Water Heaters, Boilers and Pool Heaters

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10M 09/05 Printed in U.S.A.

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HVAC Advanced Products Division

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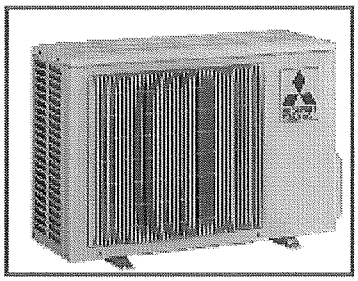
Products

Mr. Slim Split-ductless: M-Series Cooling-only

MS-A09WA

- **Click here to see the indoor unit larger.**
- **Click here to see the outdoor unit larger.**

Sleek and compact indoor unit



Compact and powerful outdoor unit

The new R410A M-Series offers the following features:

- **Anti-allergy enzyme filter** which uses artificial blue enzyme catalyst on the filter filaments to capture harmful microbes
- **Hybrid Catechin Pre-filter fibers** infused with a bioflavinoid found in green tea that has antiviral and antioxidant properties
- **A-Control for unit wiring** allows communication and power between outdoor and indoor units on three wires

Specifications

Application:	A/C
BTU Cooling:	9,500
Mounting Location:	Wall-mounted
SEER:	13.0
Indoor Unit:	MS-A09WA
Indoor Input Power: (V, PH, Hz)	115, 1 Phase, 60 Hz
Indoor Dimensions: (In. HxWxD)	11-3/4 x 30-11/16 x 8-1/4
Indoor Weight: (Lbs.)	23
Airflow Dry: (CFM)	183-261-335
Airflow Wet: (CFM)	162-233-300
Indoor Sound Level: (dBA)	26/32/40
Outdoor Unit:	MU-A09WA
Outdoor Input Power: (V, PH, Hz)	115, 1 Phase, 60 Hz
Outdoor Dimensions:	21-5/8 x 31-1/2 x 11-1/4

(In. HxWxD)	
Outdoor Weight: (Lbs.)	78
Pipe Size (Liquid): (In.)	1/4
Pipe Size (Gas): (In.)	3/8
Indoor Connection Method:	FLARE
Outdoor Connection Method:	FLARE

Limited Warranty: 6-year on compressor. 1-year on parts.
Specifications are subject to change without notice.

MITSUBISHI ELECTRIC
HVAC Advanced Products Division

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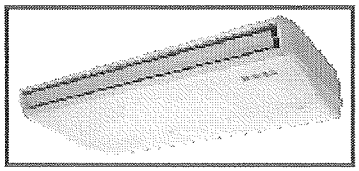
Products

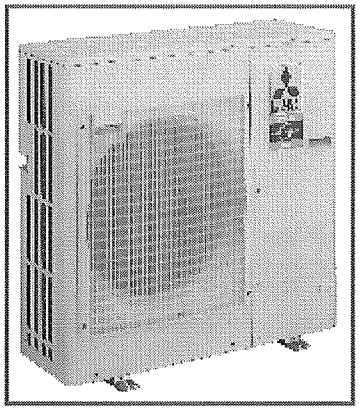
Mr. Slim Split-ductless: PC-Series Ceiling Suspended A/C and Heat Pumps

PCA-A36GA (AC)

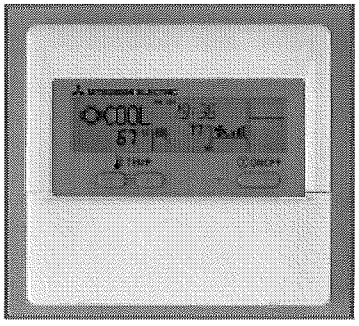
- **Click here to see the indoor unit larger.**
- **Click here to see the outdoor unit larger.**
- **Click here to see the remote controller larger.**



Powerful and quiet indoor unit



Compact and quiet inverter outdoor unit



Wall-mounted, wired remote controller

P-series Features

- **New hard-wired, multi-lingual remote controller (PAR-21MAA)** displays: Fault codes for both indoor and outdoor units, phone number of service contractor and critical unit operating data for service technician
- **Pulse Wave Modulation (PVM)** Vector Wave Eco Inverter (all models)
- **Outdoor unit sound level** reduced by 4 to 8 dB(A)
- **Anti-corrosion** model now available (-BS model)
- **The inverter models** perform well in cooling mode even with outdoor temperatures as low as 0°F
- **Units interface** with Lossnay PZ-41SLB-E controller for ventilation control
- **Outdoor unit cabinets** meet or exceed Florida "Hurricane" code for high wind load conditions

Specifications

Application:	A/C
BTU Cooling:	36,000
Mounting Location:	Ceiling-suspended
SEER:	13.1
Indoor Unit:	PCA-A36GA
Indoor Input Power: (V, PH, Hz)	208/230, 1 Phase , 60 Hz
Indoor Dimensions: (In. HxWxD)	10-5/8 x 51-9/16 x 26-25/32
Indoor Weight: (Lbs.)	82
Airflow Dry: (CFM)	705-740-810-880
Airflow Wet:	635-670-730-790

(CFM)	
Indoor Sound Level: (dBA)	40/45 (Lo/Hi)
Outdoor Unit:	PUY-A36NHA
Outdoor Input Power: (V, PH, Hz)	208/230, 1 Phase , 60 Hz
Outdoor Dimensions: (In. HxWxD)	37-1/8 x 37-13/32 x 13
Outdoor Weight: (Lbs.)	163
Outdoor Sound Level: (dBA)	48
Pipe Size (Liquid): (In.)	3/8
Pipe Size (Gas): (In.)	5/8
Indoor Connection Method:	FLARE
Outdoor Connection Method:	FLARE

Limited Warranty: 6-year on compressor. 1-year on parts.
Specifications are subject to change without notice.

Heating & Cooling Load Calculations

Y8061 Erie County Public Library

Location	235 Deleware Ave Buffalo
Building owner	
Program user	J Dodge
Company	Watts Architecture and Engineering
Comments	

By	Watts Architecture & Engineering, P.C.
Dataset name	C:\CDS\TRACE700\Projects\North Park Library.trc
Calculation time	11:03 AM on 07/15/2008
TRACE® 700 version	6.1.2

Location	Buffalo, New York	
Latitude	43.0	deg
Longitude	78.0	deg
Time Zone	5	
Elevation	705	ft
Barometric pressure	29.1	in. Hg
Air density	0.0740	lb/cu ft
Air specific heat	0.2444	Btu/lb·°F
Density-specific heat product	1.0852	Btu/h·cfm·°F
Latent heat factor	4,776.9	Btu·min/h·cu ft
Enthalpy factor	4.4395	lb·min/hr·cu ft
Summer design dry bulb	88	°F
Summer design wet bulb	71	°F
Winter design dry bulb	6	°F
Summer clearness number	0.90	
Winter clearness number	0.90	
Summer ground reflectance	0.20	
Winter ground reflectance	0.20	
Carbon Dioxide Level	400	ppm

Design simulation period	January - December
Cooling load methodology	TETD-TA1
Heating load methodology	UATD

System Checksums

By Watts Architecture & Engineering, P.C.

Hydronic Heating — **Radiation (Heating Only)**

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 0 / 0
Outside Air: OADB/WB/HR: 0 / 0 / 0

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	0	0	0	0
Glass Solar	0	0	0	0
Glass Cond	0	0	0	0
Wall Cond	0	0	0	0
Partition	0		0	0
Exposed Floor	0		0	0
Infiltration	0		0	0
Sub Total ==>	0	0	0	0
Internal Loads				
Lights	0	0	0	0
People	0		0	0
Misc	0	0	0	0
Sub Total ==>	0	0	0	0
Ceiling Load	0	0	0	0
Ventilation Load	0	0	0	0
Adj Air Trans Heat	0		0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	0		0	0
Exhaust Heat		0	0	0
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Reheat at Design			0	0
Grand Total ==>	0	0	0	100.00

CLG SPACE PEAK

Mo/Hr: 0 / 0
OADB: 0

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	0	0
Glass Solar	0	0
Glass Cond	0	0
Wall Cond	0	0
Partition	0	0
Exposed Floor	0	0
Infiltration	0	0
Sub Total ==>	0	0
Internal Loads		
Lights	0	0
People	0	0
Misc	0	0
Sub Total ==>	0	0
Ceiling Load	0	0
Ventilation Load	0	0
Adj Air Trans Heat	0	0
Ov/Undr Sizing	0	0
Grand Total ==>	0	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 6

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	-7,799	-7,799	1.79
Glass Solar	0	0	0.00
Glass Cond	-19,792	-19,792	4.54
Wall Cond	-319,199	-319,199	73.18
Partition	0	0	0.00
Exposed Floor	-28,789	-28,789	6.60
Infiltration	-17,727	-17,727	4.06
Sub Total ==>	-393,306	-393,306	90.17
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	0	0	0.00
Ventilation Load	-42,973	-42,875	9.83
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	0	0	0.00
Exhaust Heat		0	0.00
OA Preheat Diff.		0	0.00
RA Preheat Diff.		0	0.00
Additional Reheat		0	0.00
Grand Total ==>	-436,279	-436,181	100.00

TEMPERATURES

	Cooling	Heating
SADB	0.0	72.0
Plenum	0.0	72.0
Return	0.0	71.9
Ret/OA	0.0	71.9
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Vent	0	600
Infil	0	248
Supply	0	0
MinStop/Rh	0	0
Return	0	798
Exhaust	0	798
Rm Exh	0	50
Auxiliary	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	0.0	0.0
cfm/ft²	0.00	0.00
cfm/ton	0.00	
ft²/ton	0.00	
Btu/hr·ft²	0.00	-101.11
No. People	38	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aux Clg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	4,315		
Part	0		
ExFlr	2,625		
Roof	2,766	0	0
Wall	4,739	323	7

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-436.3	0.0	0.0	0.0
Aux Htg	0.0	0	0	0
Preheat	0.0	0	0	0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-436.3			

System Checksums

By Watts Architecture & Engineering, P.C.

Split System Cooling — **Packaged Terminal Air Conditioner**

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 8 / 16
Outside Air: OADB/WB/HR: 87 / 73 / 103

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	5,216	0	5,216	2
Glass Solar	9,512	0	9,512	4
Glass Cond	2,703	0	2,703	1
Wall Cond	153,262	0	153,262	72
Partition	0		0	0
Exposed Floor	2,780		2,780	1
Infiltration	7,495		7,495	3
Sub Total ==>	180,968	0	180,968	84
Internal Loads				
Lights	0	0	0	0
People	9,600		9,600	4
Misc	3,771	0	3,771	2
Sub Total ==>	13,371	0	13,371	6
Ceiling Load	0	0	0	0
Ventilation Load	0	0	19,824	9
Adj Air Trans Heat	0		0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	0		0	0
Exhaust Heat		0	0	0
Sup. Fan Heat			1	0
Ret. Fan Heat		1	1	0
Duct Heat Pkup		0	0	0
Reheat at Design			0	0
Grand Total ==>	194,340	1	214,165	100.00

CLG SPACE PEAK

Mo/Hr: Sum of
OADB: Peaks

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	5,457	3
Glass Solar	8,829	5
Glass Cond	2,596	1
Wall Cond	156,790	83
Partition	0	0
Exposed Floor	2,997	2
Infiltration	2,514	1
Sub Total ==>	179,182	95
Internal Loads		
Lights	0	0
People	5,880	3
Misc	3,771	2
Sub Total ==>	9,651	5
Ceiling Load	0	0
Ventilation Load	0	0
Adj Air Trans Heat	0	0
Ov/Undr Sizing	0	0
Exhaust Heat		
OA Preheat Diff.		
RA Preheat Diff.		
Additional Reheat		
Grand Total ==>	188,834	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 6

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	-7,544	-7,544	2.03
Glass Solar	0	0	0.00
Glass Cond	-19,115	-19,115	5.13
Wall Cond	-256,849	-256,849	69.00
Partition	0	0	0.00
Exposed Floor	-28,789	-28,789	7.73
Infiltration	-16,985	-16,985	4.56
Sub Total ==>	-329,282	-329,282	88.46
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	0	0	0.00
Ventilation Load	0	-42,973	11.54
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	0	0	0.00
Exhaust Heat		0	0.00
OA Preheat Diff.		0	0.00
RA Preheat Diff.		0	0.00
Additional Reheat		0	0.00
Grand Total ==>	-329,282	-372,256	100.00

TEMPERATURES

	Cooling	Heating
SADB	60.3	97.7
Plenum	76.0	72.0
Return	75.0	72.0
Ret/OA	75.6	68.7
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Vent	600	600
Infil	237	237
Supply	11,827	11,827
MinStop/Rh	0	0
Return	12,015	12,015
Exhaust	787	787
Rm Exh	50	50
Auxiliary	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	5.1	5.1
cfm/ft²	3.08	3.08
cfm/ton	662.71	
ft²/ton	215.39	
Btu/hr·ft²	55.71	-96.84
No. People	38	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	17.9	214.2	192.5	11,827.5	75.6	62.9	67.9	60.3	56.9	65.7
Aux Clg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	17.9	214.2								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	3,844		
Part	0		
ExFlr	2,625		
Roof	2,670	0	0
Wall	3,917	311	8

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-372.3	11,827.5	68.7	97.7
Aux Htg	0.0	0	0	0
Preheat	0.0	0	0	0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-372.3			

Project Name: Y8061 Erie County Public Library
Dataset Name: C:\CDS\TRACE700\Projects\North Park Library.trc

Zone Checksums

By Watts Architecture & Engineering, P.C.

Basement Lobby

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 8 / 11
Outside Air: OADB/WB/HR: 81 / 69 / 93

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	0	0	0	0
Glass Solar	163	0	163	2
Glass Cond	21	0	21	0
Wall Cond	8,390	0	8,390	86
Partition	0		0	0
Exposed Floor	0		0	0
Infiltration	618		618	6
Sub Total ==>	9,192	0	9,192	94
Internal Loads				
Lights	0	0	0	0
People	0		0	0
Misc	0	0	0	0
Sub Total ==>	0	0	0	0
Ceiling Load	0	0	0	0
Ventilation Load	0	0	618	6
Adj Air Trans Heat	0		0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	0		0	0
Exhaust Heat		0	0	0
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Reheat at Design			0	0
Grand Total ==>	9,192	0	9,810	100.00

CLG SPACE PEAK

Mo/Hr: 7 / 11
OADB: 81

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	0	0
Glass Solar	176	2
Glass Cond	21	0
Wall Cond	8,654	97
Partition	0	0
Exposed Floor	0	0
Infiltration	104	1
Sub Total ==>	8,955	100
Internal Loads		
Lights	0	0
People	0	0
Misc	0	0
Sub Total ==>	0	0
Ceiling Load	0	0
Ventilation Load	0	0
Adj Air Trans Heat	0	0
Ov/Undr Sizing	0	0
Exhaust Heat		
OA Preheat Diff.		
RA Preheat Diff.		
Additional Reheat		
System Plenum Heat		
Grand Total ==>	8,955	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 6

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0
Skylite Cond	0	0	0
Roof Cond	0	0	0
Glass Solar	0	0	0
Glass Cond	-524	-524	4
Wall Cond	-9,551	-9,551	74
Partition	0	0	0
Exposed Floor	0	0	0
Infiltration	-1,432	-1,432	11
Sub Total ==>	-11,507	-11,507	89
Internal Loads			
Lights	0	0	0
People	0	0	0
Misc	0	0	0
Sub Total ==>	0	0	0
Ceiling Load	0	0	0
Ventilation Load	0	-1,432	11
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	0	0	0
Exhaust Heat		0	0
OA Preheat Diff.		0	0
RA Preheat Diff.		0	0
Additional Reheat		0	0
System Plenum Heat		0	0
Grand Total ==>	-11,507	-12,939	100.00

TEMPERATURES

	Cooling	Heating
SADB	55.0	99.0
Plenum	76.0	72.0
Return	76.0	72.0
Ret/OA	76.2	68.6
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Vent	20	20
Infil	20	20
Supply	393	393
MinStop/Rh	0	0
Return	413	413
Exhaust	40	40
Rm Exh	0	0
Auxil	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	5.1	5.1
cfm/ft²	0.98	0.98
cfm/ton	480.70	
ft²/ton	489.30	
Btu/hr·ft²	24.52	-32.35
No. People	0	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	0.8	9.8	8.8	393	76.2	60.8	56.9	55.0	51.8	54.0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.8	9.8								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	400		
Part	0		
ExFlr	0		
Roof	0	0	0
Wall	120	8	6

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-12.9	393	68.6	99.0
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-12.9			

Zone Checksums

By Watts Architecture & Engineering, P.C.

Main Floor

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 8 / 17
Outside Air: OADB/WB/HR: 85 / 72 / 100

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	5,216	0	5,216	3
Glass Solar	8,527	0	8,527	5
Glass Cond	2,363	0	2,363	1
Wall Cond	125,168	0	125,168	72
Partition	0		0	0
Exposed Floor	2,780		2,780	2
Infiltration	5,422		5,422	3
Sub Total ==>	149,476	0	149,476	86
Internal Loads				
Lights	0	0	0	0
People	9,600		9,600	6
Misc	3,771	0	3,771	2
Sub Total ==>	13,371	0	13,371	8
Ceiling Load	0	0	0	0
Ventilation Load	0	0	11,572	7
Adj Air Trans Heat	0		0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	0		0	0
Exhaust Heat		0	0	0
Sup. Fan Heat			1	0
Ret. Fan Heat		1	1	0
Duct Heat Pkup		0	0	0
Reheat at Design			0	0
Grand Total ==>	162,847	1	174,421	100.00

CLG SPACE PEAK

Mo/Hr: 7 / 17
OADB: 86

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	5,457	3
Glass Solar	7,801	5
Glass Cond	2,344	2
Wall Cond	125,940	81
Partition	0	0
Exposed Floor	2,997	2
Infiltration	2,023	1
Sub Total ==>	146,562	94
Internal Loads		
Lights	0	0
People	5,880	4
Misc	3,771	2
Sub Total ==>	9,651	6
Ceiling Load	0	0
Ventilation Load	0	0
Adj Air Trans Heat	0	0
Ov/Undr Sizing	0	0
Exhaust Heat		
OA Preheat Diff.		
RA Preheat Diff.		
Additional Reheat		
System Plenum Heat		
Grand Total ==>	156,214	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 6

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0
Skylite Cond	0	0	0
Roof Cond	-7,544	-7,544	3
Glass Solar	0	0	0
Glass Cond	-15,450	-15,450	5
Wall Cond	-209,801	-209,801	70
Partition	0	0	0
Exposed Floor	-28,789	-28,789	10
Infiltration	-12,688	-12,688	4
Sub Total ==>	-274,272	-274,272	91
Internal Loads			
Lights	0	0	0
People	0	0	0
Misc	0	0	0
Sub Total ==>	0	0	0
Ceiling Load	0	0	0
Ventilation Load	0	-26,500	9
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	0	0	0
Exhaust Heat		0	0
OA Preheat Diff.		0	0
RA Preheat Diff.		0	0
Additional Reheat		0	0
System Plenum Heat		0	0
Grand Total ==>	-274,272	-300,772	100.00

TEMPERATURES

	Cooling	Heating
SADB	60.5	97.5
Plenum	75.0	72.0
Return	75.0	72.0
Ret/OA	75.4	69.5
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Vent	370	370
Infil	177	177
Supply	9,919	9,919
MinStop/Rh	0	0
Return	10,096	10,096
Exhaust	547	547
Rm Exh	0	0
Auxil	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	3.7	3.7
cfm/ft²	3.75	3.75
cfm/ton	682.39	
ft²/ton	181.91	
Btu/hr·ft²	65.97	-113.76
No. People	24	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	14.5	174.4	160.1	9,919	75.4	62.8	67.8	60.5	57.0	65.7
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	14.5	174.4								

AREAS

	Gross Total ft²	Glass ft²	Glass (%)
Floor	2,644		
Part	0		
ExFlr	2,625		
Roof	2,670	0	0
Wall	2,907	258	9

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-300.8	9,919	69.5	97.5
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-300.8			

Zone Checksums

By Watts Architecture & Engineering, P.C.

Meeting Room

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 8 / 13
Outside Air: OADB/WB/HR: 85 / 73 / 104

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	0	0	0	0
Glass Solar	823	0	823	3
Glass Cond	320	0	320	1
Wall Cond	19,704	0	19,704	66
Partition	0		0	0
Exposed Floor	0		0	0
Infiltration	1,454		1,454	5
Sub Total ==>	22,301	0	22,301	74
Internal Loads				
Lights	0	0	0	0
People	0		0	0
Misc	0	0	0	0
Sub Total ==>	0	0	0	0
Ceiling Load	0	0	0	0
Ventilation Load	0	0	7,634	26
Adj Air Trans Heat	0		0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	0		0	0
Exhaust Heat		0	0	0
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Reheat at Design			0	0
Grand Total ==>	22,301	0	29,934	100.00

CLG SPACE PEAK

Mo/Hr: 7 / 12
OADB: 84

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	0	0
Glass Solar	852	4
Glass Cond	230	1
Wall Cond	22,197	94
Partition	0	0
Exposed Floor	0	0
Infiltration	386	2
Sub Total ==>	23,665	100
Internal Loads		
Lights	0	0
People	0	0
Misc	0	0
Sub Total ==>	0	0
Ceiling Load	0	0
Ventilation Load	0	0
Adj Air Trans Heat	0	0
Dehumid. Ov Sizing		
Ov/Undr Sizing	0	0
Exhaust Heat		
Sup. Fan Heat		
Ret. Fan Heat		
Duct Heat Pkup		
Reheat at Design		
Grand Total ==>	23,665	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 6

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0
Skylite Cond	0	0	0
Roof Cond	0	0	0
Glass Solar	0	0	0
Glass Cond	-3,142	-3,142	5
Wall Cond	-37,498	-37,498	64
Partition	0	0	0
Exposed Floor	0	0	0
Infiltration	-2,865	-2,865	5
Sub Total ==>	-43,504	-43,504	74
Internal Loads			
Lights	0	0	0
People	0	0	0
Misc	0	0	0
Sub Total ==>	0	0	0
Ceiling Load	0	0	0
Ventilation Load	0	-15,041	26
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	0	0	0
Exhaust Heat		0	0
OA Preheat Diff.		0	0
RA Preheat Diff.		0	0
Additional Reheat		0	0
System Plenum Heat		0	0
Grand Total ==>	-43,504	-58,545	100.00

TEMPERATURES

	Cooling	Heating
SADB	60.6	98.4
Plenum	75.0	72.0
Return	75.0	72.0
Ret/OA	76.4	62.9
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Vent	210	210
Infil	40	40
Supply	1,516	1,516
MinStop/Rh	0	0
Return	1,506	1,506
Exhaust	200	200
Rm Exh	50	50
Auxil	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	13.9	13.9
cfm/ft²	1.89	1.89
cfm/ton	607.72	
ft²/ton	320.70	
Btu/hr·ft²	37.42	-73.18
No. People	14	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	2.5	29.9	23.6	1,516	76.4	64.0	71.8	60.6	57.6	68.1
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	2.5	29.9								

AREAS

	Gross Total ft²	Glass ft²	Glass (%)
Floor	800		
Part	0		
ExFlr	0		
Roof	0	0	0
Wall	890	45	5

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-58.5	1,516	62.9	98.4
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-58.5			