

# FINAL REPORT

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## HVAC System Engineering Feasibility Study Old Main

Commonwealth of Pennsylvania  
State System of Higher Education  
Shippensburg University  
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## **EXECUTIVE SUMMARY**

Century Engineering has been issued a work order (#2011-1, under Contract #5000000031) by Shippensburg University of the State System of Higher Education of the Commonwealth of Pennsylvania to provide a feasibility study for upgrading the HVAC system serving Old Main located at 1871 Old Main Drive.

Old Main is the signature building on campus. The overall goal of this study is to determine what HVAC system upgrades and specific options are available to bring the entire building up to code compliant conditions, including efficient energy management, providing each space with reasonable temperature control and a comfortable working atmosphere. This study presents an engineering opinion on how best to utilize small annual funding sources to make progress on the overall goal and to achieve maximum results for any portion of HVAC upgrades that would benefit the building along the way. In order to limit the complexity of this analysis, a few assumptions have been made to help narrow the focus onto specific options which present a more realistic approach to renovating this particular building.

Old Main is partially conditioned by an existing mechanical HVAC system consisting of two central station, four-pipe air handling units (approximately 60 Tons each), that have been in service since the last major renovation effort in 1984-85. It has been reported that maintenance staff have at times had to manually isolate floors individually to control airflow in order to bring adequate HVAC system capacity to all areas of the building. It is clear that the existing system has surpassed its expected service life, having been in operation for over twenty-five years. Because of the present condition and limited operability of the HVAC system, the University requested this study in order to suggest recommended upgrades to rectify the problems in the best way possible with the goal in mind to increase overall building energy efficiency.

As part of this study a peak block cooling load calculation was performed on all floors of Old Main. The building load was divided into zoned groups of spaces based on exposure orientation and then grouped by floor and also by building quadrant. Old Main requires approximately 150 Tons of peak load cooling and approximately 4,600 CFM of outdoor ventilation air.

After careful examination of all assumptions and limiting factors involved, the following have been chosen for analysis and consideration:

- Option 1: Replace two (2) existing air handling units with two (2) new 75-Ton four-pipe variable air volume (VAV) air handlers and retrofit the existing zones with single duct VAV terminals with heating water coil; the heating water finned tube radiation system at the perimeter shall be retained as it is currently used.
- Option 2: Replace two (2) existing air handling units with four (4) new 38-Ton four-pipe variable air volume (VAV) air handlers isolating the four building quadrants into separate air systems; retrofit the existing zones with single duct VAV terminals with heating water coil; the heating water finned tube radiation system at the perimeter shall be retained as it is currently used.
- Option 3: Remove two (2) existing air handling units, the pneumatic zone dampers, and the heating water finned tube radiation system at the perimeter; provide four-pipe console fan coil units along the perimeter and concealed units where required for interior spaces; provide two (2) new 2,500 CFM dedicated outdoor air energy recovery units to provide tempered ventilation air to the conditioned zone spaces.

Each of the three design options listed above have their inherent advantages in terms of the overall benefits that each option provides and all three options will have a significant effect on improving overall building energy consumption. However, the feasibility of implementation can present a number of pitfalls and hurdles that must be considered and overcome along the way, which may affect the decision on which suggestion makes the most sense. A challenge is presented of determining what the best and most logical recommendation is for spending the annual funding allotments in order to achieve the end goal of a completely renovated Old Main building HVAC system.

It appears that the option that presents the most practical choice, offering more flexibility and ease of implementation, is the second featured alternative which suggests dividing Old Main into four separate variable air volume systems each with a four-pipe air handling unit and VAV air terminals. Any option that is chosen will require significant coordination of the multiple phases of implementation, but it appears as though splitting the building into quadrant systems allows the easiest to control for the use of incremental annual funding sources.



## **INTRODUCTION/BACKGROUND**

Old Main is the signature building on campus, and houses administrative functions including the President's and Vice President's offices, as well as other administrative services, human resources, admissions, financial aid, registrar, and student accounts offices. Constructed in 1871, its reported last renovation occurred in 1984-85 when most of the HVAC systems were either upgraded or replaced.

The overall goal of this study is to determine what HVAC system upgrades and specific options are available to bring the entire building up to code compliant conditions, including efficient energy management, providing each space with reasonable temperature control and a comfortable working atmosphere. This includes providing systems analysis and "order-of-magnitude" opinions of probable construction cost to determine the approximate funding level required to achieve this overall goal. It is evident that the level of funding to achieve this goal in its entirety may not be available for some time; however, a lower level of project funding in annual increments should be available in the near future. Therefore, this study presents an engineering opinion on how best to utilize these smaller funding sources to make progress on the overall goal and to achieve maximum results for any portion of HVAC upgrades that would benefit the building along the way.

When evaluating existing buildings for recommendations for renovating mechanical systems, the analysis must consider a wide range of choices with regard to the types of systems that are available. In order to limit the complexity of this analysis, a few assumptions have been made to help narrow the focus onto specific options which present a more realistic approach to renovating this particular building.

- One assumption is obviously the limitation on project funding, as already mentioned. The entire building HVAC system will not be able to be demolished for full replacement all under one effort. Any upgrades to the HVAC system will be assumed to be implemented as partial upgrades with changes made on an incremental basis according to availability of funding and building logistics such as time schedule and occupancy. It is understood that there will be a limitation of available funding in annual increments, which is to be appropriated as an annual maintenance budget for Old Main.
- Another assumption heavily considers the historical nature of this building and the limitations that the existing architecture presents on the notion of renovation activity. Mechanical construction must be able to be accomplished without altering or destroying the historical significance of the building's appearance. Mechanical system recommendations have assumed that little to no major architectural alterations to any parts of Old Main are desired by the University or any governing historical society or group.

- It is assumed that during and throughout any renovation construction activity, the remainder of the building is to remain fully functional and occupied continuously. While minor inconveniences are unavoidable during this type of work, the recommendations presented have taken into consideration what level of impact the suggested renovation activity could have on the facility and its occupants.
- The existing building envelope including the wall, window, and roof constructions will remain in their current state and any plans for upgrading or renovating any one or all of these architectural systems have not been considered here. It should be noted that the existing wall, window, and roof constructions appear to be marginally insulated, if at all, and are most likely not conducive to enhancing the energy efficiency of proposed mechanical systems nor contributory to the reduction of the heating and cooling capacity required to condition the spaces for optimal human comfort. Consideration of optimizing the building envelope will surely help a great deal, but are beyond the scope of this analysis.
- The mechanical HVAC systems currently serving Old Main use a central plant that produces chilled water, hydronic heating water, and hydronic heating glycol as the heat transfer media used in the HVAC systems equipment. It is reported that these central plant utilities are intended to remain in place for the short-term future while a campus-wide central plant is in the planning stages to serve this building in the long-term. Therefore, the system recommendations presented have only considered those that use chilled and heating water equipment and other systems such as DX refrigerant based, gas-fired packaged or water source heat loop have been eliminated from consideration. Should this assumption be determined to be too narrow, then consideration of these other types of systems may be expanded upon.
- The system of automatic temperature control (ATC) that is currently installed in Old Main consists of a web-based BACnet compatible direct digital control (DDC) network backbone (by Automated Logic Corporation) that controls the existing hydronic heating and cooling equipment and distribution pumps as well as the control of the existing air handling units. It is assumed that any future HVAC renovations will utilize or expand this existing ATC system network as required to sequence and control any additional new equipment.

As part of this feasibility study effort, Century Engineering has performed the following tasks under the scope of this work:

- A cursory overall review of the existing building documentation available which includes the original mechanical renovation drawings (c. 12/29/1982), Century Room upgrades (c. 12/15/1998), and the relocation of the existing chiller condensing units (7/28/1997). Other documents reviewed were the "Feasibility Study for the Old Main Chapel," (RPA,

1/14/2008), "Central Chilled Water System Evaluation," (EEI, 6/10/2010), and the Old Main ATC As-Built, (Intercon Automation, 7/7/2005).

- A preliminary site visit to Old Main for the purpose of observing the extent of the existing mechanical HVAC systems and equipment in order to gain visual knowledge of the age, condition, and overall functioning state of the system as it currently operates. This site visit was also to determine evidence of any major deviations from the existing documents as they were reviewed and to visually assess the general architectural layout and construction of the building.
- General discussions during initial and subsequent site visits with Shippensburg University maintenance personnel regarding the overall condition, history, and operation of the existing HVAC systems and equipment.
- Completion of overall estimated building block heating and cooling load calculations using basic assumptions for the purpose of determining general overall expected systems capacity requirements for both heating and cooling capacity and necessary volumes of outdoor air for use in meeting the current ventilation requirements. These calculations do not provide sufficient data for use with any detailed design preparation and it is recommended that a more extensive detailed analysis be performed in the future to meet any actual design purpose.
- Analyzed, selected, and evaluated potential options, alternatives, and cost implications of mechanical HVAC system renovations that could be offered for consideration to be implemented into Old Main taking into account the confines of the realm of assumptions made.
- Presented a Preliminary Draft Report documenting initial progress of the essential tasks pertinent to realizing the achievement of the overall goal of this study.
- Participated in a review discussion of the Preliminary Draft Report with Shippensburg University facilities managers.
- A follow-up site visit to Old Main for the purpose of observing in closer detail some of the pneumatic bladder dampers and their associated controls and completing a detailed survey of the existing zone control thermostats while documenting current space usage.
- Presented this Final Draft Report documenting the completion of the full HVAC System Feasibility Study of Old Main, including the compilation of supporting analysis data, floor plans showing proposed zoning diagrams, and revisions to previously submitted order-of-magnitude project costs.

## **EXISTING CONDITIONS/LOAD STUDY**

Old Main is partially conditioned by an existing mechanical HVAC system consisting of two central station four-pipe air handling units (approximately 60 Tons each), that have been in service since the last major renovation effort in 1984-85. These units were originally variable volume by way of variable guide vanes at the inlets to the supply fans. With the retrofit of new variable frequency drives, the air handling units have since been converted for variable air volume (VAV) operation with full air-side economizer mode. These two AHUs are situated on the top (4<sup>th</sup>) floor of the building in mechanical equipment rooms located on the back (North) side of the building at opposite ends of the main central corridor. Each unit is tasked with serving half of the building including spaces on the first, second, and third floors and are practically identical in size, capacity, and configuration. Two inline return/relief fans are located in the upper attic space above the fourth floor main corridor and are each assigned to one of the main air handling units. Four-pipe hydronic service is distributed from the basement central plant consisting of two 70-Ton (nominal) capacity split system chillers and a 1700 MBH steam-glycol hot water convertor. Two additional 812 MBH steam-hot water convertors in the basement also produce heating water that serves all of the perimeter finned tube radiation heating throughout the building.

The fourth floor is presently unoccupied and contains small rooms that have been abandoned and were not renovated in the 1984-85 major improvement to the building. Subsequently, this floor is not mechanically conditioned or ventilated by the central HVAC system with the exception of a limited number of heating water unit heaters installed in the corridors. The HVAC system as described above distributes conditioned mixed supply air to the third, second, and first floors via vertical supply air ducts in each quadrant of the building. The supply air mains branch outward from duct shafts in each of the four quadrants on each floor where they separate into multiple sub-branches. Each sub-branch contains a duct-mounted pneumatically operated bladder-type damper which serves as a variable air volume (VAV) type zone control device. These air systems use the central air handlers to produce low pressure variable amounts of air via the bladder-type zone dampers to provide a temperature responsive system for the end users. Each pneumatically operated zone damper is controlled by a single differential pressure sensor downstream of the damper to maintain airflow to the conditioned spaces within the zone. Temperature in each space is controlled by dedicated room thermostats, which operate individual duct-mounted pneumatically operated bladder dampers or variable air volume ceiling supply air diffusers, which in turn control static pressure downstream of their respective zone dampers. The existing zone dampers are presently in poor operating condition and are failing due to age. This is making it extremely difficult to maintain overall building control with respect to adequate air distribution and control of temperature and humidity. It has been reported that maintenance staff have at times had to manually isolate floors individually to control airflow in order to bring adequate HVAC system capacity to all areas of the building. The need for this has occurred primarily during a building start-up after an unoccupied shutdown period such as over a weekend or extended holiday.

It is clear that the existing system has surpassed its expected service life having been in operation for over twenty-five years and the current state of its operation is having a significant negative impact on overall building energy consumption. There have been attempts to upgrade and maintain the system as best as can be expected with items such as upgrades to the automatic temperature control (ATC) system and routine periodic maintenance to the air handling units including motor shafts and bearings. However, the main area of concern appears to be the inability of the pneumatic dampers to be able to operate properly. Most of these devices are located above hard ceilings or in otherwise difficult to access locations and cannot be repaired or maintained. Because of the present condition and limited operability of the HVAC system, the University requested this study in order to suggest recommended upgrades to rectify the problems in the best way possible with the goal in mind to increase overall building energy efficiency.

As part of this study a peak block cooling load calculation was performed on all floors of Old Main. The Chapel and the Institutional Research Wing were calculated separately. The Century Room café area was excluded since this area was recently renovated and adequate data is available regarding this system. As a result, Old Main requires a block cooling load capacity of approximately 150 Tons including the load due to incoming outdoor ventilation air. The following assumptions were made with regard to cooling load input factors. More detailed information is included in the Appendices of this document.

- Weather Data: Harrisburg, PA, Summer Design-92°Fdb/74°Fwb, Winter Design-9°F
- Exterior Wall Construction: 4" face brick, 8" HW concrete block (stone) masonry, uninsulated cavity, gypsum wallboard, u-value = 0.248
- Roof/Attic Construction: Slate, wood deck, 6" batt insulation, u-value = 0.044
- Window Construction: Wood framed, single pane, 1/8" clear glass, u-value = 0.98
- Spaces: Typical office criteria, 5 People/1000 sq.ft. (per ASHRAE 62.1-2007), Lighting = 1.0 W./sq.ft., Equipment = 1.5 W./sq.ft., Infiltration = 0.5 ACH (cooling)/1.25 ACH (heating)
- Ventilation Rate: 5.0 CFM/P. + 0.06 CFM/sq.ft. (typical office space per ASHRAE 62.1-2007)
- Thermostat Set Points: Occupied-75°F(cooling)/70°F(heating)
- Hydronic Service Temperatures: 12°F(dT, chilled water), 20°F(dT, heating water)

The building load was divided into zoned groups of spaces based on exposure orientation and then grouped by floor and also by building quadrant. The following tables summarize the calculated building loads. Due to the different grouping of spaces and zones from the Floor Grouping to the Quadrant Grouping, there is some diversity in the peak cooling and ventilation loads which is evident by the slightly differing total results as shown in the tabular data. It is important to note that these values, while differing slightly, are well within the same orders of magnitude and the differences are negligible for this analysis. Detailed breakdowns of the resultant block loads are included in the Appendices.

**Zones Grouped By Floor**

<b>SYSTEM</b>	<b>Cooling Capacity (Tons)</b>	<b>Heating Capacity (MBH)</b>	<b>Ventilation Air (CFM)</b>	<b>Building Area (sq.ft.)</b>
1 <sup>st</sup> Floor	40.2	531.6	1235	16,250
2 <sup>nd</sup> Floor	40.4	538.4	1080	14,205
3 <sup>rd</sup> Floor	33.6	456.1	1080	14,210
4 <sup>th</sup> Floor	37.1	498.7	1200	16,000
<b>TOTAL</b>	<b>151.3</b>	<b>2024.8</b>	<b>4595</b>	<b>60,665</b>

**Zones Grouped By Quadrant**

<b>SYSTEM</b>	<b>Cooling Capacity (Tons)</b>	<b>Heating Capacity (MBH)</b>	<b>Ventilation Air (CFM)</b>	<b>Building Area (sq.ft.)</b>
NW Core	31.1	383.2	875	10,690
SW Core	31.2	377.6	875	10,710
NE Core	26.5	334.7	715	8,840
SE Core	35.2	427.3	985	12,060
N4 Core/Main	29.1	502.2	1155	18,365
<b>TOTAL</b>	<b>153.1</b>	<b>2025.0</b>	<b>4605</b>	<b>60,665</b>

**Note:** N4 Core/Main includes the 4<sup>th</sup> Floor North Central Wing and all main corridors, stairs, and toilet rooms on all floors

<b>SYSTEM</b>	<b>Cooling Capacity (Tons)</b>	<b>Heating Capacity (MBH)</b>	<b>Ventilation Air (CFM)</b>	<b>Building Area (sq.ft.)</b>
Chapel	41.0	534.3	1920	5,555
Institutional Research Wing	5.9	77.0	175	2,045

<b>BLDG. TOTAL</b>	<b>Cooling Capacity (Tons)</b>	<b>Heating Capacity (MBH)</b>	<b>Ventilation Air (CFM)</b>	<b>Building Area (sq.ft.)</b>
Old Main Bldg.	200	2636	6700	68,265

## **DISCUSSION/BUILDING SYSTEM REQUIREMENTS**

As outlined above, Old Main requires approximately 150 Tons of peak load cooling and approximately 4,600 CFM of outdoor ventilation air. The Chapel and the Institutional Research Wing add another approximately 47 Tons of cooling. An examination of the zoning method as depicted on the existing drawings indicates that the building load has been divided equally in half from East to West with a single air handling unit serving each half. The two building halves are then divided again with each air handling unit serving a specific quadrant of the building (AHU-1, NE/SE and AHU-2, NW/SW). Nominally, each half of the building can be approximated to require about 75 Tons where each of the four quadrants requires about 38 Tons of cooling and about 15,000 CFM of supply air.

- Each air handling unit serves half of the building and there are no provisions in place to provide any redundancy or flexibility should one of the air handling units be rendered inoperable due to failure or other shutdown of the unit. Therefore, one half of the building is affected if there is a shutdown of one of the air handlers for any reason. New HVAC upgrades should consider reducing the breadth of reliability on one air system by possibly further dividing the building zones into smaller HVAC systems.
- The existing systems are reportedly designed to include future capacity which is assumed to be the possible fit out of the fourth floor. To date there has been no fit out requiring extension of the HVAC system to the fourth floor. Any future HVAC upgrades should consider including all or at least a portion of the fourth floor load into the system capacity.
- Operations and activity within Old Main will be expected to continue while HVAC upgrades are occurring. Any future HVAC upgrades should take into account the effects that shutting down any portion of the building has allowing the least amount of disruption to the occupants and the functions that occur in those areas of the building.
- Old Main has several different exposure orientations and considerably different space usage diversity. For this reason, as much system flexibility as possible should be considered in order to properly satisfy the varying load conditions that may occur throughout the building at any given time. Several zones of control should be provided in any future HVAC systems upgrade.
- There is an existing direct digital control (DDC) network backbone already in place to provide a limited degree of building automation of the existing HVAC systems. It is assumed that any future HVAC upgrades will be incorporated into this existing system in order to expand the building automation capabilities. Any incremental system upgrades will have to be able to tie into the existing ATC system and be fully operational while the remaining systems continue to operate alongside them as they presently do.

## **ANALYSIS AND RECOMMENDATIONS**

After careful examination of all assumptions and limiting factors involved, the following have been chosen for analysis and consideration:

- **Option 1:** Replace two (2) existing air handling units with two (2) new 75-Ton four-pipe variable air volume (VAV) air handlers and retrofit the existing zones with single duct VAV terminals with heating water coil; the heating water finned tube radiation system at the perimeter shall be retained as it is currently used.
- **Option 2:** Replace two (2) existing air handling units with four (4) new 38-Ton four-pipe variable air volume (VAV) air handlers isolating the four building quadrants into separate air systems; retrofit the existing zones with single duct VAV terminals with heating water coil; the heating water finned tube radiation system at the perimeter shall be retained as it is currently used.
- **Option 3:** Remove two (2) existing air handling units, the pneumatic zone dampers, and the heating water finned tube radiation system at the perimeter; provide four-pipe console fan coil units along the perimeter and concealed units where required for interior spaces; provide two (2) new 2,500 CFM dedicated outdoor air energy recovery units to provide tempered ventilation air to the conditioned zone spaces.

### **Option 1**

It has already been mentioned that the existing HVAC systems equipment is well beyond its expected service life, so it goes without saying that the existing air handling units are in need of immediate replacement in order to satisfy their intended use and be considered reliable into the foreseeable future. A direct replacement of the existing air handling units is a straight-forward initial recommendation as it presents the option of replacing the aged equipment without changing any of the original functional intent of the system. Each unit would be located in the existing locations and sized for the intended load capacity, including the appropriate amount of outdoor ventilation air to meet the latest building code requirements. The failing pneumatically operated zone dampers would be replaced with single duct VAV terminals with zone controllers to produce a more reliable air distribution system with better zone comfort control. Control of these units can be incorporated into the existing building ATC system. It is possible that some or all of the system ductwork can be reused with little or no reconfiguration. The heating water finned tube radiation system at the perimeter serves the purpose of providing an offset to the building envelope heat losses and would continue to serve this purpose with little to no modifications needed.



### Option 2

Much like the system described above in Option 1, this system alternative allows for the replacement of the aged existing AHUs with four new units while providing the flexibility and specialized zone coverage of a smaller capacity air system dedicated to a select building zone. Two of these new air handling units would be located in new mechanical equipment rooms on the fourth floor, constructed directly across from the existing rooms, while two additional new units would be located in the existing mechanical rooms. The vertical duct risers serving the two southern quadrants would be decoupled from the existing duct mains and isolated from the northern quadrants, each to be served by their own new air handling unit. The units would be sized for the capacity of a single quadrant load capacity and ventilation air requirement. Likewise, this option would provide replacement of the existing pneumatic dampers with VAV terminals while the perimeter heating system remains.

### Option 3

This system alternative suggests the most radical change away from the existing design by essentially eliminating the notion of a central air system satisfying all of the building conditioning needs. Each space within the building conditioning zones would be provided with one or more four-pipe fan coil units providing all of the sensible cooling and heating requirements within a localized controlled zone. Console fan coil units fitted with chilled and heating water coils would be installed on the perimeter of the spaces along the exterior wall. A single-zone thermostat would control each unit individually to meet the immediate needs of the spaces. The perimeter finned tube heating system would be removed in this scenario. New chilled and heating water piping risers and lateral runs would be provided to serve each zone of fan coil units installed in each quadrant. The two existing air handling units would be removed and two new dedicated outdoor air energy recovery units would be provided in their place to deliver tempered ventilation air to the conditioned zone spaces. The existing duct shafts would be used for distribution of ventilation supply air and exhaust air removal.

## **FEASIBILITY/IMPLEMENTATION**

A key part of the decision making process when considering upgrades and modifications to existing buildings is the impact that the renovation concept has on the ability to get the work done. Each of the three design options listed above have their inherent advantages in terms of the overall benefits that each option provides and all three options will have a significant effect on improving overall building energy consumption. However, the feasibility of implementation can present a number of pitfalls and hurdles that must be considered and overcome along the way which may affect the decision on which suggestion makes the most sense.

### **Option 1**

While this option seems like the simplest and most logical decision whereby the existing air handling units are replaced in kind, the impact on the total building is larger. As mentioned before, each of the two existing air handlers serves one half of the building. In order to replace even one of them there would have to be a total shutdown of that half of the building to get the old unit out and install the new unit in its place and get it up and running. This could take several weeks to accomplish. Careful planning would have to be arranged ahead of time in order to coordinate this type of shutdown. However, once completed there would not be any further need to disrupt this amount of building occupancy and the remainder of the recommended upgrades can take place fairly easily. Each quadrant zone can be isolated from the central system and retrofitted one floor at a time. Once the retrofit is completed, it can be tied into the air system main and brought online. The overall impact would only be to the functionality of the spaces being renovated at that particular time period. This could more than likely be coordinated rather easily with some prior planning and availability of swing space. The existing pneumatic dampers, controls, and a majority of the ductwork will have to be removed. With the retrofitting of the existing zone dampers with VAV terminals, there will be the requirement for some minor architectural modifications as existing ceiling spaces will have to be accessed and bulkheads and ceiling heights may have to be altered in order to accommodate the installation of new equipment. This presents some unique challenges in different parts of Old Main as each floor is not typical with respect to the others. Ceiling space is limited in most areas, but there are varying ceiling heights on the different floors and accessibility to existing ductwork and zone dampers can be especially challenging in some cases. Vertical duct risers could possibly remain intact without the need to access or remove them at all. This would definitely be a benefit to the feasibility of this option.

### **Option 2**

In contrast to Option 1 as described above, this option seems to alleviate some of the problem of the impact presented by a half building shutdown. It is conceivable that the first steps to implementing this option would be to construct the new mechanical equipment rooms on the fourth floor across from the existing air handler rooms in preparation for serving the two southern building quadrants. Since the fourth floor is abandoned and unconditioned, there would be practically no impact on the existing building functions whatsoever while these units are placed in the ready position to be

integrated into the building HVAC system. Once they are ready to go, a brief coordinated shutdown of the existing air handler would allow the existing duct main to be decoupled, isolating the two respective building quadrants while the new air handler is placed online to serve the zones in its associated southern building quadrant. The existing air handler can be reconnected and placed back online to continue serving the remaining northern building quadrant until it is replaced. But much like the problem presented by Option 1, the northern quadrants will have to endure a prolonged shutdown while the existing air handlers are replaced. However, the overall building impact will be minimized since only one fourth of the building will be inconvenienced as it will only be serving that one northern quadrant by that time. One important hurdle whose significance should not be overlooked when considering this option is locating provisions for outdoor air intake to and relief air exhaust from the new air handling units. The existing units have convenient access to the northern (back) side of the building for this crucial function. The new units will need to find similar access for new louvered air plenums as the front side of the building will not be a desirable location to provide this. Implementing the remainder of the concept scheme follows very similarly to the installation of VAV zones on the individual floors, except each will be integrated into a single quadrant air system independent of the other quadrant. In the end, there will be closer control of a smaller air system with this concept with more flexibility between the four air systems serving all four quadrants of the building.

### Option 3

As mentioned above, this option presents the most radical change of all when compared to the central air systems outlined in the other two options. However, in order to implement this option successfully a significant portion of the system needs to be installed ahead of time before bringing it online. Before any existing zones can be retrofitted with four-pipe fan coil units, the chilled and heating water risers will have to be put in place to distribute the hydronic services. While this presents a new set of piping networks including risers and lateral runs, it does not impact the functionality of the existing air systems in the mean time. Pipe risers can be located in convenient existing chase spaces emanating from the basement central plant and continuing up through the building with valved zone connections included for future connection to lateral branches when the zones are to be retrofitted. Each individual space within a particular zone can be planned for the installation of the console fan coil units needed to serve it and these can be installed at a time when this is most feasible. It is important to note that while disruption within the zone may be isolated to only one or two spaces at a time, there may be a wider impact to areas directly below in order to install lateral branch piping in the ceiling space of the floor below with rough-in connections up to the fan coil units on the floor above. This system can be implemented on a floor-by-floor basis within a particular quadrant and then that quadrant can be isolated from the air system serving that portion of the building. A significant hurdle associated with this option is how to provide ventilation air to the retrofitted zones before the entire half of the building is completed and the existing air handling units have not yet been replaced with new dedicated outdoor air energy recovery ventilators. A notable drawback to this system type is the introduction of several new individual equipment units that require periodic maintenance or are subject to require various repairs or replacement parts.

## **BUDGET/COST IMPLICATIONS**

The limiting factor that carries the most significant impact on the implementation of any major HVAC upgrades that are to be carried out in the near future in Old Main is the availability of sufficient funding to cover the costs associated with completing the project. As it has been stated, it is understood that there will be a limitation of available funding in annual increments. Therefore, a challenge is presented of determining what the best and most logical recommendation is for spending the annual funding allotments in order to achieve the end goal of a completely renovated Old Main building HVAC system. The following breakdown presents a budget cost assumption for each of the options suggested in this study. It should be noted that due to the analytical nature of this study, which does not include detailed design efforts, there cannot be any strict reliance on these costs for anything other than an overall assumption of reasonable expectations of order-of-magnitude project costs.

### **Option 1 (Unit Prices)**

HVAC Demolition, Existing Central Station AHU	\$5,000 (each)
HVAC Demolition, ductwork, dampers, air devices	\$22,500 (per quadrant)
(1) New 75-Ton/30,000 CFM Central Station Air Handling Unit, installed	\$105,000 (each)
(1) Single Duct VAV Terminal w/ HW Reheat, ductwork, diffusers installed	\$6,750 (each)
ATC tie-in to existing Automated Logic DDC backbone, per VAV terminal	\$1,200 (each)
Sheet Metal Ductwork (main), insulated, installed	\$50,000 (per quadrant)
Hydronic Piping (main), insulated, installed	\$37,500 (per quadrant)
Misc. Archit. Modifications (walls, ceilings, bulkheads, floors)	\$200,000 (allowance)

### **Option 2 (Unit Prices)**

HVAC Demolition, Existing Central Station AHU	\$5,000 (each)
HVAC Demolition, ductwork, dampers, air devices	\$22,500 (per quadrant)
(1) New 38-Ton/15,000 CFM Central Station Air Handling Unit, installed	\$54,000 (each)
(1) Single Duct VAV Terminal w/ HW Reheat, ductwork, diffusers installed	\$6,750 (each)
ATC tie-in to existing Automated Logic DDC backbone, per VAV terminal	\$1,200 (each)
(1) Intake Air Plenum/(1) Exhaust Air Plenum	\$8,000 (pair)
Sheet Metal Ductwork (main), insulated, installed	\$50,000 (per quadrant)
Hydronic Piping (main), insulated, installed	\$37,500 (per quadrant)
Misc. Archit. Modifications (walls, ceilings, bulkheads, floors)	\$200,000 (allowance)

### **Option 3 (Unit Prices)**

HVAC Demolition, Existing Central Station AHU	\$5,000 (each)
HVAC Demolition, ductwork, dampers, air devices	\$22,500 (per quadrant)
HVAC Demolition, HW piping and perimeter heat	\$7,600 (per quadrant)
(1) New 2,500 CFM Energy Recovery Ventilator w/ Total Wheel, Installed	\$38,600 (each)
(1) Fan Coil Unit, Console Type, 4-Pipe, installed	\$5,000 (each)
ATC tie-in to existing Automated Logic DDC backbone, per FCU	\$1,500 (each)
Hydronic Piping (main and branch), insulated, installed	\$103,000 (per quadrant)
Sheet Metal Ductwork (main, supply/exhaust), insulated, installed	\$39,600 (per quadrant)
Misc. Archit. Modifications (walls, ceilings, bulkheads, floors)	\$200,000 (allowance)

Option 1 (Convert NE quadrant including a new central AHU for East side)

ITEM	QUANTITY	TOTAL ASSUMED COST
HVAC Demolition		\$27,500
75-Ton AHU, East Wings	1	\$105,000
Single Duct VAV Terminals, NE Wing, 1 <sup>st</sup> – 4th Floors	43	\$290,250
ATC tie-in, VAV Terminals, NE Wing, 1 <sup>st</sup> – 4th Floors	43	\$51,600
Sheet Metal Ductwork	1	\$50,000
Hydronic Piping	1	\$37,500
Misc. Archit. Mods.	1	\$200,000
<b>TOTAL</b>	<b>-----</b>	<b>\$761,850</b>

Option 1 (Convert SE quadrant and tie into a new central AHU on East side)

ITEM	QUANTITY	TOTAL ASSUMED COST
HVAC Demolition		\$22,500
Single Duct VAV Terminals, SE Wing, 1 <sup>st</sup> – 4th Floors	42	\$283,500
ATC tie-in, VAV Terminals, SE Wing, 1 <sup>st</sup> – 4th Floors	42	\$50,400
Sheet Metal Ductwork	1	\$50,000
Hydronic Piping	1	\$37,500
Misc. Archit. Mods.	1	\$200,000
<b>TOTAL</b>	<b>-----</b>	<b>\$643,900</b>

Option 1 (Convert entire East side of building including both NE and SE Wings and a new central AHU)

ITEM	QUANTITY	TOTAL ASSUMED COST
HVAC Demolition		\$50,000
75-Ton AHU, East Wings	1	\$105,000
Single Duct VAV Terminals, NE/SE Wings, 1 <sup>st</sup> – 4th Floors	85	\$573,750
ATC tie-in, VAV Terminals, NE/SE Wings, 1 <sup>st</sup> – 4th Floors	85	\$102,000
Sheet Metal Ductwork	2	\$100,000
Hydronic Piping	2	\$75,000
Misc. Archit. Mods.	2	\$400,000
<b>TOTAL</b>	<b>-----</b>	<b>\$1,405,750</b>

Option 1 (Convert NW quadrant including a new central AHU for West side)

ITEM	QUANTITY	TOTAL ASSUMED COST
HVAC Demolition		\$27,500
75-Ton AHU, East Wings	1	\$105,000
Single Duct VAV Terminals, NW Wing, 1 <sup>st</sup> – 4th Floors	42	\$283,500
ATC tie-in, VAV Terminals, NW Wing, 1 <sup>st</sup> – 4th Floors	42	\$50,400
Sheet Metal Ductwork	1	\$50,000
Hydronic Piping	1	\$37,500
Misc. Archit. Mods.	1	\$200,000
<b>TOTAL</b>	<b>-----</b>	<b>\$753,900</b>

Option 1 (Convert SW quadrant and tie into a new central AHU on West side)

ITEM	QUANTITY	TOTAL ASSUMED COST
HVAC Demolition		\$22,500
Single Duct VAV Terminals, SW Wing, 1 <sup>st</sup> – 4th Floors	43	\$290,250
ATC tie-in, VAV Terminals, SW Wing, 1 <sup>st</sup> – 4th Floors	43	\$51,600
Sheet Metal Ductwork	1	\$50,000
Hydronic Piping	1	\$37,500
Misc. Archit. Mods.	1	\$200,000
<b>TOTAL</b>	<b>-----</b>	<b>\$651,850</b>

Option 1 (Convert entire West side of building including both NW and SW Wings & a new central AHU)

ITEM	QUANTITY	TOTAL ASSUMED COST
HVAC Demolition		\$50,000
75-Ton AHU, East Wings	1	\$105,000
Single Duct VAV Terminals, NW/SW Wings, 1 <sup>st</sup> – 4th Flrs	85	\$573,750
ATC tie-in, VAV Terminals, NW/SW Wings, 1 <sup>st</sup> – 4th Flrs	85	\$102,000
Sheet Metal Ductwork	2	\$100,000
Hydronic Piping	2	\$75,000
Misc. Archit. Mods.	2	\$400,000
<b>TOTAL</b>	<b>-----</b>	<b>\$1,405,750</b>

Option 2 (Convert NW quadrant including a new central AHU for NW quadrant)

ITEM	QUANTITY	TOTAL ASSUMED COST
HVAC Demolition		\$27,500
38-Ton AHU, NW Quadrant	1	\$54,000
Single Duct VAV Terminals, NW Wing, 1 <sup>st</sup> – 4th Floors	42	\$283,500
ATC tie-in, VAV Terminals, NW Wing, 1 <sup>st</sup> – 4th Floors	42	\$50,400
Sheet Metal Ductwork	1	\$50,000
Hydronic Piping	1	\$37,500
Misc. Archit. Mods.	1	\$200,000
<b>TOTAL</b>	<b>-----</b>	<b>\$702,900</b>

Option 2 (Convert NE quadrant including a new central AHU for NE quadrant)

ITEM	QUANTITY	TOTAL ASSUMED COST
HVAC Demolition		\$27,500
38-Ton AHU, NE Quadrant	1	\$54,000
Single Duct VAV Terminals, NE Wing, 1 <sup>st</sup> – 4th Floors	43	\$290,250
ATC tie-in, VAV Terminals, NE Wing, 1 <sup>st</sup> – 4th Floors	43	\$51,600
Sheet Metal Ductwork	1	\$50,000
Hydronic Piping	1	\$37,500
Misc. Archit. Mods.	1	\$200,000
<b>TOTAL</b>	<b>-----</b>	<b>\$710,850</b>

Option 2 (Convert entire North side of building including both NW and NE Wings & two new central AHUs)

ITEM	QUANTITY	TOTAL ASSUMED COST
HVAC Demolition		\$55,000
38-Ton AHU, East Wings	2	\$108,000
Single Duct VAV Terminals, NE/SE Wings, 1 <sup>st</sup> – 4th Floors	85	\$573,750
ATC tie-in, VAV Terminals, NE/SE Wings, 1 <sup>st</sup> – 4th Floors	85	\$102,000
Intake/Exhaust Plenums	1	\$8,000
Sheet Metal Ductwork	2	\$100,000
Hydronic Piping	2	\$75,000
Misc. Archit. Mods.	2	\$400,000
<b>TOTAL</b>	<b>-----</b>	<b>\$1,421,750</b>

**Option 2 (Convert SW quadrant including a new central AHU for SW quadrant)**

ITEM	QUANTITY	TOTAL ASSUMED COST
HVAC Demolition		\$22,500
38-Ton AHU, SW Quadrant	1	\$54,000
Single Duct VAV Terminals, SW Wing, 1 <sup>st</sup> – 4th Floors	43	\$290,250
ATC tie-in, VAV Terminals, SW Wing, 1 <sup>st</sup> – 4th Floors	43	\$51,600
Intake/Exhaust Plenums	1	\$8,000
Sheet Metal Ductwork	1	\$50,000
Hydronic Piping	1	\$37,500
Misc. Archit. Mods.	1	\$200,000
<b>TOTAL</b>	<b>-----</b>	<b>\$682,050</b>

**Option 2 (Convert SE quadrant including a new central AHU for SE quadrant)**

ITEM	QUANTITY	TOTAL ASSUMED COST
HVAC Demolition		\$22,500
38-Ton AHU, SE Quadrant	1	\$54,000
Single Duct VAV Terminals, SE Wing, 1 <sup>st</sup> – 4th Floors	42	\$283,500
ATC tie-in, VAV Terminals, SE Wing, 1 <sup>st</sup> – 4th Floors	42	\$50,400
Intake/Exhaust Plenums	1	\$8,000
Sheet Metal Ductwork	1	\$50,000
Hydronic Piping	1	\$37,500
Misc. Archit. Mods.	1	\$200,000
<b>TOTAL</b>	<b>-----</b>	<b>\$705,900</b>

**Option 2 (Convert entire South side of bldg including both SW & SE Wings & two new central AHUs)**

ITEM	QUANTITY	TOTAL ASSUMED COST
HVAC Demolition		\$45,000
38-Ton AHU, East Wings	2	\$108,000
Single Duct VAV Terminals, NW/SW Wings, 1 <sup>st</sup> – 4th Flrs	85	\$573,750
ATC tie-in, VAV Terminals, NW/SW Wings, 1 <sup>st</sup> – 4th Flrs	85	\$102,000
Intake/Exhaust Plenums	1	\$8,000
Sheet Metal Ductwork	2	\$100,000
Hydronic Piping	2	\$75,000
Misc. Archit. Mods.	2	\$400,000
<b>TOTAL</b>	<b>-----</b>	<b>\$1,411,750</b>



Option 3 (Convert NE Quadrant to FCUs NOT including a new Energy Recovery Ventilator)

ITEM	QUANTITY	TOTAL ASSUMED COST
HVAC Demolition		\$30,100
4-Pipe FCU's, NE Wing, 1 <sup>st</sup> – 4th Floors	41	\$205,000
ATC tie-in, FCU's, NE Wing, 1 <sup>st</sup> – 4th Floors	41	\$61,500
Sheet Metal Ductwork	1	\$39,600
Hydronic Piping	1	\$103,000
Misc. Archit. Mods.	1	\$200,000
<b>TOTAL</b>	-----	<b>\$639,200</b>

Option 3 (Convert SE Quadrant to FCUs NOT including a new Energy Recovery Ventilator)

ITEM	QUANTITY	TOTAL ASSUMED COST
HVAC Demolition		\$30,100
4-Pipe FCU's, SE Wing, 1 <sup>st</sup> – 4th Floors	52	\$260,000
ATC tie-in, FCU's, SE Wing, 1 <sup>st</sup> – 4th Floors	52	\$78,000
Sheet Metal Ductwork	1	\$39,600
Hydronic Piping	1	\$103,000
Misc. Archit. Mods.	1	\$200,000
<b>TOTAL</b>	-----	<b>\$710,700</b>

Option 3 (Convert NW Quadrant to FCUs NOT including a new Energy Recovery Ventilator)

ITEM	QUANTITY	TOTAL ASSUMED COST
HVAC Demolition		\$30,100
4-Pipe FCU's, NW Wing, 1 <sup>st</sup> – 4th Floors	50	\$250,000
ATC tie-in, FCU's, NW Wing, 1 <sup>st</sup> – 4th Floors	50	\$75,000
Sheet Metal Ductwork	1	\$39,600
Hydronic Piping	1	\$103,000
Misc. Archit. Mods.	1	\$200,000
<b>TOTAL</b>	-----	<b>\$697,700</b>

Option 3 (Convert SW Quadrant to FCUs NOT including a new Energy Recovery Ventilator)

ITEM	QUANTITY	TOTAL ASSUMED COST
HVAC Demolition		\$30,100
4-Pipe FCU's, SW Wing, 1 <sup>st</sup> – 4th Floors	48	\$240,000
ATC tie-in, FCU's, SW Wing, 1 <sup>st</sup> – 4th Floors	48	\$72,000
Sheet Metal Ductwork	1	\$39,600
Hydronic Piping	1	\$103,000
Misc. Archit. Mods.	1	\$200,000
<b>TOTAL</b>	-----	<b>\$684,700</b>

Option 3 (Convert entire East side of building to FCUs including a new Energy Recovery Ventilator)

ITEM	QUANTITY	TOTAL ASSUMED COST
HVAC Demolition		\$35,100
2,500 CFM ERV, East Wings	1	\$38,600
4-Pipe FCU's, NE/SE Wings, 1 <sup>st</sup> – 4th Floors	93	\$465,000
ATC tie-in, FCU's, NE/SE Wings, 1 <sup>st</sup> – 4th Floors	93	\$139,500
Sheet Metal Ductwork	2	\$79,200
Hydronic Piping	2	\$206,000
Misc. Archit. Mods.	2	\$400,000
<b>TOTAL</b>	-----	<b>\$1,363,400</b>

Option 3 (Convert entire West side of building to FCUs including a new Energy Recovery Ventilator)

ITEM	QUANTITY	TOTAL ASSUMED COST
HVAC Demolition		\$35,100
2,500 CFM ERV, West Wings	1	\$38,600
4-Pipe FCU's, NW/SW Wings, 1 <sup>st</sup> – 4th Floors	98	\$490,000
ATC tie-in, FCU's, NW/SW Wings, 1 <sup>st</sup> – 4th Floors	98	\$147,000
Sheet Metal Ductwork	2	\$79,200
Hydronic Piping	2	\$206,000
Misc. Archit. Mods.	2	\$400,000
<b>TOTAL</b>	-----	<b>\$1,395,900</b>

## **CONCLUSION**

Three options for upgrading the existing HVAC systems serving Old Main have been offered here all of which include the use of a combined chilled and heating water hydronic system in keeping with the University's master plan for a campus utility plant. The first option suggests merely a replacement of the two existing four-pipe air handlers, while converting the conditioned spaces to a variable volume air system retrofitting the existing pneumatically operated dampers with single duct terminal units with hydronic heating coils. While providing an upgrade to the existing system components, this option limits the flexibility and diversity of system operation and does not optimize energy efficiency performance. Another option suggests the most radical change away from the existing design by eliminating the notion of a central air system with each space within the building conditioning zones being provided with four-pipe fan coil units. Providing a larger degree of individual control increases the flexibility of the system, but an increase in the number of equipment units will result in an increase maintenance burden in order to keep all of these units operating properly. However, it appears that the option that presents the most practical choice, offering more flexibility and ease of implementation, is the second featured alternative which suggests dividing Old Main into four separate variable air volume systems each with a four-pipe air handling unit and VAV air terminals. Any option that is chosen will require significant coordination of the multiple phases of implementation, but it appears as though splitting the building into quadrant systems allows the easiest to control for the use of incremental annual funding sources.

# **APPENDICES**

# **Appendix A**

## **Option 2 VAV Zoning Plans**

↑ CARD READER LOCATION  
 K&S KEYED SWITCH ENTRY  
 ♿ ADA ENTRANCE  
 1208 = ROOM NUMBER  
 488 = AREA / ROOM SQFT  
 FLOOR PLAN UPDATED LAST:  
 3/5/07  
 TOTAL GROSS SQFT =  
 113,653 SQFT

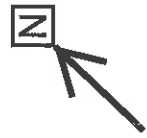


**OPTION 2: VAV ZONING (32 zones)**  
 NW Quadrant: 9 zones  
 NE Quadrant: 6 zones  
 SW Quadrant: 5 zones  
 SE Quadrant: 6 zones  
 N/Central: 6 zones

T = THERMOSTAT

**OLD MAIN  
 FIRST FLOOR PLAN**  
 NO SCALE 1"=8'-3"

↑ CARD READER LOCATION  
 K&S KEYED SWITCH ENTRY  
 ♿ ADA ENTRANCE  
 120B = ROOM NUMBER  
 488 = AREA / ROOM SQFT  
 FLOOR PLAN UPDATED LAST:  
 3/5/07  
 TOTAL GROSS SQFT =  
 113,853 SQFT



**OPTION 2: VAV ZONING (31 zones)**  
 NW Quadrant: 6 zones  
 NE Quadrant: 5 zones  
 SW Quadrant: 8 zones  
 SE Quadrant: 6 zones  
 N/Central: 6 zones

T = THERMOSTAT



**OLD MAIN SECOND FLOOR PLAN**  
 NO SCALE B-1-2-3-4

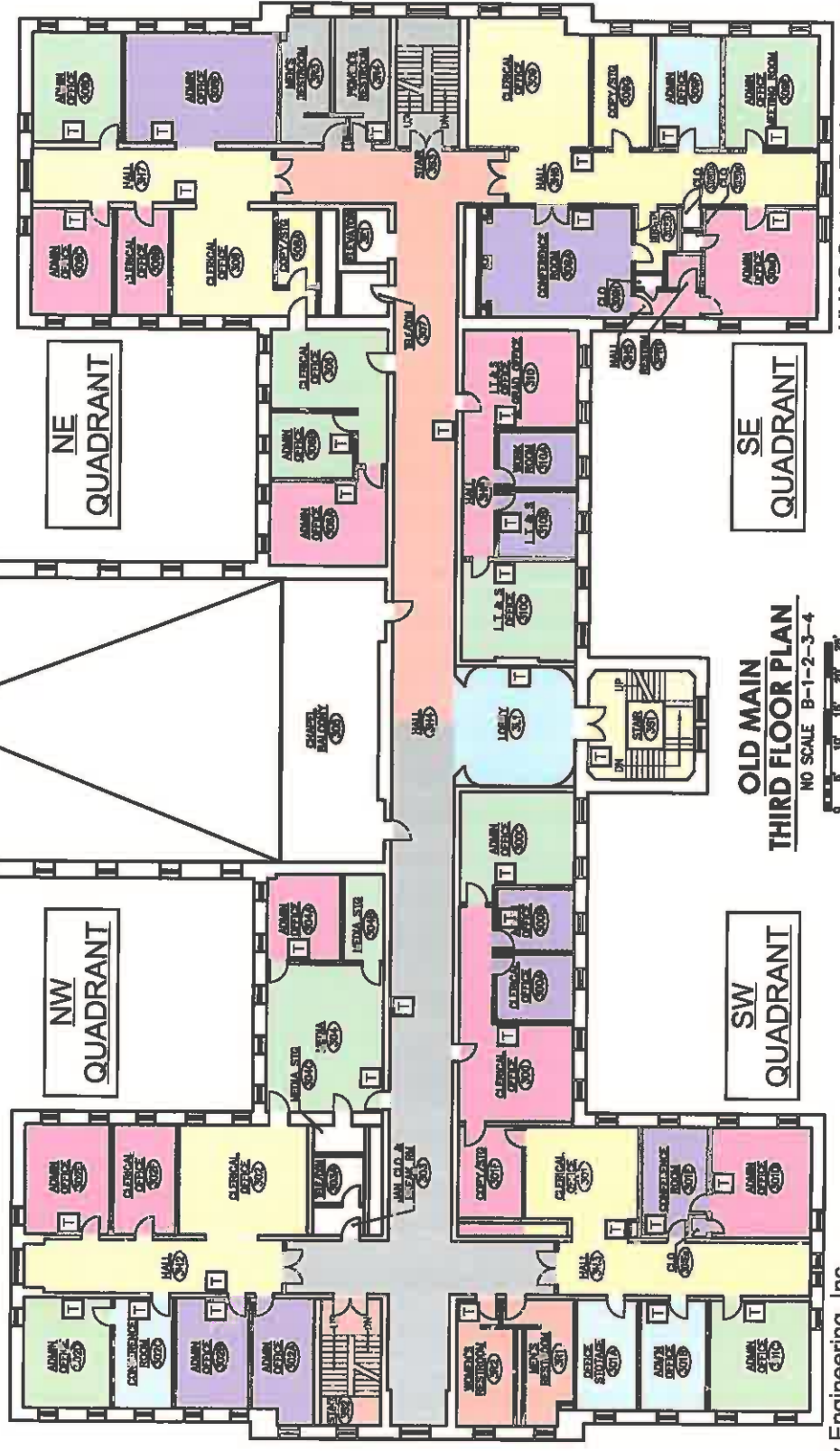


↑ CARD READER LOCATION  
 K\$ KEYED SWITCH ENTRY  
 ♿ ADA ENTRANCE  
 120B = ROOM NUMBER  
 488 = AREA / ROOM SQFT  
 FLOOR PLAN UPDATED LAST:  
 3/5/07  
 TOTAL GROSS SQFT =  
 113,653 SQFT



**OPTION 2: VAV ZONING (35 zones)**  
 NW Quadrant: 7 zones  
 NE Quadrant: 6 zones  
 SW Quadrant: 8 zones  
 SE Quadrant: 8 zones  
 N/Central: 6 zones

T = THERMOSTAT



**OLD MAIN  
 THIRD FLOOR PLAN**  
 NO SCALE B-1-2-3-4  
 0 5 10 15 20 25

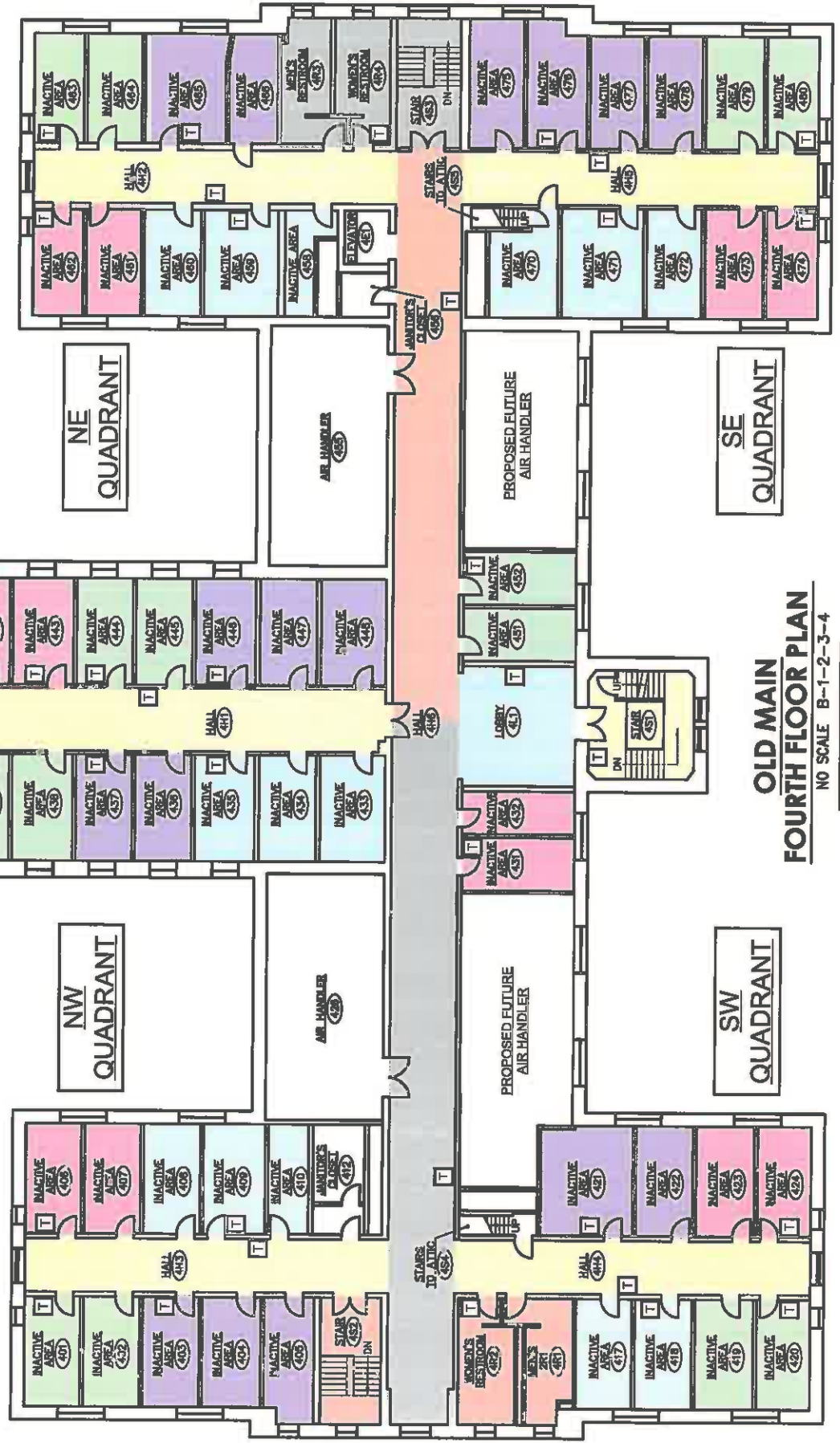


↑ CARD READER LOCATION  
 K&S KEYED SWITCH ENTRY  
 ♿ ADA ENTRANCE  
 120B - ROOM NUMBER  
 498 - AREA / ROOM SQFT  
 FLOOR PLAN UPDATED LAST:  
 3/5/07  
 TOTAL GROSS SQFT =  
 113,653 SQFT



**OPTION 2: VAV ZONING (35 zones)**  
 NW Quadrant: 5 zones  
 NE Quadrant: 5 zones  
 SW Quadrant: 6 zones  
 SE Quadrant: 6 zones  
 N/Central: 13 zones

T = THERMOSTAT



**OLD MAIN  
 FOURTH FLOOR PLAN**  
 NO SCALE B-1-2-3-4  
 0 5 10 15 20 25'

# **Appendix B**

## **Block Load Data**

# **Appendix B-1**

## **Building Envelope Input Data**

## Design Weather Parameters & MSHGs

ShipU. Old Main HVAC Study  
Century Engineering

12/06/2011  
01:14PM

### Design Parameters:

City Name ..... **Harrisburg**  
 Location ..... **Pennsylvania**  
 Latitude ..... **40.2** Deg.  
 Longitude ..... **76.8** Deg.  
 Elevation ..... **308.0** ft  
 Summer Design Dry-Bulb ..... **92.0** °F  
 Summer Coincident Wet-Bulb ..... **74.0** °F  
 Summer Daily Range ..... **18.8** °F  
 Winter Design Dry-Bulb ..... **9.0** °F  
 Winter Design Wet-Bulb ..... **6.7** °F  
 Atmospheric Clearness Number ..... **1.00**  
 Average Ground Reflectance ..... **0.20**  
 Soil Conductivity ..... **0.800** BTU/(hr-ft-°F)  
 Local Time Zone (GMT +/- N hours) ..... **5.0** hours  
 Consider Daylight Savings Time ..... **No**  
 Simulation Weather Data ..... **Harrisburg (TM2)**  
 Current Data is ..... **2001 ASHRAE Handbook**  
 Design Cooling Months ..... **January to December**

### Design Day Maximum Solar Heat Gains

(The MSHG values are expressed in BTU/(hr-ft<sup>2</sup>) )

Month	N	NNE	NE	ENE	E	ESE	SE	SSE	S
January	19.4	19.4	19.4	78.7	151.1	207.4	239.5	250.5	253.8
February	23.9	23.9	46.3	129.3	187.0	232.8	247.3	245.1	241.0
March	28.7	28.7	100.5	164.6	218.0	237.7	237.0	218.0	206.3
April	33.5	67.6	140.8	193.8	219.0	225.4	202.2	171.5	153.5
May	36.9	102.9	162.3	206.1	219.0	207.9	172.4	133.1	112.0
June	46.1	113.6	170.0	207.9	214.8	198.8	159.3	116.6	95.5
July	37.9	99.1	162.1	201.9	212.2	203.8	169.6	129.9	109.6
August	35.3	64.8	137.4	185.6	213.2	217.2	195.9	165.9	148.8
September	29.7	29.7	94.9	154.1	204.9	228.6	226.8	210.7	198.5
October	24.6	24.6	51.3	116.9	184.0	221.6	241.2	238.7	232.8
November	19.6	19.6	19.6	81.2	145.5	202.8	234.9	248.7	248.6
December	17.4	17.4	17.4	61.4	132.3	192.5	229.6	246.2	251.2
Month	SSW	SW	WSW	W	WNW	NW	NNW	HOR	Mult
January	253.0	240.9	202.9	152.6	79.0	19.4	19.4	131.4	1.00
February	245.3	248.3	233.6	188.9	125.5	52.4	23.9	178.7	1.00
March	216.5	233.4	240.2	212.6	169.5	98.0	28.7	221.3	1.00
April	170.5	200.6	224.5	221.3	194.5	137.9	71.6	249.7	1.00
May	132.4	173.3	207.0	220.3	205.6	160.2	103.9	263.3	1.00
June	114.9	160.7	196.4	216.9	206.2	168.7	115.4	266.3	1.00
July	128.2	170.0	200.8	216.4	200.7	159.1	103.7	261.0	1.00
August	164.5	193.9	216.4	213.6	187.8	133.9	70.8	245.6	1.00
September	210.7	227.0	228.4	205.2	153.4	95.0	29.7	212.3	1.00
October	238.5	240.4	221.8	182.6	122.8	44.6	24.6	174.7	1.00
November	247.4	232.8	204.1	144.5	81.1	19.6	19.6	129.7	1.00
December	248.3	227.0	192.9	127.6	64.2	17.4	17.4	110.1	1.00

Mult. = User-defined solar multiplier factor.

## Wall Constructions

ShipU. Old Main HVAC Study  
Century Engineering

12/06/2011  
01:30PM

### Exterior Wall Assembly

#### Wall Details

Outside Surface Color ..... **Medium**  
 Absorptivity ..... **0.675**  
 Overall U-Value ..... **0.248** BTU/(hr-ft<sup>2</sup>-°F)

#### Wall Layers Details (Inside to Outside)

Layers	Thickness in	Density lb/ft <sup>3</sup>	Specific Ht. BTU / (lb - °F)	R-Value (hr-ft <sup>2</sup> -°F)/BTU	Weight lb/ft <sup>2</sup>
Inside surface resistance	0.000	0.0	0.00	0.68500	0.0
Gypsum board	0.625	50.0	0.26	0.56000	2.6
Air space	0.000	0.0	0.00	0.91000	0.0
8-in HW concrete block	8.000	61.0	0.20	1.11111	40.7
Face brick	4.000	125.0	0.22	0.43300	41.7
Outside surface resistance	0.000	0.0	0.00	0.33300	0.0
<b>Totals</b>	<b>12.625</b>	-		<b>4.03211</b>	<b>84.9</b>

## Window Constructions

ShipU. Old Main HVAC Study  
Century Engineering

12/06/2011  
01:31PM

**W1**

**Window Details:**

Detailed Input ..... **Yes**  
 Height ..... **5.75** ft  
 Width ..... **3.00** ft  
 Frame Type ..... **Wood**  
 Internal Shade Type ..... **None**  
 Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
 Overall Shade Coefficient ..... **0.831**

**Glass Details:**

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" clear	0.841	0.078	0.081
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

**W10**

**Window Details:**

Detailed Input ..... **Yes**  
 Height ..... **9.75** ft  
 Width ..... **1.33** ft  
 Frame Type ..... **Wood**  
 Internal Shade Type ..... **None**  
 Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
 Overall Shade Coefficient ..... **0.831**

**Glass Details:**

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" clear	0.841	0.078	0.081
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

**W11**

**Window Details:**

Detailed Input ..... **Yes**  
 Height ..... **7.75** ft  
 Width ..... **2.67** ft  
 Frame Type ..... **Wood**  
 Internal Shade Type ..... **None**  
 Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
 Overall Shade Coefficient ..... **0.831**

**Glass Details:**

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" clear	0.841	0.078	0.081
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

## Window Constructions

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### W12

#### Window Details:

Detailed Input ..... **Yes**  
 Height ..... **10.00** ft  
 Width ..... **2.33** ft  
 Frame Type ..... **Wood**  
 Internal Shade Type ..... **None**  
 Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
 Overall Shade Coefficient ..... **0.831**

#### Glass Details:

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" clear	0.841	0.078	0.081
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

### W13

#### Window Details:

Detailed Input ..... **Yes**  
 Height ..... **9.00** ft  
 Width ..... **12.00** ft  
 Frame Type ..... **Wood**  
 Internal Shade Type ..... **None**  
 Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
 Overall Shade Coefficient ..... **0.831**

#### Glass Details:

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" clear	0.841	0.078	0.081
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

### W14

#### Window Details:

Detailed Input ..... **Yes**  
 Height ..... **8.00** ft  
 Width ..... **4.67** ft  
 Frame Type ..... **Wood**  
 Internal Shade Type ..... **None**  
 Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
 Overall Shade Coefficient ..... **0.831**

#### Glass Details:

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" clear	0.841	0.078	0.081
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

## Window Constructions

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### W15

#### Window Details:

Detailed Input ..... **Yes**  
 Height ..... **8.25** ft  
 Width ..... **4.67** ft  
 Frame Type ..... **Wood**  
 Internal Shade Type ..... **None**  
 Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
 Overall Shade Coefficient ..... **0.831**

#### Glass Details:

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" clear	0.841	0.078	0.081
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

### W16

#### Window Details:

Detailed Input ..... **Yes**  
 Height ..... **16.28** ft  
 Width ..... **5.33** ft  
 Frame Type ..... **Wood**  
 Internal Shade Type ..... **None**  
 Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
 Overall Shade Coefficient ..... **0.831**

#### Glass Details:

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" clear	0.841	0.078	0.081
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

### W17

#### Window Details:

Detailed Input ..... **Yes**  
 Height ..... **18.00** ft  
 Width ..... **5.33** ft  
 Frame Type ..... **Wood**  
 Internal Shade Type ..... **None**  
 Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
 Overall Shade Coefficient ..... **0.688**

#### Glass Details:

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" gray tint	0.631	0.065	0.304
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000



## Window Constructions

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### W18

#### Window Details:

Detailed Input ..... **Yes**  
 Height ..... **27.00** ft  
 Width ..... **5.00** ft  
 Frame Type ..... **Wood**  
 Internal Shade Type ..... **None**  
 Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
 Overall Shade Coefficient ..... **0.688**

#### Glass Details:

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" gray tint	0.631	0.065	0.304
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

### W19

#### Window Details:

Detailed Input ..... **Yes**  
 Height ..... **8.00** ft  
 Width ..... **4.67** ft  
 Frame Type ..... **Wood**  
 Internal Shade Type ..... **None**  
 Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
 Overall Shade Coefficient ..... **0.831**

#### Glass Details:

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" clear	0.841	0.078	0.081
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

### W2

#### Window Details:

Detailed Input ..... **Yes**  
 Height ..... **10.75** ft  
 Width ..... **4.75** ft  
 Frame Type ..... **Wood**  
 Internal Shade Type ..... **None**  
 Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
 Overall Shade Coefficient ..... **0.831**

#### Glass Details:

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" clear	0.841	0.078	0.081
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

## Window Constructions

ShipU. Old Main HVAC Study  
Century Engineering

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### W20

#### Window Details:

Detailed Input ..... **Yes**  
 Height ..... **5.00** ft  
 Width ..... **2.33** ft  
 Frame Type ..... **Wood**  
 Internal Shade Type ..... **None**  
 Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
 Overall Shade Coefficient ..... **0.831**

#### Glass Details:

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" clear	0.841	0.078	0.081
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

### W21

#### Window Details:

Detailed Input ..... **Yes**  
 Height ..... **10.75** ft  
 Width ..... **4.33** ft  
 Frame Type ..... **Wood**  
 Internal Shade Type ..... **None**  
 Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
 Overall Shade Coefficient ..... **0.831**

#### Glass Details:

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" clear	0.841	0.078	0.081
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

### W22

#### Window Details:

Detailed Input ..... **Yes**  
 Height ..... **6.75** ft  
 Width ..... **3.00** ft  
 Frame Type ..... **Wood**  
 Internal Shade Type ..... **None**  
 Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
 Overall Shade Coefficient ..... **0.831**

#### Glass Details:

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" clear	0.841	0.078	0.081
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

## Window Constructions

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Century Engineering

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### W23

#### Window Details:

Detailed Input ..... **Yes**  
 Height ..... **34.50** ft  
 Width ..... **5.00** ft  
 Frame Type ..... **Wood**  
 Internal Shade Type ..... **None**  
 Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
 Overall Shade Coefficient ..... **0.831**

#### Glass Details:

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" clear	0.841	0.078	0.081
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

### W3

#### Window Details:

Detailed Input ..... **Yes**  
 Height ..... **8.10** ft  
 Width ..... **6.00** ft  
 Frame Type ..... **Wood**  
 Internal Shade Type ..... **None**  
 Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
 Overall Shade Coefficient ..... **0.831**

#### Glass Details:

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" clear	0.841	0.078	0.081
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

### W4

#### Window Details:

Detailed Input ..... **Yes**  
 Height ..... **9.75** ft  
 Width ..... **4.25** ft  
 Frame Type ..... **Wood**  
 Internal Shade Type ..... **None**  
 Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
 Overall Shade Coefficient ..... **0.831**

#### Glass Details:

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" clear	0.841	0.078	0.081
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

## Window Constructions

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Century Engineering

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### W5

#### Window Details:

Detailed Input ..... **Yes**  
 Height ..... **7.25** ft  
 Width ..... **4.25** ft  
 Frame Type ..... **Wood**  
 Internal Shade Type ..... **None**  
 Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
 Overall Shade Coefficient ..... **0.831**

#### Glass Details:

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" clear	0.841	0.078	0.081
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

### W6

#### Window Details:

Detailed Input ..... **Yes**  
 Height ..... **7.50** ft  
 Width ..... **4.75** ft  
 Frame Type ..... **Wood**  
 Internal Shade Type ..... **None**  
 Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
 Overall Shade Coefficient ..... **0.831**

#### Glass Details:

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" clear	0.841	0.078	0.081
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

### W7

#### Window Details:

Detailed Input ..... **Yes**  
 Height ..... **7.50** ft  
 Width ..... **6.00** ft  
 Frame Type ..... **Wood**  
 Internal Shade Type ..... **None**  
 Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
 Overall Shade Coefficient ..... **0.831**

#### Glass Details:

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" clear	0.841	0.078	0.081
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

## Window Constructions

ShipU. Old Main HVAC Study  
Century Engineering

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W8

### Window Details:

Detailed Input ..... **Yes**  
Height ..... **6.25** ft  
Width ..... **4.00** ft  
Frame Type ..... **Wood**  
Internal Shade Type ..... **None**  
Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
Overall Shade Coefficient ..... **0.831**

### Glass Details:

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" clear	0.841	0.078	0.081
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

W9

### Window Details:

Detailed Input ..... **Yes**  
Height ..... **6.25** ft  
Width ..... **1.33** ft  
Frame Type ..... **Wood**  
Internal Shade Type ..... **None**  
Overall U-Value ..... **0.982** BTU/(hr-ft<sup>2</sup>-°F)  
Overall Shade Coefficient ..... **0.831**

### Glass Details:

Gap Type ..... **1/4" Air Space**

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/8" clear	0.841	0.078	0.081
Glazing #2	not used	1.000	0.000	0.000
Glazing #3	not used	1.000	0.000	0.000

## Door Constructions

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Century Engineering

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01:32PM

### Wood Door

---

#### Door Details:

Gross Area ..... **21.0** ft<sup>2</sup>  
Door U-Value ..... **0.300** BTU/(hr-ft<sup>2</sup>-°F)

#### Glass Details:

Glass Area ..... **0.0** ft<sup>2</sup>  
Glass U-Value ..... **0.580** BTU/(hr-ft<sup>2</sup>-°F)  
Glass Shade Coefficient ..... **0.880**  
Glass Shaded All Day? ..... **No**

# External Shade Geometries

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01:31PM

## South Balcony

Reveal Depth ..... 0.0 in

### Left Fin:

Projection from surface ..... 0.0 in  
Height above window ..... 0.0 in  
Dist. from edge of window ..... 0.0 in

### Overhang:

Projection from surface ..... 96.0 in  
Height above window ..... 12.0 in  
Ext. past RH side of window ..... 0.0 in  
Ext. past LH side of window ..... 0.0 in

### Right Fin:

Projection from surface ..... 0.0 in  
Height above window ..... 0.0 in  
Dist. from edge of window ..... 0.0 in

## Roof Constructions

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### Slate + Wood Deck

#### Roof Details

Outside Surface Color ..... **Dark**  
 Absorptivity ..... **0.900**  
 Overall U-Value ..... **0.044** BTU/(hr-ft<sup>2</sup>-°F)

#### Roof Layers Details (Inside to Outside)

Layers	Thickness In	Density lb/ft <sup>3</sup>	Specific Ht. BTU / (lb - °F)	R-Value (hr-ft <sup>2</sup> -°F)/BTU	Weight lb/ft <sup>2</sup>
Inside surface resistance	0.000	0.0	0.00	0.68500	0.0
1/2-in gypsum board	0.500	50.0	0.26	0.44803	2.1
R-19 batt insulation	6.000	0.5	0.20	19.23077	0.3
Air space	0.000	0.0	0.00	0.91000	0.0
3/4-in wood board	0.750	34.0	0.29	0.93284	2.1
Slate	0.500	270.0	0.30	0.05002	11.3
Outside surface resistance	0.000	0.0	0.00	0.33300	0.0
<b>Totals</b>	<b>7.750</b>	-		<b>22.58965</b>	<b>15.7</b>



# **Appendix B-2**

## **Space Input Data**

## Space Input Data

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Century Engineering

12/06/2011  
01:16PM

### 1-E. Toilet/Stair 3

#### 1. General Details:

Floor Area ..... 500.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 9.8 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... GENERAL: Corridor  
OA Requirement 1 ..... 0.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 0.75 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

##### 2.4. People:

Occupancy ..... 0.0 Person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... None

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

##### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

##### 2.3. Electrical Equipment:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	247.0	2	0	2

#### 3.1. Construction Types for Exposure E

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W5  
Door Type ..... Wood Door

#### 4. Roofs, Skylights:

(No Roof or Skylight data).

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

#### 7. Partitions:

(No partition data).

# Space Input Data

ShipU. Old Main HVAC Study  
Century Engineering

12/06/2011  
01:16PM

## 1-Lounge/Corridor

### 1. General Details:

Floor Area ..... **905.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **9.8** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... **0.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **0.75** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

#### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	431.0	5	0	0

#### 3.1. Construction Types for Exposure E

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W5**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... **0.0** Person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**

# Space Input Data

ShipU. Old Main HVAC Study  
Century Engineering

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01:16PM

## 1-Main Corr/Lobby

### 1. General Details:

Floor Area ..... 2255.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 9.8 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... 0.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... 0.75 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... **100% Load 24-7**

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

### 3. Walls, Windows, Doors:

(No Wall, Window, Door data).

### 4. Roofs, Skylights:

(No Roof or Skylight data).

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
(No additional input required for this floor type).

### 7. Partitions:

(No partition data).

### 2.4. People:

Occupancy ..... 0.0 Person  
Activity Level ..... **Office Work**  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... **None**

### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... **None**  
Latent ..... 0 BTU/hr  
Schedule ..... **None**

# Space Input Data

ShipU. Old Main HVAC Study  
Century Engineering

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## 1-NE Corridor

### 1. General Details:

Floor Area ..... 335.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 9.8 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... 0.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... 0.75 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... **100% Load 24-7**

#### 2.4. People:

Occupancy ..... 0.0 Person  
Activity Level ..... **Office Work**  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... **None**

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... **None**  
Latent ..... 0 BTU/hr  
Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
N	78.0	0	0	2

#### 3.1. Construction Types for Exposure N

Wall Type ..... **Exterior Wall Assembly**  
Door Type ..... **Wood Door**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

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### 1-NE Wing 1

#### 1. General Details:

Floor Area ..... 630.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 10.0 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

##### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	360.0	5	0	0
N	150.0	1	0	0

##### 3.1. Construction Types for Exposure E

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W5

##### 3.2. Construction Types for Exposure N

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W5

#### 4. Roofs, Skylights:

(No Roof or Skylight data).

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

#### 7. Partitions:

(No partition data).

##### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

##### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

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## 1-NE Wing 2

### 1. General Details:

Floor Area ..... 865.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 10.0 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

#### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	320.0	3	1	0
N	150.0	2	0	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W5  
2nd Window Type ..... W13

#### 3.2. Construction Types for Exposure N

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W5

### 4. Roofs, Skylights:

(No Roof or Skylight data).

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

### 7. Partitions:

(No partition data).

### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

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### 1-NE Wing 3

#### 1. General Details:

Floor Area ..... **610.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **10.0** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
OA Requirement 1 ..... **5.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **1.00** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

##### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
Schedule ..... **100% Load 24-7**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
N	360.0	5	0	0

#### 3.1. Construction Types for Exposure N

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W5**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**



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## 1-NW Corridor

### 1. General Details:

Floor Area ..... 335.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 9.8 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... 0.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... 0.75 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... **100% Load 24-7**

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
N	78.0	0	0	1

#### 3.1. Construction Types for Exposure N

Wall Type ..... **Exterior Wall Assembly**  
Door Type ..... **Wood Door**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... 0.0 Person  
Activity Level ..... **Office Work**  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... **None**  
Latent ..... 0 BTU/hr  
Schedule ..... **None**

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### 1-NW Wing 1

#### 1. General Details:

Floor Area ..... 730.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 10.0 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

##### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	430.0	6	0	0
N	150.0	1	0	0

##### 3.1. Construction Types for Exposure W

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W5

##### 3.2. Construction Types for Exposure N

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W5

#### 4. Roofs, Skylights:

(No Roof or Skylight data).

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

#### 7. Partitions:

(No partition data).

#### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

## Space Input Data

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### 1-NW Wing 2

#### 1. General Details:

Floor Area ..... 715.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 10.0 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

##### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	320.0	5	0	0
N	150.0	1	0	0

##### 3.1. Construction Types for Exposure E

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W5

##### 3.2. Construction Types for Exposure N

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W5

#### 4. Roofs, Skylights:

(No Roof or Skylight data).

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

#### 7. Partitions:

(No partition data).

##### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

##### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

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### 1-NW Wing 3

#### 1. General Details:

Floor Area ..... **665.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **10.0** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
OA Requirement 1 ..... **5.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **1.00** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
Schedule ..... **100% Load 24-7**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
N	360.0	5	0	0

#### 3.1. Construction Types for Exposure N

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W5**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **100% Load 24-7**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**

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### 1-NW Wing 4

#### 1. General Details:

Floor Area ..... 1230.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 10.0 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

##### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	290.0	3	0	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W5

#### 4. Roofs, Skylights:

(No Roof or Skylight data).

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

#### 7. Partitions:

(No partition data).

#### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

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### 1-SE Corridor

#### 1. General Details:

Floor Area ..... 350.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 9.8 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... 0.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... 0.75 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
S	78.0	2	0	0

#### 3.1. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W14**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... 0.0 Person  
Activity Level ..... **Office Work**  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... **None**  
Latent ..... 0 BTU/hr  
Schedule ..... **None**

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### 1-SE Wing 1

#### 1. General Details:

Floor Area ..... 850.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 10.0 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

##### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

##### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

##### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	520.0	6	0	0
S	150.0	1	0	0

##### 3.1. Construction Types for Exposure E

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W5

##### 3.2. Construction Types for Exposure S

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W5

#### 4. Roofs, Skylights:

(No Roof or Skylight data).

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

#### 7. Partitions:

(No partition data).

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## 1-SE Wing 2

### 1. General Details:

Floor Area ..... **850.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **10.0** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
OA Requirement 1 ..... **5.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **1.00** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

#### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
Schedule ..... **100% Load 24-7**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	360.0	2	1	0
S	150.0	1	0	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W5**  
2nd Window Type ..... **W13**

#### 3.2. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W5**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **100% Load 24-7**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**



## Space Input Data

ShipU. Old Main HVAC Study  
Century Engineering

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### 1-SE Wing 3

#### 1. General Details:

Floor Area ..... **835.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **10.0** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
OA Requirement 1 ..... **5.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **1.00** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
Schedule ..... **100% Load 24-7**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
S	490.0	6	0	1

#### 3.1. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W5**  
1st Window Shade Type ..... **South Balcony**  
Door Type ..... **Wood Door**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **100% Load 24-7**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**

## Space Input Data

ShipU. Old Main HVAC Study  
Century Engineering

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### 1-Stair 2

#### 1. General Details:

Floor Area ..... 270.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 13.6 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... 0.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... 0.75 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	152.0	0	0	0
S	162.0	0	0	2
E	152.0	0	0	0

##### 3.1. Construction Types for Exposure W

Wall Type ..... **Exterior Wall Assembly**

##### 3.2. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
Door Type ..... **Wood Door**

##### 3.3. Construction Types for Exposure E

Wall Type ..... **Exterior Wall Assembly**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

##### 2.4. People:

Occupancy ..... 0.0 Person  
Activity Level ..... **Office Work**  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... **None**

##### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... **None**  
Latent ..... 0 BTU/hr  
Schedule ..... **None**

## Space Input Data

ShipU. Old Main HVAC Study  
Century Engineering

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### 1-SW Corridor

#### 1. General Details:

Floor Area ..... 310.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 9.8 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... 0.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... 0.75 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... **100% Load 24-7**

##### 2.4. People:

Occupancy ..... 0.0 Person  
Activity Level ..... **Office Work**  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... **None**

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... **None**  
Latent ..... 0 BTU/hr  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
S	78.0	2	0	0

#### 3.1. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W9**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

## Space Input Data

ShipU. Old Main HVAC Study  
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### 1-SW Wing 1

#### 1. General Details:

Floor Area ..... 630.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 10.0 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

##### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	360.0	5	0	0
S	150.0	1	0	0

##### 3.1. Construction Types for Exposure W

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W5

##### 3.2. Construction Types for Exposure S

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W5

#### 4. Roofs, Skylights:

(No Roof or Skylight data).

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

#### 7. Partitions:

(No partition data).

##### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

##### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

## Space Input Data

ShipU. Old Main HVAC Study  
Century Engineering

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### 1-SW Wing 2

#### 1. General Details:

Floor Area ..... 850.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 10.0 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

##### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	360.0	3	0	1
S	150.0	1	0	0

##### 3.1. Construction Types for Exposure E

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W5  
Door Type ..... Wood Door

##### 3.2. Construction Types for Exposure S

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W5

#### 4. Roofs, Skylights:

(No Roof or Skylight data).

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

#### 7. Partitions:

(No partition data).

#### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

## Space Input Data

ShipU. Old Main HVAC Study  
Century Engineering

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### 1-SW Wing 3

#### 1. General Details:

Floor Area ..... **850.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **10.0** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
OA Requirement 1 ..... **5.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **1.00** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
Schedule ..... **100% Load 24-7**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
S	490.0	5	0	1

#### 3.1. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W5**  
1st Window Shade Type ..... **South Balcony**  
Door Type ..... **Wood Door**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **100% Load 24-7**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**

## Space Input Data

ShipU. Old Main HVAC Study  
Century Engineering

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### 1-W. Toilet/Vest/Stair1

#### 1. General Details:

Floor Area ..... **680.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **9.8** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... **0.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **0.75** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	247.0	2	1	2

#### 3.1. Construction Types for Exposure W

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W5**  
2nd Window Type ..... **W6**  
Door Type ..... **Wood Door**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... **0.0** Person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**

## Space Input Data

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### 2-Chap. Platform/Storage

#### 1. General Details:

Floor Area ..... **2385.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **30.0** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **PUBLIC ASSEMBLY: Auditorium**  
OA Requirement 1 ..... **5.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **1.75** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

##### 2.4. People:

Occupancy ..... **0.0** Person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **None**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
Schedule ..... **100% Load 24-7**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	720.0	1	1	0
E	1560.0	3	0	0
N	720.0	2	2	0

##### 3.1. Construction Types for Exposure W

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W18**  
2nd Window Type ..... **W17**

##### 3.2. Construction Types for Exposure E

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W17**

##### 3.3. Construction Types for Exposure N

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W17**  
2nd Window Type ..... **W20**

#### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
E	1192.5	45	0
W	1192.5	45	0

##### 4.1. Construction Types for Exposure E

Roof Type ..... **Slate + Wood Deck**

##### 4.2. Construction Types for Exposure W

Roof Type ..... **Slate + Wood Deck**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM

*Infiltration occurs at all hours.*



## Space Input Data

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### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

### 7. Partitions:

(No partition data).

## Space Input Data

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### 2-Chapel Assembly

#### 1. General Details:

Floor Area ..... 3170.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 30.0 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **PUBLIC ASSEMBLY: Auditorium**  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... 1.75 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **100% Load 24-7**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	1590.0	6	0	0
E	1590.0	6	0	0

##### 3.1. Construction Types for Exposure W

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W18**

##### 3.2. Construction Types for Exposure E

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W18**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

##### 2.4. People:

Occupancy ..... 10.00 ft<sup>2</sup>/person  
Activity Level ..... **Office Work**  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... **100% Load 24-7**

##### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... **None**  
Latent ..... 0 BTU/hr  
Schedule ..... **None**

## Space Input Data

ShipU. Old Main HVAC Study  
Century Engineering

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### 2-E. Toilet/Stair 3

#### 1. General Details:

Floor Area ..... **500.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **13.6** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... **0.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **0.75** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

##### 2.4. People:

Occupancy ..... **0.0** Person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **None**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	247.0	2	1	0

#### 3.1. Construction Types for Exposure E

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W4**  
2nd Window Type ..... **W2**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

# Space Input Data

ShipU. Old Main HVAC Study  
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## 2-Main Corr/Lobby

### 1. General Details:

Floor Area ..... 2360.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 13.6 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... 0.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... 0.75 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... **100% Load 24-7**

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

### 3. Walls, Windows, Doors:

(No Wall, Window, Door data).

### 4. Roofs, Skylights:

(No Roof or Skylight data).

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
(No additional input required for this floor type).

### 7. Partitions:

(No partition data).

### 2.4. People:

Occupancy ..... 0.0 Person  
Activity Level ..... **Office Work**  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... **None**

### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... **None**  
Latent ..... 0 BTU/hr  
Schedule ..... **None**

## Space Input Data

ShipU. Old Main HVAC Study  
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### 2-NE Corridor

#### 1. General Details:

Floor Area ..... **335.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **13.8** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... **0.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **0.75** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
N	110.0	1	0	0

#### 3.1. Construction Types for Exposure N

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W16**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... **0.0** Person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**

## Space Input Data

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### 2-NE Wing 1

#### 1. General Details:

Floor Area ..... **645.0** ft<sup>2</sup>  
 Avg. Ceiling Height ..... **10.0** ft  
 Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
 OA Requirement 1 ..... **5.0** CFM/person  
 OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
 Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
 Wattage ..... **1.00** W/ft<sup>2</sup>  
 Ballast Multiplier ..... **1.00**  
 Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
 Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
 Schedule ..... **100% Load 24-7**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	360.0	5	0	0
N	150.0	1	0	0

##### 3.1. Construction Types for Exposure E

Wall Type ..... **Exterior Wall Assembly**  
 1st Window Type ..... **W4**

##### 3.2. Construction Types for Exposure N

Wall Type ..... **Exterior Wall Assembly**  
 1st Window Type ..... **W4**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
 Design Heating ..... **1.25** ACH  
 Energy Analysis ..... **0.00** CFM  
 Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
 Activity Level ..... **Office Work**  
 Sensible ..... **245.0** BTU/hr/person  
 Latent ..... **205.0** BTU/hr/person  
 Schedule ..... **100% Load 24-7**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
 Schedule ..... **None**  
 Latent ..... **0** BTU/hr  
 Schedule ..... **None**

## Space Input Data

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### 2-NE Wing 2

#### 1. General Details:

Floor Area ..... 730.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 10.0 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

##### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	350.0	5	0	0
N	150.0	1	0	0

##### 3.1. Construction Types for Exposure W

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W4

##### 3.2. Construction Types for Exposure N

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W4

#### 4. Roofs, Skylights:

(No Roof or Skylight data).

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

#### 7. Partitions:

(No partition data).

#### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

## Space Input Data

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### 2-NE Wing 3

#### 1. General Details:

Floor Area ..... **685.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **10.0** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
OA Requirement 1 ..... **5.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **1.00** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
Schedule ..... **100% Load 24-7**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
N	360.0	5	0	0

#### 3.1. Construction Types for Exposure N

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W4**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **100% Load 24-7**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**



## Space Input Data

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### 2-NW Corridor

#### 1. General Details:

Floor Area ..... 350.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 13.8 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... 0.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... 0.75 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... **100% Load 24-7**

##### 2.4. People:

Occupancy ..... 0.0 Person  
Activity Level ..... **Office Work**  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... **None**

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... **None**  
Latent ..... 0 BTU/hr  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
N	110.0	1	0	0

#### 3.1. Construction Types for Exposure N

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W16**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

## Space Input Data

ShipU. Old Main HVAC Study  
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### 2-NW Wing 1

#### 1. General Details:

Floor Area ..... **685.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **10.0** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
OA Requirement 1 ..... **5.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **1.00** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
Schedule ..... **100% Load 24-7**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	430.0	6	0	0
N	150.0	1	0	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W4**

#### 3.2. Construction Types for Exposure N

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W4**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **100% Load 24-7**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**

## Space Input Data

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### 2-NW Wing 2

#### 1. General Details:

Floor Area ..... **900.0** ft<sup>2</sup>  
 Avg. Ceiling Height ..... **10.0** ft  
 Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
 OA Requirement 1 ..... **5.0** CFM/person  
 OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
 Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
 Wattage ..... **1.00** W/ft<sup>2</sup>  
 Ballast Multiplier ..... **1.00**  
 Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
 Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
 Schedule ..... **100% Load 24-7**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	320.0	5	0	0
N	150.0	1	0	0

#### 3.1. Construction Types for Exposure E

Wall Type ..... **Exterior Wall Assembly**  
 1st Window Type ..... **W4**

#### 3.2. Construction Types for Exposure N

Wall Type ..... **Exterior Wall Assembly**  
 1st Window Type ..... **W4**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
 Design Heating ..... **1.25** ACH  
 Energy Analysis ..... **0.00** CFM  
 Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
 Activity Level ..... **Office Work**  
 Sensible ..... **245.0** BTU/hr/person  
 Latent ..... **205.0** BTU/hr/person  
 Schedule ..... **100% Load 24-7**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
 Schedule ..... **None**  
 Latent ..... **0** BTU/hr  
 Schedule ..... **None**

## Space Input Data

ShipU, Old Main HVAC Study  
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### 2-NW Wing 3

#### 1. General Details:

Floor Area ..... **645.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **10.0** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
OA Requirement 1 ..... **5.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **1.00** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
Schedule ..... **100% Load 24-7**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
N	360.0	5	0	0

#### 3.1. Construction Types for Exposure N

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W4**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **100% Load 24-7**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**

## Space Input Data

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Century Engineering

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### 2-SE Corridor

#### 1. General Details:

Floor Area ..... **430.0** ft<sup>2</sup>  
 Avg. Ceiling Height ..... **13.8** ft  
 Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
 OA Requirement 1 ..... **0.0** CFM/person  
 OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
 Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
 Wattage ..... **0.75** W/ft<sup>2</sup>  
 Ballast Multiplier ..... **1.00**  
 Schedule ..... **100% Load 24-7**

##### 2.4. People:

Occupancy ..... **0.0** Person  
 Activity Level ..... **Office Work**  
 Sensible ..... **245.0** BTU/hr/person  
 Latent ..... **205.0** BTU/hr/person  
 Schedule ..... **None**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
 Schedule ..... **None**

##### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
 Schedule ..... **None**  
 Latent ..... **0** BTU/hr  
 Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **0.00** W/ft<sup>2</sup>  
 Schedule ..... **None**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
S	110.0	2	0	0

#### 3.1. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
 1st Window Type ..... **W10**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
 Design Heating ..... **1.25** ACH  
 Energy Analysis ..... **0.00** CFM  
 Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

## Space Input Data

ShipU. Old Main HVAC Study  
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### 2-SE Wing 1

#### 1. General Details:

Floor Area ..... **900.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **10.0** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
OA Requirement 1 ..... **5.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **1.00** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
Schedule ..... **100% Load 24-7**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	520.0	6	0	0
S	150.0	1	0	0

##### 3.1. Construction Types for Exposure E

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W4**

##### 3.2. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W4**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **100% Load 24-7**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**

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### 2-SE Wing 2

#### 1. General Details:

Floor Area ..... 800.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 10.0 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

##### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	360.0	4	0	1
S	150.0	1	0	0

##### 3.1. Construction Types for Exposure W

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W4  
Door Type ..... Wood Door

##### 3.2. Construction Types for Exposure S

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W4

#### 4. Roofs, Skylights:

(No Roof or Skylight data).

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

#### 7. Partitions:

(No partition data).

#### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

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### 2-SE Wing 3

#### 1. General Details:

Floor Area ..... **850.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **10.0** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
OA Requirement 1 ..... **5.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **1.00** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
Schedule ..... **100% Load 24-7**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
S	490.0	5	0	1

#### 3.1. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W4**  
1st Window Shade Type ..... **South Balcony**  
Door Type ..... **Wood Door**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **100% Load 24-7**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**



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### 2-Stair 2

#### 1. General Details:

Floor Area ..... 270.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 13.6 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... 0.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... 0.75 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... **100% Load 24-7**

##### 2.4. People:

Occupancy ..... 0.0 Person  
Activity Level ..... **Office Work**  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... **None**

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... **None**  
Latent ..... 0 BTU/hr  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	152.0	0	0	0
S	162.0	1	0	0
E	152.0	0	0	0

##### 3.1. Construction Types for Exposure W

Wall Type ..... **Exterior Wall Assembly**

##### 3.2. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W3**

##### 3.3. Construction Types for Exposure E

Wall Type ..... **Exterior Wall Assembly**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

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### 2-SW Corridor

#### 1. General Details:

Floor Area ..... 335.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 13.8 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... 0.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... 0.75 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
S	110.0	2	0	0

#### 3.1. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W10**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... 0.0 Person  
Activity Level ..... **Office Work**  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... **None**  
Latent ..... 0 BTU/hr  
Schedule ..... **None**

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## 2-SW Wing 1

### 1. General Details:

Floor Area ..... 575.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 10.0 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

#### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	360.0	5	0	0
S	150.0	1	0	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W4

#### 3.2. Construction Types for Exposure S

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W4

### 4. Roofs, Skylights:

(No Roof or Skylight data).

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

### 7. Partitions:

(No partition data).

#### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

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### 2-SW Wing 2

#### 1. General Details:

Floor Area ..... 845.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 10.0 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

##### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	360.0	3	0	1
S	150.0	1	0	0

##### 3.1. Construction Types for Exposure E

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W4  
Door Type ..... Wood Door

##### 3.2. Construction Types for Exposure S

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W4

#### 4. Roofs, Skylights:

(No Roof or Skylight data).

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

#### 7. Partitions:

(No partition data).

##### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

##### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

## Space Input Data

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### 2-SW Wing 3

#### 1. General Details:

Floor Area ..... **865.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **10.0** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
OA Requirement 1 ..... **5.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **1.00** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
Schedule ..... **100% Load 24-7**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
S	490.0	6	0	0

#### 3.1. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W4**  
1st Window Shade Type ..... **South Balcony**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **100% Load 24-7**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**

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## 2-W. Toilet/Stair 1

### 1. General Details:

Floor Area ..... **500.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **13.6** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... **0.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **0.75** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

#### 2.4. People:

Occupancy ..... **0.0** Person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **None**

#### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	247.0	2	1	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W4**  
2nd Window Type ..... **W2**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

# Space Input Data

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## 3-Balcony

### 1. General Details:

Floor Area ..... 700.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 10.0 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... PUBLIC ASSEMBLY: Auditorium  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

#### 2.3. Electrical Equipment:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

### 3. Walls, Windows, Doors:

(No Wall, Window, Door data).

### 4. Roofs, Skylights:

(No Roof or Skylight data).

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

### 7. Partitions:

(No partition data).

### 2.4. People:

Occupancy ..... 50.0 People  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

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### 3-E. Toilet/Stair 3

#### 1. General Details:

Floor Area ..... **500.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **9.5** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... **0.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **0.75** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	247.0	2	1	0

#### 3.1. Construction Types for Exposure E

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W8**  
2nd Window Type ..... **W2**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM

Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... **0.0** Person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**



# Space Input Data

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## 3-Main Corr/Lobby

### 1. General Details:

Floor Area ..... **2435.0** ft<sup>2</sup>  
 Avg. Ceiling Height ..... **9.8** ft  
 Building Weight ..... **100.0** lb/ft<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
 OA Requirement 1 ..... **0.0** CFM/person  
 OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
 Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
 Wattage ..... **0.75** W/ft<sup>2</sup>  
 Ballast Multiplier ..... **1.00**  
 Schedule ..... **100% Load 24-7**

#### 2.4. People:

Occupancy ..... **0.0** Person  
 Activity Level ..... **Office Work**  
 Sensible ..... **245.0** BTU/hr/person  
 Latent ..... **205.0** BTU/hr/person  
 Schedule ..... **None**

#### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
 Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
 Schedule ..... **None**  
 Latent ..... **0** BTU/hr  
 Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... **0.00** W/ft<sup>2</sup>  
 Schedule ..... **None**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	88.5	1	0	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... **Exterior Wall Assembly**  
 1st Window Type ..... **W7**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
 Design Heating ..... **1.25** ACH  
 Energy Analysis ..... **0.00** CFM  
 Infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

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### 3-NE Corridor

#### 1. General Details:

Floor Area ..... **305.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **9.8** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... **0.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **0.75** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
N	78.0	1	0	0

#### 3.1. Construction Types for Exposure N

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W9**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... **0.0** Person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**

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## 3-NE Wing 1

### 1. General Details:

Floor Area ..... **610.0** ft<sup>2</sup>  
 Avg. Ceiling Height ..... **10.0** ft  
 Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
 OA Requirement 1 ..... **5.0** CFM/person  
 OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
 Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
 Wattage ..... **1.00** W/ft<sup>2</sup>  
 Ballast Multiplier ..... **1.00**  
 Schedule ..... **100% Load 24-7**

#### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
 Activity Level ..... **Office Work**  
 Sensible ..... **245.0** BTU/hr/person  
 Latent ..... **205.0** BTU/hr/person  
 Schedule ..... **100% Load 24-7**

#### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
 Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
 Schedule ..... **None**  
 Latent ..... **0** BTU/hr  
 Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
 Schedule ..... **100% Load 24-7**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	360.0	5	0	0
N	150.0	1	0	0

#### 3.1. Construction Types for Exposure E

Wall Type ..... **Exterior Wall Assembly**  
 1st Window Type ..... **W8**

#### 3.2. Construction Types for Exposure N

Wall Type ..... **Exterior Wall Assembly**  
 1st Window Type ..... **W8**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
 Design Heating ..... **1.25** ACH  
 Energy Analysis ..... **0.00** CFM  
**Infiltration occurs at all hours.**

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

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### 3-NE Wing 2

#### 1. General Details:

Floor Area ..... 730.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 10.0 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

##### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	360.0	5	0	0
N	150.0	1	0	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W8

#### 3.2. Construction Types for Exposure N

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W8

#### 4. Roofs, Skylights:

(No Roof or Skylight data).

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

#### 7. Partitions:

(No partition data).

#### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

# Space Input Data

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## 3-NE Wing 3

### 1. General Details:

Floor Area ..... **645.0** ft<sup>2</sup>  
 Avg. Ceiling Height ..... **10.0** ft  
 Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
 OA Requirement 1 ..... **5.0** CFM/person  
 OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
 Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
 Wattage ..... **1.00** W/ft<sup>2</sup>  
 Ballast Multiplier ..... **1.00**  
 Schedule ..... **100% Load 24-7**

#### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
 Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
 Schedule ..... **100% Load 24-7**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
N	360.0	5	0	0

#### 3.1. Construction Types for Exposure N

Wall Type ..... **Exterior Wall Assembly**  
 1st Window Type ..... **W8**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
 Design Heating ..... **1.25** ACH  
 Energy Analysis ..... **0.00** CFM  
 Infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
 Activity Level ..... **Office Work**  
 Sensible ..... **245.0** BTU/hr/person  
 Latent ..... **205.0** BTU/hr/person  
 Schedule ..... **100% Load 24-7**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
 Schedule ..... **None**  
 Latent ..... **0** BTU/hr  
 Schedule ..... **None**

# Space Input Data

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## 3-NW Corridor

### 1. General Details:

Floor Area ..... **345.0** ft<sup>2</sup>  
 Avg. Ceiling Height ..... **9.8** ft  
 Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
 OA Requirement 1 ..... **0.0** CFM/person  
 OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
 Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
 Wattage ..... **0.75** W/ft<sup>2</sup>  
 Ballast Multiplier ..... **1.00**  
 Schedule ..... **100% Load 24-7**

#### 2.4. People:

Occupancy ..... **0.0** Person  
 Activity Level ..... **Office Work**  
 Sensible ..... **245.0** BTU/hr/person  
 Latent ..... **205.0** BTU/hr/person  
 Schedule ..... **None**

#### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
 Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
 Schedule ..... **None**  
 Latent ..... **0** BTU/hr  
 Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... **0.00** W/ft<sup>2</sup>  
 Schedule ..... **None**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
N	78.0	1	0	0

#### 3.1. Construction Types for Exposure N

Wall Type ..... **Exterior Wall Assembly**  
 1st Window Type ..... **W15**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
 Design Heating ..... **1.25** ACH  
 Energy Analysis ..... **0.00** CFM  
 Infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

# Space Input Data

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## 3-NW Wing 1

### 1. General Details:

Floor Area ..... 750.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 10.0 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

#### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	430.0	6	0	0
N	150.0	1	0	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W8

#### 3.2. Construction Types for Exposure N

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W8

### 4. Roofs, Skylights:

(No Roof or Skylight data).

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

### 7. Partitions:

(No partition data).

### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

# Space Input Data

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## 3-NW Wing 2

### 1. General Details:

Floor Area ..... 750.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 10.0 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

#### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	330.0	5	0	0
N	150.0	1	0	0

#### 3.1. Construction Types for Exposure E

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W8

#### 3.2. Construction Types for Exposure N

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W8

### 4. Roofs, Skylights:

(No Roof or Skylight data).

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

### 7. Partitions:

(No partition data).

#### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None



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### 3-NW Wing 3

#### 1. General Details:

Floor Area ..... **650.0** ft<sup>2</sup>  
 Avg. Ceiling Height ..... **10.0** ft  
 Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
 OA Requirement 1 ..... **5.0** CFM/person  
 OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
 Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
 Wattage ..... **1.00** W/ft<sup>2</sup>  
 Ballast Multiplier ..... **1.00**  
 Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
 Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
 Schedule ..... **100% Load 24-7**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
N	360.0	5	0	0

##### 3.1. Construction Types for Exposure N

Wall Type ..... **Exterior Wall Assembly**  
 1st Window Type ..... **W8**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
 Design Heating ..... **1.25** ACH  
 Energy Analysis ..... **0.00** CFM  
 Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

##### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
 Activity Level ..... **Office Work**  
 Sensible ..... **245.0** BTU/hr/person  
 Latent ..... **205.0** BTU/hr/person  
 Schedule ..... **100% Load 24-7**

##### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
 Schedule ..... **None**  
 Latent ..... **0** BTU/hr  
 Schedule ..... **None**

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## 3-SE Corridor

### 1. General Details:

Floor Area ..... **375.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **9.8** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... **0.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **0.75** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

#### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
S	78.0	1	0	0

#### 3.1. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W9**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... **0.0** Person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**

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## 3-SE Wing 1

### 1. General Details:

Floor Area ..... 920.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 10.0 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

#### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	520.0	6	0	0
S	150.0	1	0	0

#### 3.1. Construction Types for Exposure E

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W8

#### 3.2. Construction Types for Exposure S

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W8

### 4. Roofs, Skylights:

(No Roof or Skylight data).

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

### 7. Partitions:

(No partition data).

#### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

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## 3-SE Wing 2

### 1. General Details:

Floor Area ..... **920.0** ft<sup>2</sup>  
 Avg. Ceiling Height ..... **10.0** ft  
 Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
 OA Requirement 1 ..... **5.0** CFM/person  
 OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
 Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
 Wattage ..... **1.00** W/ft<sup>2</sup>  
 Ballast Multiplier ..... **1.00**  
 Schedule ..... **100% Load 24-7**

#### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
 Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
 Schedule ..... **100% Load 24-7**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	360.0	4	0	0
S	150.0	1	0	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... **Exterior Wall Assembly**  
 1st Window Type ..... **W8**

#### 3.2. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
 1st Window Type ..... **W8**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
 Design Heating ..... **1.25** ACH  
 Energy Analysis ..... **0.00** CFM  
 Infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
 Activity Level ..... **Office Work**  
 Sensible ..... **245.0** BTU/hr/person  
 Latent ..... **205.0** BTU/hr/person  
 Schedule ..... **100% Load 24-7**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
 Schedule ..... **None**  
 Latent ..... **0** BTU/hr  
 Schedule ..... **None**

# Space Input Data

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## 3-SE Wing 3

### 1. General Details:

Floor Area ..... 850.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 10.0 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

#### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
S	490.0	6	0	0

### 3.1. Construction Types for Exposure S

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W8

### 4. Roofs, Skylights:

(No Roof or Skylight data).

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

### 7. Partitions:

(No partition data).

### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

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## 3-Stair 2

### 1. General Details:

Floor Area ..... 270.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 9.8 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... 0.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... 0.75 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... **100% Load 24-7**

#### 2.4. People:

Occupancy ..... 0.0 Person  
Activity Level ..... **Office Work**  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... **None**

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... **None**  
Latent ..... 0 BTU/hr  
Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	152.0	0	0	0
S	162.0	2	0	0
E	152.0	0	0	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... **Exterior Wall Assembly**

#### 3.2. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W11**

#### 3.3. Construction Types for Exposure E

Wall Type ..... **Exterior Wall Assembly**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

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### 3-SW Corridor

#### 1. General Details:

Floor Area ..... **345.0** ft<sup>2</sup>  
 Avg. Ceiling Height ..... **9.8** ft  
 Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
 OA Requirement 1 ..... **0.0** CFM/person  
 OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
 Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
 Wattage ..... **0.75** W/ft<sup>2</sup>  
 Ballast Multiplier ..... **1.00**  
 Schedule ..... **100% Load 24-7**

##### 2.4. People:

Occupancy ..... **0.0** Person  
 Activity Level ..... **Office Work**  
 Sensible ..... **245.0** BTU/hr/person  
 Latent ..... **205.0** BTU/hr/person  
 Schedule ..... **None**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
 Schedule ..... **None**

##### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
 Schedule ..... **None**  
 Latent ..... **0** BTU/hr  
 Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **0.00** W/ft<sup>2</sup>  
 Schedule ..... **None**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
S	78.0	1	0	0

#### 3.1. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
 1st Window Type ..... **W9**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
 Design Heating ..... **1.25** ACH  
 Energy Analysis ..... **0.00** CFM  
 Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

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### 3-SW Wing 1

#### 1. General Details:

Floor Area ..... 595.0 ft<sup>2</sup>  
 Avg. Ceiling Height ..... 10.0 ft  
 Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
 OA Requirement 1 ..... 5.0 CFM/person  
 OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
 Space Usage Defaults ..... ASHRAE Std 62.1-2007

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
 Wattage ..... 1.00 W/ft<sup>2</sup>  
 Ballast Multiplier ..... 1.00  
 Schedule ..... 100% Load 24-7

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
 Schedule ..... None

##### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
 Schedule ..... 100% Load 24-7

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	360.0	4	0	0
S	150.0	1	0	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... Exterior Wall Assembly  
 1st Window Type ..... W8

#### 3.2. Construction Types for Exposure S

Wall Type ..... Exterior Wall Assembly  
 1st Window Type ..... W8

#### 4. Roofs, Skylights:

(No Roof or Skylight data).

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
 Design Heating ..... 1.25 ACH  
 Energy Analysis ..... 0.00 CFM  
 Infiltration occurs at all hours.

#### 6. Floors:

Type ..... Floor Above Conditioned Space  
 (No additional input required for this floor type).

#### 7. Partitions:

(No partition data).

#### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
 Activity Level ..... Office Work  
 Sensible ..... 245.0 BTU/hr/person  
 Latent ..... 205.0 BTU/hr/person  
 Schedule ..... 100% Load 24-7

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
 Schedule ..... None  
 Latent ..... 0 BTU/hr  
 Schedule ..... None



## Space Input Data

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### 3-SW Wing 2

#### 1. General Details:

Floor Area ..... 595.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 10.0 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

##### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	360.0	4	0	0
S	150.0	1	0	0

#### 3.1. Construction Types for Exposure E

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W8

#### 3.2. Construction Types for Exposure S

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W8

#### 4. Roofs, Skylights:

(No Roof or Skylight data).

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

#### 7. Partitions:

(No partition data).

#### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

## Space Input Data

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### 3-SW Wing 3

#### 1. General Details:

Floor Area ..... 1120.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 10.0 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

##### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
S	490.0	6	0	0

#### 3.1. Construction Types for Exposure S

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W8

#### 4. Roofs, Skylights:

(No Roof or Skylight data).

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

#### 7. Partitions:

(No partition data).

#### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

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### 3-W. Toilet/Stair 1

#### 1. General Details:

Floor Area ..... 500.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 9.5 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... 0.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... 0.75 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	247.0	2	1	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W8**  
2nd Window Type ..... **W2**

#### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... 0.0 Person  
Activity Level ..... **Office Work**  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... **None**  
Latent ..... 0 BTU/hr  
Schedule ..... **None**

## Space Input Data

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### 4-E. Toilet/Stair 3

#### 1. General Details:

Floor Area ..... 500.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 9.5 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... GENERAL: Corridor  
OA Requirement 1 ..... 0.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 0.75 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

##### 2.4. People:

Occupancy ..... 0.0 Person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... None

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

##### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

##### 2.3. Electrical Equipment:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	247.0	2	1	0

##### 3.1. Construction Types for Exposure E

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W1  
2nd Window Type ..... W2

#### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
W	500.0	45	0

##### 4.1. Construction Types for Exposure W

Roof Type ..... Slate + Wood Deck

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
infiltration occurs at all hours.

#### 6. Floors:

Type ..... Floor Above Conditioned Space  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

## Space Input Data

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### 4-Main Corr/Lobby

#### 1. General Details:

Floor Area ..... 2070.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 9.5 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... 0.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... 0.75 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... **100% Load 24-7**

##### 2.4. People:

Occupancy ..... 0.0 Person  
Activity Level ..... **Office Work**  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... **None**

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... **None**  
Latent ..... 0 BTU/hr  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	85.5	1	0	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W3**

#### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
N	1035.0	45	0
S	1035.0	45	0

#### 4.1. Construction Types for Exposure N

Roof Type ..... **Slate + Wood Deck**

#### 4.2. Construction Types for Exposure S

Roof Type ..... **Slate + Wood Deck**

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
*Infiltration occurs at all hours.*

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
*(No additional input required for this floor type).*

#### 7. Partitions:

*(No partition data).*

# Space Input Data

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## 4-N Corridor

### 1. General Details:

Floor Area ..... 970.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 9.5 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... 0.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... 0.75 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... **100% Load 24-7**

#### 2.4. People:

Occupancy ..... 0.0 Person  
Activity Level ..... **Office Work**  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... **None**

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... **None**  
Latent ..... 0 BTU/hr  
Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	66.5	0	0	1
E	66.5	1	0	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... **Exterior Wall Assembly**  
Door Type ..... **Wood Door**

#### 3.2. Construction Types for Exposure E

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W1**

### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
E	485.0	45	0
W	485.0	45	0

#### 4.1. Construction Types for Exposure E

Roof Type ..... **Slate + Wood Deck**

#### 4.2. Construction Types for Exposure W

Roof Type ..... **Slate + Wood Deck**

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

### 7. Partitions:

#### 7.1. 1st Partition Details:

Partition Type ..... **Wall Partition**  
Area ..... 418.0 ft<sup>2</sup>

U-Value ..... 0.500 BTU/(hr-ft<sup>2</sup>-°F)  
Uncondit. Space Max Temp ..... 95.0 °F  
Ambient at Space Max Temp ..... 115.0 °F

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Uncondit. Space Min Temp ..... 10.0 °F  
Ambient at Space Min Temp ..... 35.0 °F

7.2. 2nd Partition Details:  
(No partition data).

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## 4-N Wing 1

### 1. General Details:

Floor Area ..... 1055.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 8.8 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

#### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

#### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	484.0	5	0	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W1

### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
W	1055.0	45	0

#### 4.1. Construction Types for Exposure W

Roof Type ..... Slate + Wood Deck

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM

Infiltration occurs at all hours.

### 6. Floors:

Type ..... Floor Above Conditioned Space  
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**



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## 4-N Wing 2

### 1. General Details:

Floor Area ..... 1055.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 8.8 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

#### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	484.0	5	0	0

#### 3.1. Construction Types for Exposure E

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W1

### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
E	1055.0	45	0

#### 4.1. Construction Types for Exposure E

Roof Type ..... Slate + Wood Deck

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM

Infiltration occurs at all hours.

### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

### 7. Partitions:

(No partition data).

#### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

# Space Input Data

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## 4-NE Corridor

### 1. General Details:

Floor Area ..... 440.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 9.5 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... 0.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... 0.75 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... **100% Load 24-7**

#### 2.4. People:

Occupancy ..... 0.0 Person  
Activity Level ..... **Office Work**  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... **None**

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... **None**  
Latent ..... 0 BTU/hr  
Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
N	76.0	1	0	0

#### 3.1. Construction Types for Exposure N

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W3**

### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
E	220.0	45	0
W	220.0	45	0

#### 4.1. Construction Types for Exposure E

Roof Type ..... **Slate + Wood Deck**

#### 4.2. Construction Types for Exposure W

Roof Type ..... **Slate + Wood Deck**

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

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## 4-NE Wing 1

### 1. General Details:

Floor Area ..... 630.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 8.8 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

#### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

#### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	325.0	4	0	0
N	150.0	0	0	0

#### 3.1. Construction Types for Exposure E

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W1

#### 3.2. Construction Types for Exposure N

Wall Type ..... Exterior Wall Assembly

### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
E	630.0	45	0

#### 4.1. Construction Types for Exposure E

Roof Type ..... Slate + Wood Deck

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

### 7. Partitions:

(No partition data).

# Space Input Data

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## 4-NE Wing 2

### 1. General Details:

Floor Area ..... **645.0** ft<sup>2</sup>  
 Avg. Ceiling Height ..... **8.8** ft  
 Building Weight ..... **100.0** lb/ft<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
 OA Requirement 1 ..... **5.0** CFM/person  
 OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
 Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
 Wattage ..... **1.00** W/ft<sup>2</sup>  
 Ballast Multiplier ..... **1.00**  
 Schedule ..... **100% Load 24-7**

#### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
 Activity Level ..... **Office Work**  
 Sensible ..... **245.0** BTU/hr/person  
 Latent ..... **205.0** BTU/hr/person  
 Schedule ..... **100% Load 24-7**

#### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
 Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
 Schedule ..... **None**  
 Latent ..... **0** BTU/hr  
 Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
 Schedule ..... **100% Load 24-7**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	334.0	4	0	0
N	150.0	0	0	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... **Exterior Wall Assembly**  
 1st Window Type ..... **W1**

#### 3.2. Construction Types for Exposure N

Wall Type ..... **Exterior Wall Assembly**

### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
W	645.0	45	0

#### 4.1. Construction Types for Exposure W

Roof Type ..... **Slate + Wood Deck**

### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
 Design Heating ..... **1.25** ACH  
 Energy Analysis ..... **0.00** CFM  
 infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
 (No additional input required for this floor type).

### 7. Partitions:

(No partition data).

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## 4-NW Corridor

### 1. General Details:

Floor Area ..... **440.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **9.5** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... **0.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **0.75** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

#### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
N	76.0	1	0	0

#### 3.1. Construction Types for Exposure N

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W3**

### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
E	220.0	45	0
W	220.0	45	0

#### 4.1. Construction Types for Exposure E

Roof Type ..... **Slate + Wood Deck**

#### 4.2. Construction Types for Exposure W

Roof Type ..... **Slate + Wood Deck**

### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... **0.0** Person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**

# Space Input Data

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## 4-NW Wing 1

### 1. General Details:

Floor Area ..... 750.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 8.8 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

#### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	380.0	5	0	0
N	150.0	0	0	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W1

#### 3.2. Construction Types for Exposure N

Wall Type ..... Exterior Wall Assembly

### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
W	750.0	45	0

#### 4.1. Construction Types for Exposure W

Roof Type ..... Slate + Wood Deck

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

### 7. Partitions:

(No partition data).

#### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

# Space Input Data

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## 4-NW Wing 2

### 1. General Details:

Floor Area ..... 750.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 8.8 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

#### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	300.0	4	0	0
N	150.0	0	0	0

#### 3.1. Construction Types for Exposure E

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W1

#### 3.2. Construction Types for Exposure N

Wall Type ..... Exterior Wall Assembly

### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
E	750.0	45	0

#### 4.1. Construction Types for Exposure E

Roof Type ..... Slate + Wood Deck

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

### 7. Partitions:

(No partition data).

### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

# Space Input Data

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## 4-SE Corridor

### 1. General Details:

Floor Area ..... **440.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **9.5** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... **0.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **0.75** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

#### 2.4. People:

Occupancy ..... **0.0** Person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **None**

#### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
S	76.0	1	0	0

#### 3.1. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W3**

### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
E	220.0	45	0
W	220.0	45	0

#### 4.1. Construction Types for Exposure E

Roof Type ..... **Slate + Wood Deck**

#### 4.2. Construction Types for Exposure W

Roof Type ..... **Slate + Wood Deck**

### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**



# Space Input Data

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## 4-SE Wing 1

### 1. General Details:

Floor Area ..... **920.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **8.8** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
OA Requirement 1 ..... **5.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **1.00** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

#### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **100% Load 24-7**

#### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
Schedule ..... **100% Load 24-7**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	475.0	6	0	0
S	150.0	1	0	0

#### 3.1. Construction Types for Exposure E

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W1**

#### 3.2. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W1**

### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
E	920.0	45	0

#### 4.1. Construction Types for Exposure E

Roof Type ..... **Slate + Wood Deck**

### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

# Space Input Data

ShipU. Old Main HVAC Study  
Century Engineering

12/06/2011  
01:16PM

## 4-SE Wing 2

### 1. General Details:

Floor Area ..... **665.0** ft<sup>2</sup>  
 Avg. Ceiling Height ..... **8.8** ft  
 Building Weight ..... **100.0** lb/ft<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
 OA Requirement 1 ..... **5.0** CFM/person  
 OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
 Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
 Wattage ..... **1.00** W/ft<sup>2</sup>  
 Ballast Multiplier ..... **1.00**  
 Schedule ..... **100% Load 24-7**

#### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
 Activity Level ..... **Office Work**  
 Sensible ..... **245.0** BTU/hr/person  
 Latent ..... **205.0** BTU/hr/person  
 Schedule ..... **100% Load 24-7**

#### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
 Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
 Schedule ..... **None**  
 Latent ..... **0** BTU/hr  
 Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
 Schedule ..... **100% Load 24-7**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	308.0	4	0	0
S	150.0	1	0	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... **Exterior Wall Assembly**  
 1st Window Type ..... **W1**

#### 3.2. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
 1st Window Type ..... **W1**

### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
W	665.0	45	0

#### 4.1. Construction Types for Exposure W

Roof Type ..... **Slate + Wood Deck**

### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
 Design Heating ..... **1.25** ACH  
 Energy Analysis ..... **0.00** CFM  
 Infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
 (No additional input required for this floor type).

### 7. Partitions:

(No partition data).

# Space Input Data

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01:16PM

## 4-SE Wing 3

### 1. General Details:

Floor Area ..... 1105.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 8.8 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

#### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

#### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
S	449.0	6	0	0

#### 3.1. Construction Types for Exposure S

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W1

### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
S	1105.0	45	0

#### 4.1. Construction Types for Exposure S

Roof Type ..... Slate + Wood Deck

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

### 7. Partitions:

(No partition data).

# Space Input Data

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01:16PM

## 4-Stair 2

### 1. General Details:

Floor Area ..... 270.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 9.5 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... 0.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... 0.75 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... **100% Load 24-7**

#### 2.4. People:

Occupancy ..... 0.0 Person  
Activity Level ..... **Office Work**  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... **None**

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... **None**  
Latent ..... 0 BTU/hr  
Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	152.0	0	0	0
S	162.0	2	0	0
E	152.0	0	0	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... **Exterior Wall Assembly**

#### 3.2. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W12**

#### 3.3. Construction Types for Exposure E

Wall Type ..... **Exterior Wall Assembly**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

## Space Input Data

ShipU. Old Main HVAC Study  
Century Engineering

12/06/2011  
01:16PM

### 4-SW Corridor

#### 1. General Details:

Floor Area ..... **440.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **9.5** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... **0.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... **0.75** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

##### 2.4. People:

Occupancy ..... **0.0** Person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **None**

##### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
S	76.0	1	0	0

##### 3.1. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W3**

#### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
E	220.0	45	0
W	220.0	45	0

##### 4.1. Construction Types for Exposure E

Roof Type ..... **Slate + Wood Deck**

##### 4.2. Construction Types for Exposure W

Roof Type ..... **Slate + Wood Deck**

#### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
Design Heating ..... **1.25** ACH  
Energy Analysis ..... **0.00** CFM  
*Infiltration occurs at all hours.*

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

# Space Input Data

ShipU. Old Main HVAC Study  
Century Engineering

12/06/2011  
01:16PM

## 4-SW Wing 1

### 1. General Details:

Floor Area ..... 595.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 8.8 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

#### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

#### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	308.0	4	0	0
S	150.0	1	0	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W1

#### 3.2. Construction Types for Exposure S

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W1

### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
W	595.0	45	0

#### 4.1. Construction Types for Exposure W

Roof Type ..... Slate + Wood Deck

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

### 7. Partitions:

(No partition data).

# Space Input Data

ShipU. Old Main HVAC Study  
Century Engineering

12/06/2011  
01:16PM

## 4-SW Wing 2

### 1. General Details:

Floor Area ..... 695.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 8.8 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 5.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... ASHRAE Std 62.1-2007

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... Free Hanging  
Wattage ..... 1.00 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... 100% Load 24-7

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... None

#### 2.3. Electrical Equipment:

Wattage ..... 1.50 W/ft<sup>2</sup>  
Schedule ..... 100% Load 24-7

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	308.0	4	0	0
S	150.0	1	0	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W1

#### 3.2. Construction Types for Exposure S

Wall Type ..... Exterior Wall Assembly  
1st Window Type ..... W1

### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
W	695.0	45	0

#### 4.1. Construction Types for Exposure W

Roof Type ..... Slate + Wood Deck

### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM  
Infiltration occurs at all hours.

### 6. Floors:

Type ..... Floor Above Conditioned Space  
(No additional input required for this floor type).

### 7. Partitions:

(No partition data).

#### 2.4. People:

Occupancy ..... 200.00 ft<sup>2</sup>/person  
Activity Level ..... Office Work  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... 100% Load 24-7

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... None  
Latent ..... 0 BTU/hr  
Schedule ..... None

# Space Input Data

ShipU. Old Main HVAC Study  
Century Engineering

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01:16PM

## 4-SW Wing 3

### 1. General Details:

Floor Area ..... **1065.0** ft<sup>2</sup>  
 Avg. Ceiling Height ..... **8.8** ft  
 Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
 OA Requirement 1 ..... **5.0** CFM/person  
 OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
 Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
 Wattage ..... **1.00** W/ft<sup>2</sup>  
 Ballast Multiplier ..... **1.00**  
 Schedule ..... **100% Load 24-7**

#### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
 Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
 Schedule ..... **100% Load 24-7**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
S	431.0	6	0	0

#### 3.1. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
 1st Window Type ..... **W1**

### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
S	1065.0	45	0

#### 4.1. Construction Types for Exposure S

Roof Type ..... **Slate + Wood Deck**

### 5. Infiltration:

Design Cooling ..... **0.50** ACH  
 Design Heating ..... **1.25** ACH  
 Energy Analysis ..... **0.00** CFM  
 Infiltration occurs at all hours.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
 (No additional input required for this floor type).

### 7. Partitions:

(No partition data).

#### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
 Activity Level ..... **Office Work**  
 Sensible ..... **245.0** BTU/hr/person  
 Latent ..... **205.0** BTU/hr/person  
 Schedule ..... **100% Load 24-7**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
 Schedule ..... **None**  
 Latent ..... **0** BTU/hr  
 Schedule ..... **None**



## Space Input Data

ShipU. Old Main HVAC Study  
Century Engineering

12/06/2011  
01:16PM

### 4-W. Toilet/Stair 1

#### 1. General Details:

Floor Area ..... 500.0 ft<sup>2</sup>  
Avg. Ceiling Height ..... 9.5 ft  
Building Weight ..... 100.0 lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**  
OA Requirement 1 ..... 0.0 CFM/person  
OA Requirement 2 ..... 0.06 CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**  
Wattage ..... 0.75 W/ft<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... **100% Load 24-7**

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

##### 2.3. Electrical Equipment:

Wattage ..... 0.00 W/ft<sup>2</sup>  
Schedule ..... **None**

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
W	247.0	2	1	0

#### 3.1. Construction Types for Exposure W

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W1**  
2nd Window Type ..... **W2**

#### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
W	500.0	45	0

#### 4.1. Construction Types for Exposure W

Roof Type ..... **Slate + Wood Deck**

#### 5. Infiltration:

Design Cooling ..... 0.50 ACH  
Design Heating ..... 1.25 ACH  
Energy Analysis ..... 0.00 CFM

*infiltration occurs at all hours.*

#### 6. Floors:

Type ..... **Floor Above Conditioned Space**  
**(No additional input required for this floor type).**

#### 7. Partitions:

**(No partition data).**

#### 2.4. People:

Occupancy ..... 0.0 Person  
Activity Level ..... **Office Work**  
Sensible ..... 245.0 BTU/hr/person  
Latent ..... 205.0 BTU/hr/person  
Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 BTU/hr  
Schedule ..... **None**  
Latent ..... 0 BTU/hr  
Schedule ..... **None**

# Space Input Data

ShipU. Old Main HVAC Study  
Century Engineering

12/06/2011  
01:16PM

## Inst. Research Bldg.

### 1. General Details:

Floor Area ..... **2045.0** ft<sup>2</sup>  
Avg. Ceiling Height ..... **9.0** ft  
Building Weight ..... **100.0** lb/ft<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**  
OA Requirement 1 ..... **5.0** CFM/person  
OA Requirement 2 ..... **0.06** CFM/ft<sup>2</sup>  
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... **Recessed (Unvented)**  
Wattage ..... **1.00** W/ft<sup>2</sup>  
Ballast Multiplier ..... **1.00**  
Schedule ..... **100% Load 24-7**

#### 2.4. People:

Occupancy ..... **200.00** ft<sup>2</sup>/person  
Activity Level ..... **Office Work**  
Sensible ..... **245.0** BTU/hr/person  
Latent ..... **205.0** BTU/hr/person  
Schedule ..... **100% Load 24-7**

#### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft<sup>2</sup>  
Schedule ..... **None**

#### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr  
Schedule ..... **None**  
Latent ..... **0** BTU/hr  
Schedule ..... **None**

#### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft<sup>2</sup>  
Schedule ..... **100% Load 24-7**

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
N	300.0	2	0	2
S	300.0	2	1	0
E	570.0	3	0	2
W	340.0	2	0	0

#### 3.1. Construction Types for Exposure N

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W6**  
Door Type ..... **Wood Door**

#### 3.2. Construction Types for Exposure S

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W14**  
2nd Window Type ..... **W1**

#### 3.3. Construction Types for Exposure E

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W14**  
Door Type ..... **Wood Door**

#### 3.4. Construction Types for Exposure W

Wall Type ..... **Exterior Wall Assembly**  
1st Window Type ..... **W14**

### 4. Roofs, Skylights:

Exp.	Roof Gross Area (ft <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
N	510.0	20	0
S	510.0	20	0
E	510.0	20	0
W	510.0	20	0

#### 4.1. Construction Types for Exposure N

Roof Type ..... **Slate + Wood Deck**

## Space Input Data

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### 4.2. Construction Types for Exposure S

Roof Type ..... Slate + Wood Deck

### 4.3. Construction Types for Exposure E

Roof Type ..... Slate + Wood Deck

### 4.4. Construction Types for Exposure W

Roof Type ..... Slate + Wood Deck

### 5. Infiltration:

Design Cooling ..... 0.50 ACH

Design Heating ..... 1.25 ACH

Energy Analysis ..... 0.00 CFM

Infiltration occurs at all hours.

### 6. Floors:

Type ..... Floor Above Conditioned Space

(No additional input required for this floor type).

### 7. Partitions:

(No partition data).

# **Appendix B-3**

## **Air System Input Data**

# 1st Floor Input Data

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/08/2011  
 10:16AM

## 1. General Details:

Air System Name ..... 1st Floor  
 Equipment Type ..... Chilled Water AHU  
 Air System Type ..... VAV  
 Number of zones ..... 5

## 2. System Components:

### Ventilation Air Data:

Airflow Control ..... Constant Ventilation Airflow  
 Ventilation Sizing Method ..... Sum of Space OA Airflows  
 Unocc. Damper Position ..... Closed  
 Damper Leak Rate ..... 0 %  
 Outdoor Air CO2 Level ..... 400 ppm

### Economizer Data:

Control ..... Non-integrated dry-bulb control  
 Upper Cutoff ..... 55.0 °F  
 Lower Cutoff ..... 50.0 °F

### Preheat Coil Data:

Setpoint ..... 60.0 °F  
 Heating Source ..... Hot Water  
 Schedule ..... JFMAMJJASOND  
 Coil position ..... Downstream of Mixing Point

### Central Cooling Data:

Supply Air Temperature ..... 55.0 °F  
 Coil Bypass Factor ..... 0.100  
 Cooling Source ..... Chilled Water  
 Schedule ..... JFMAMJJASOND  
 Capacity Control ..... Constant Temperature - Fan On

### Supply Fan Data:

Fan Type ..... BI/AF with Variable Frequency Drive  
 Configuration ..... Draw-thru  
 Fan Performance ..... 3.00 in wg  
 Overall Efficiency ..... 43 %

<b>% Airflow</b>	100	90	80	70	60	50
<b>% kW</b>	100	77	57	42	30	21

<b>% Airflow</b>	40	30	20	10	0
<b>% kW</b>	15	13	10	7	5

### Duct System Data:

#### Supply Duct Data:

Duct Heat Gain ..... 0 %  
 Duct Leakage ..... 0 %

#### Return Duct or Plenum Data:

Return Air Via ..... Ducted Return

### Return Fan Data:

Fan Type ..... Forward Curved with Variable Frequency Drive  
 Fan Performance ..... 2.00 in wg  
 Overall Efficiency ..... 48 %

<b>% Airflow</b>	100	90	80	70	60	50
<b>% kW</b>	100	77	60	44	35	25

<b>% Airflow</b>	40	30	20	10	0
<b>% kW</b>	19	13	9	7	6

## 3. Zone Components:

### Space Assignments:

<b>Zone 1: Zone 1</b>	
-----------------------	--

# 1st Floor Input Data

Project Name: ShipU. Old Main HVAC Study  
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1-Main Corr/Lobby	x1
1-Lounge/Corridor	x1
1-Stair 2	x1
1-W. Toilet/Vest/Stair1	x1
1-E. Toilet/Stair 3	x1
<b>Zone 2: Zone 2</b>	
1-NW Corridor	x1
1-NW Wing 1	x1
1-NW Wing 2	x1
1-NW Wing 3	x1
1-NW Wing 4	x1
<b>Zone 3: Zone 3</b>	
1-SW Corridor	x1
1-SW Wing 1	x1
1-SW Wing 2	x1
1-SW Wing 3	x1
<b>Zone 4: Zone 4</b>	
1-NE Corridor	x1
1-NE Wing 1	x1
1-NE Wing 2	x1
1-NE Wing 3	x1
<b>Zone 5: Zone 5</b>	
1-SE Corridor	x1
1-SE Wing 1	x1
1-SE Wing 2	x1
1-SE Wing 3	x1

**Thermostats and Zone Data:**

Zone ..... **All**  
 Cooling T-stat: Occ. .... **75.0** °F  
 Cooling T-stat: Unocc. .... **85.0** °F  
 Heating T-stat: Occ. .... **70.0** °F  
 Heating T-stat: Unocc. .... **60.0** °F  
 T-stat Throttling Range ..... **0.10** °F  
 Diversity Factor ..... **100** %  
 Direct Exhaust Airflow ..... **0.0** CFM  
 Direct Exhaust Fan kW ..... **0.0** kW

Thermostat Schedule ..... **100% Occ. 24-7**  
 Unoccupied Cooling is ..... **Available**

**Supply Terminals Data:**

Zone ..... **All**  
 Terminal Type ..... **VAV box with RH**  
 Minimum Airflow ..... **40** % of supply air

Reheat Coil Source ..... **Hot Water**  
 Reheat Coil Schedule ..... **JFMAMJJASOND**

**Zone Heating Units:**

Zone ..... **All**  
 Zone Heating Unit Type ..... **None**

Zone Unit Heat Source ..... **Hot Water**  
 Zone Heating Unit Schedule ..... **JFMAMJJASOND**

**4. Sizing Data (Computer-Generated):**

**System Sizing Data:**

Cooling Supply Temperature ..... **55.0** °F  
 Supply Fan Airflow ..... **15504.7** CFM  
 Ventilation Airflow ..... **1232.8** CFM

**Hydronic Sizing Specifications:**

Chilled Water Delta-T ..... **12.0** °F  
 Hot Water Delta-T ..... **20.0** °F

**Safety Factors:**

## 1st Floor Input Data

Project Name: ShipU. Old Main HVAC Study  
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Cooling Sensible ..... 0 %  
 Cooling Latent ..... 0 %  
 Heating ..... 0 %

**Zone Sizing Data:**

Zone Airflow Sizing Method ..... Sum of space airflow rates  
 Space Airflow Sizing Method ..... Individual peak space loads

Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coil (MBH)	-
1	2136.8	-	111.9	-
2	3900.5	-	130.7	-
3	2997.8	-	100.6	-
4	2935.0	-	100.3	-
5	3735.9	-	119.8	-

**5. Equipment Data**

No Equipment Data required for this system.

## 2nd Floor Input Data

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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### 1. General Details:

Air System Name ..... 2nd Floor  
 Equipment Type ..... Chilled Water AHU  
 Air System Type ..... VAV  
 Number of zones ..... 5

### 2. System Components:

#### Ventilation Air Data:

Airflow Control ..... Constant Ventilation Airflow  
 Ventilation Sizing Method ..... Sum of Space OA Airflows  
 Unocc. Damper Position ..... Closed  
 Damper Leak Rate ..... 0 %  
 Outdoor Air CO2 Level ..... 400 ppm

#### Economizer Data:

Control ..... Non-integrated dry-bulb control  
 Upper Cutoff ..... 55.0 °F  
 Lower Cutoff ..... 50.0 °F

#### Preheat Coil Data:

Setpoint ..... 60.0 °F  
 Heating Source ..... Hot Water  
 Schedule ..... JFMAMJJASOND  
 Coil position ..... Downstream of Mixing Point

#### Central Cooling Data:

Supply Air Temperature ..... 55.0 °F  
 Coil Bypass Factor ..... 0.100  
 Cooling Source ..... Chilled Water  
 Schedule ..... JFMAMJJASOND  
 Capacity Control ..... Constant Temperature - Fan On

#### Supply Fan Data:

Fan Type ..... BI/AF with Variable Frequency Drive  
 Configuration ..... Draw-thru  
 Fan Performance ..... 3.00 in wg  
 Overall Efficiency ..... 43 %

<b>% Airflow</b>	100	90	80	70	60	50
<b>% kW</b>	100	77	57	42	30	21

<b>% Airflow</b>	40	30	20	10	0
<b>% kW</b>	15	13	10	7	5

#### Duct System Data:

##### Supply Duct Data:

Duct Heat Gain ..... 0 %  
 Duct Leakage ..... 0 %

##### Return Duct or Plenum Data:

Return Air Via ..... Ducted Return

#### Return Fan Data:

Fan Type ..... Forward Curved with Variable Frequency Drive  
 Fan Performance ..... 2.00 in wg  
 Overall Efficiency ..... 48 %

<b>% Airflow</b>	100	90	80	70	60	50
<b>% kW</b>	100	77	60	44	35	25

<b>% Airflow</b>	40	30	20	10	0
<b>% kW</b>	19	13	9	7	6

### 3. Zone Components:

#### Space Assignments:

<b>Zone 1: Zone 1</b>	
2-Main Corr/Lobby	x1



## 2nd Floor Input Data

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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2-Stair 2	x1
2-W. Toilet/Stair 1	x1
2-E. Toilet/Stair 3	x1
<b>Zone 2: Zone 2</b>	
2-NW Corridor	x1
2-NW Wing 1	x1
2-NW Wing 2	x1
2-NW Wing 3	x1
<b>Zone 3: Zone 3</b>	
2-SW Corridor	x1
2-SW Wing 1	x1
2-SW Wing 2	x1
2-SW Wing 3	x1
<b>Zone 4: Zone 4</b>	
2-NE Corridor	x1
2-NE Wing 1	x1
2-NE Wing 2	x1
2-NE Wing 3	x1
<b>Zone 5: Zone 5</b>	
2-SE Corridor	x1
2-SE Wing 1	x1
2-SE Wing 2	x1
2-SE Wing 3	x1

**Thermostats and Zone Data:**

Zone ..... All  
 Cooling T-stat: Occ. .... 75.0 °F  
 Cooling T-stat: Unocc. .... 85.0 °F  
 Heating T-stat: Occ. .... 70.0 °F  
 Heating T-stat: Unocc. .... 60.0 °F  
 T-stat Throttling Range ..... 0.10 °F  
 Diversity Factor ..... 100 %  
 Direct Exhaust Airflow ..... 0.0 CFM  
 Direct Exhaust Fan kW ..... 0.0 kW

Thermostat Schedule ..... 100% Occ. 24-7  
 Unoccupied Cooling is ..... Available

**Supply Terminals Data:**

Zone ..... All  
 Terminal Type ..... VAV box with RH  
 Minimum Airflow ..... 40 % of supply air  
 Reheat Coil Source ..... Hot Water  
 Reheat Coil Schedule ..... JFMAMJJASOND

**Zone Heating Units:**

Zone ..... All  
 Zone Heating Unit Type ..... None  
 Zone Unit Heat Source ..... Hot Water  
 Zone Heating Unit Schedule ..... JFMAMJJASOND

**4. Sizing Data (Computer-Generated):**

**System Sizing Data:**

Cooling Supply Temperature ..... 55.0 °F  
 Supply Fan Airflow ..... 16144.5 CFM  
 Ventilation Airflow ..... 1080.4 CFM

**Hydronic Sizing Specifications:**

Chilled Water Delta-T ..... 12.0 °F  
 Hot Water Delta-T ..... 20.0 °F

**Safety Factors:**

Cooling Sensible ..... 0 %  
 Cooling Latent ..... 0 %  
 Heating ..... 0 %

## 2nd Floor Input Data

Project Name: ShipU. Old Main HVAC Study  
Prepared by: Century Engineering

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### Zone Sizing Data:

Zone Airflow Sizing Method ..... Sum of space airflow rates  
Space Airflow Sizing Method ..... Individual peak space loads

Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coil (MBH)	-
1	2002.6	-	108.5	-
2	3549.0	-	119.8	-
3	3657.7	-	116.2	-
4	3301.7	-	113.2	-
5	3903.3	-	127.4	-

### 5. Equipment Data

No Equipment Data required for this system.

## 3rd Floor Input Data

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/08/2011  
 10:16AM

### 1. General Details:

Air System Name ..... 3rd Floor  
 Equipment Type ..... Chilled Water AHU  
 Air System Type ..... VAV  
 Number of zones ..... 5

### 2. System Components:

#### Ventilation Air Data:

Airflow Control ..... Constant Ventilation Airflow  
 Ventilation Sizing Method ..... Sum of Space OA Airflows  
 Unocc. Damper Position ..... Closed  
 Damper Leak Rate ..... 0 %  
 Outdoor Air CO2 Level ..... 400 ppm

#### Economizer Data:

Control ..... Non-integrated dry-bulb control  
 Upper Cutoff ..... 55.0 °F  
 Lower Cutoff ..... 50.0 °F

#### Preheat Coil Data:

Setpoint ..... 60.0 °F  
 Heating Source ..... Hot Water  
 Schedule ..... JFMAMJJASOND  
 Coil position ..... Downstream of Mixing Point

#### Central Cooling Data:

Supply Air Temperature ..... 55.0 °F  
 Coil Bypass Factor ..... 0.100  
 Cooling Source ..... Chilled Water  
 Schedule ..... JFMAMJJASOND  
 Capacity Control ..... Constant Temperature - Fan On

#### Supply Fan Data:

Fan Type ..... BI/AF with Variable Frequency Drive  
 Configuration ..... Draw-thru  
 Fan Performance ..... 3.00 in wg  
 Overall Efficiency ..... 43 %

<b>% Airflow</b>	100	90	80	70	60	50
<b>% kW</b>	100	77	57	42	30	21

<b>% Airflow</b>	40	30	20	10	0
<b>% kW</b>	15	13	10	7	5

#### Duct System Data:

##### Supply Duct Data:

Duct Heat Gain ..... 0 %  
 Duct Leakage ..... 0 %

##### Return Duct or Plenum Data:

Return Air Via ..... Ducted Return

#### Return Fan Data:

Fan Type ..... Forward Curved with Variable Frequency Drive  
 Fan Performance ..... 2.00 in wg  
 Overall Efficiency ..... 48 %

<b>% Airflow</b>	100	90	80	70	60	50
<b>% kW</b>	100	77	60	44	35	25

<b>% Airflow</b>	40	30	20	10	0
<b>% kW</b>	19	13	9	7	6

### 3. Zone Components:

#### Space Assignments:

<b>Zone 1: Zone 1</b>	
3-Main Cor/Lobby	x1

## 3rd Floor Input Data

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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3-Stair 2	x1
3-W. Toilet/Stair 1	x1
3-E. Toilet/Stair 3	x1
<b>Zone 2: Zone 2</b>	
3-NW Corridor	x1
3-NW Wing 1	x1
3-NW Wing 2	x1
3-NW Wing 3	x1
<b>Zone 3: Zone 3</b>	
3-SW Corridor	x1
3-SW Wing 1	x1
3-SW Wing 2	x1
3-SW Wing 3	x1
<b>Zone 4: Zone 4</b>	
3-NE Corridor	x1
3-NE Wing 1	x1
3-NE Wing 2	x1
3-NE Wing 3	x1
<b>Zone 5: Zone 5</b>	
3-SE Corridor	x1
3-SE Wing 1	x1
3-SE Wing 2	x1
3-SE Wing 3	x1

### Thermostats and Zone Data:

Zone ..... **All**  
 Cooling T-stat: Occ. .... **75.0** °F  
 Cooling T-stat: Unocc. .... **85.0** °F  
 Heating T-stat: Occ. .... **70.0** °F  
 Heating T-stat: Unocc. .... **60.0** °F  
 T-stat Throttling Range ..... **0.10** °F  
 Diversity Factor ..... **100** %  
 Direct Exhaust Airflow ..... **0.0** CFM  
 Direct Exhaust Fan kW ..... **0.0** kW  
  
 Thermostat Schedule ..... **100% Occ. 24-7**  
 Unoccupied Cooling is ..... **Available**

### Supply Terminals Data:

Zone ..... **All**  
 Terminal Type ..... **VAV box with RH**  
 Minimum Airflow ..... **40** % of supply air  
  
 Reheat Coil Source ..... **Hot Water**  
 Reheat Coil Schedule ..... **JFMAMJJASOND**

### Zone Heating Units:

Zone ..... **All**  
 Zone Heating Unit Type ..... **None**  
  
 Zone Unit Heat Source ..... **Hot Water**  
 Zone Heating Unit Schedule ..... **JFMAMJJASOND**

### 4. Sizing Data (Computer-Generated):

#### System Sizing Data:

Cooling Supply Temperature ..... **55.0** °F  
 Supply Fan Airflow ..... **12839.3** CFM  
 Ventilation Airflow ..... **1081.0** CFM

#### Hydronic Sizing Specifications:

Chilled Water Delta-T ..... **12.0** °F  
 Hot Water Delta-T ..... **20.0** °F

#### Safety Factors:

Cooling Sensible ..... **0** %  
 Cooling Latent ..... **0** %  
 Heating ..... **0** %

### 3rd Floor Input Data

Project Name: ShipU. Old Main HVAC Study  
Prepared by: Century Engineering

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#### Zone Sizing Data:

Zone Airflow Sizing Method ..... Sum of space airflow rates  
Space Airflow Sizing Method ..... Individual peak space loads

Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coil (MBH)	-
1	1859.2	-	89.6	-
2	2655.2	-	95.3	-
3	2883.7	-	96.7	-
4	2416.3	-	87.9	-
5	3262.2	-	109.4	-

#### 5. Equipment Data

No Equipment Data required for this system.

## 4th Floor Input Data

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/08/2011  
 10:16AM

### 1. General Details:

Air System Name ..... 4th Floor  
 Equipment Type ..... Chilled Water AHU  
 Air System Type ..... VAV  
 Number of zones ..... 6

### 2. System Components:

#### Ventilation Air Data:

Airflow Control ..... Constant Ventilation Airflow  
 Ventilation Sizing Method ..... Sum of Space OA Airflows  
 Unocc. Damper Position ..... Closed  
 Damper Leak Rate ..... 0 %  
 Outdoor Air CO2 Level ..... 400 ppm

#### Economizer Data:

Control ..... Non-integrated dry-bulb control  
 Upper Cutoff ..... 55.0 °F  
 Lower Cutoff ..... 50.0 °F

#### Preheat Coil Data:

Setpoint ..... 60.0 °F  
 Heating Source ..... Hot Water  
 Schedule ..... JFMAMJJASOND  
 Coil position ..... Downstream of Mixing Point

#### Central Cooling Data:

Supply Air Temperature ..... 55.0 °F  
 Coil Bypass Factor ..... 0.100  
 Cooling Source ..... Chilled Water  
 Schedule ..... JFMAMJJASOND  
 Capacity Control ..... Constant Temperature - Fan On

#### Supply Fan Data:

Fan Type ..... BI/AF with Variable Frequency Drive  
 Configuration ..... Draw-thru  
 Fan Performance ..... 3.00 in wg  
 Overall Efficiency ..... 43 %

<b>% Airflow</b>	100	90	80	70	60	50
<b>% kW</b>	100	77	57	42	30	21

<b>% Airflow</b>	40	30	20	10	0
<b>% kW</b>	15	13	10	7	5

#### Duct System Data:

##### Supply Duct Data:

Duct Heat Gain ..... 0 %  
 Duct Leakage ..... 0 %

##### Return Duct or Plenum Data:

Return Air Via ..... Ducted Return

#### Return Fan Data:

Fan Type ..... Forward Curved with Variable Frequency Drive  
 Fan Performance ..... 2.00 in wg  
 Overall Efficiency ..... 48 %

<b>% Airflow</b>	100	90	80	70	60	50
<b>% kW</b>	100	77	60	44	35	25

<b>% Airflow</b>	40	30	20	10	0
<b>% kW</b>	19	13	9	7	6

### 3. Zone Components:

#### Space Assignments:

<b>Zone 1: Zone 1</b>	
4-Main Corr/Lobby	x1

## 4th Floor Input Data

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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4-Stair 2	x1
4-W. Toilet/Stair 1	x1
4-E. Toilet/Stair 3	x1
<b>Zone 2: Zone 2</b>	
4-NW Corridor	x1
4-NW Wing 1	x1
4-NW Wing 2	x1
<b>Zone 3: Zone 3</b>	
4-N Corridor	x1
4-N Wing 1	x1
4-N Wing 2	x1
<b>Zone 4: Zone 4</b>	
4-NE Corridor	x1
4-NE Wing 1	x1
4-NE Wing 2	x1
<b>Zone 5: Zone 5</b>	
4-SW Corridor	x1
4-SW Wing 1	x1
4-SW Wing 2	x1
4-SW Wing 3	x1
<b>Zone 6: Zone 6</b>	
4-SE Corridor	x1
4-SE Wing 1	x1
4-SE Wing 2	x1
4-SE Wing 3	x1

### Thermostats and Zone Data:

Zone ..... All  
 Cooling T-stat: Occ. .... 75.0 °F  
 Cooling T-stat: Unocc. .... 85.0 °F  
 Heating T-stat: Occ. .... 70.0 °F  
 Heating T-stat: Unocc. .... 60.0 °F  
 T-stat Throttling Range ..... 0.10 °F  
 Diversity Factor ..... 100 %  
 Direct Exhaust Airflow ..... 0.0 CFM  
 Direct Exhaust Fan kW ..... 0.0 kW  
  
 Thermostat Schedule ..... 100% Occ. 24-7  
 Unoccupied Cooling is ..... Available

### Supply Terminals Data:

Zone ..... All  
 Terminal Type ..... VAV box with RH  
 Minimum Airflow ..... 40 % of supply air  
  
 Reheat Coil Source ..... Hot Water  
 Reheat Coil Schedule ..... JFMAMJJASOND

### Zone Heating Units:

Zone ..... All  
 Zone Heating Unit Type ..... None  
  
 Zone Unit Heat Source ..... Hot Water  
 Zone Heating Unit Schedule ..... JFMAMJJASOND

### 4. Sizing Data (Computer-Generated):

#### System Sizing Data:

Cooling Supply Temperature ..... 55.0 °F  
 Supply Fan Airflow ..... 14323.8 CFM  
 Ventilation Airflow ..... 1208.3 CFM

#### Hydronic Sizing Specifications:

Chilled Water Delta-T ..... 12.0 °F  
 Hot Water Delta-T ..... 20.0 °F

#### Safety Factors:

Cooling Sensible ..... 0 %

## 4th Floor Input Data

Project Name: ShipU. Old Main HVAC Study  
Prepared by: Century Engineering

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Cooling Latent ..... 0 %  
Heating ..... 0 %

**Zone Sizing Data:**

Zone Airflow Sizing Method ..... Sum of space airflow rates  
Space Airflow Sizing Method ..... Individual peak space loads

Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coil (MBH)	-
1	2087.9	-	92.5	-
2	1897.0	-	66.1	-
3	2450.0	-	99.5	-
4	1681.2	-	60.3	-
5	3081.8	-	97.2	-
6	3342.0	-	108.1	-

**5. Equipment Data**

No Equipment Data required for this system.



# Chapel Input Data

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/08/2011  
 10:16AM

## 1. General Details:

Air System Name ..... Chapel  
 Equipment Type ..... Chilled Water AHU  
 Air System Type ..... Single Zone CAV  
 Number of zones ..... 1

## 2. System Components:

### Ventilation Air Data:

Airflow Control ..... Constant Ventilation Airflow  
 Ventilation Sizing Method ..... Sum of Space OA Airflows  
 Unocc. Damper Position ..... Closed  
 Damper Leak Rate ..... 0 %  
 Outdoor Air CO2 Level ..... 400 ppm

### Economizer Data:

Control ..... Non-integrated dry-bulb control  
 Upper Cutoff ..... 55.0 °F  
 Lower Cutoff ..... 50.0 °F

### Central Cooling Data:

Supply Air Temperature ..... 55.0 °F  
 Coil Bypass Factor ..... 0.100  
 Cooling Source ..... Chilled Water  
 Schedule ..... JFMAMJJASOND  
 Capacity Control ..... Cycled or Staged Capacity - Fan On

### Central Heating Data:

Supply Temperature ..... 95.0 °F  
 Heating Source ..... Hot Water  
 Schedule ..... JFMAMJJASOND  
 Capacity Control ..... Cycled or Staged Capacity - Fan On

### Supply Fan Data:

Fan Type ..... Backward Inclined or Airfoil (BI/AF)  
 Configuration ..... Draw-thru  
 Fan Performance ..... 2.00 in wg  
 Overall Efficiency ..... 54 %

### Duct System Data:

#### Supply Duct Data:

Duct Heat Gain ..... 0 %  
 Duct Leakage ..... 0 %

### Return Duct or Plenum Data:

Return Air Via ..... Ducted Return

## 3. Zone Components:

### Space Assignments:

<b>Zone 1: Zone 1</b>	
2-Chapel Assembly	x1
2-Chap. Platform/Storage	x1

### Thermostats and Zone Data:

Zone ..... All  
 Cooling T-stat: Occ. .... 75.0 °F  
 Cooling T-stat: Unocc. .... 85.0 °F  
 Heating T-stat: Occ. .... 70.0 °F  
 Heating T-stat: Unocc. .... 60.0 °F  
 T-stat Throttling Range ..... 0.10 °F  
 Diversity Factor ..... 100 %  
 Direct Exhaust Airflow ..... 0.0 CFM  
 Direct Exhaust Fan kW ..... 0.0 kW

Thermostat Schedule ..... 100% Occ. 24-7  
 Unoccupied Cooling is ..... Available

### Supply Terminals Data:

Zone ..... All  
 Terminal Type ..... Diffuser  
 Minimum Airflow ..... 0.00 CFM/person

## Chapel Input Data

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/08/2011  
 10:16AM

**Zone Heating Units:**

Zone ..... All  
 Zone Heating Unit Type ..... None  
  
 Zone Unit Heat Source ..... Hot Water  
 Zone Heating Unit Schedule ..... JFMAMJJASOND

**4. Sizing Data (Computer-Generated):**

**System Sizing Data:**

Cooling Supply Temperature ..... 55.0 °F  
 Supply Fan Airflow ..... 16979.1 CFM  
 Ventilation Airflow ..... 1918.3 CFM  
 Heating Supply Temperature ..... 95.0 °F

**Hydronic Sizing Specifications:**

Chilled Water Delta-T ..... 12.0 °F  
 Hot Water Delta-T ..... 20.0 °F

**Safety Factors:**

Cooling Sensible ..... 0 %  
 Cooling Latent ..... 0 %  
 Heating ..... 0 %

**Zone Sizing Data:**

Zone Airflow Sizing Method ..... Sum of space airflow rates  
 Space Airflow Sizing Method ..... Individual peak space loads

Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coll (MBH)	- (CFM)
1	16979.1	-	-	

**5. Equipment Data**

No Equipment Data required for this system.

# N4 Core/Main Corr. Input Data

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/08/2011  
 10:16AM

## 1. General Details:

Air System Name ..... **N4 Core/Main Corr.**  
 Equipment Type ..... **Chilled Water AHU**  
 Air System Type ..... **VAV**  
 Number of zones ..... **4**

## 2. System Components:

### Ventilation Air Data:

Airflow Control ..... **Constant Ventilation Airflow**  
 Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Unocc. Damper Position ..... **Closed**  
 Damper Leak Rate ..... **0** %  
 Outdoor Air CO2 Level ..... **400** ppm

### Economizer Data:

Control ..... **Non-integrated dry-bulb control**  
 Upper Cutoff ..... **55.0** °F  
 Lower Cutoff ..... **50.0** °F

### Preheat Coil Data:

Setpoint ..... **60.0** °F  
 Heating Source ..... **Hot Water**  
 Schedule ..... **JFMAMJJASOND**  
 Coil position ..... **Downstream of Mixing Point**

### Central Cooling Data:

Supply Air Temperature ..... **55.0** °F  
 Coil Bypass Factor ..... **0.100**  
 Cooling Source ..... **Chilled Water**  
 Schedule ..... **JFMAMJJASOND**  
 Capacity Control ..... **Constant Temperature - Fan On**

### Supply Fan Data:

Fan Type ..... **BI/AF with Variable Frequency Drive**  
 Configuration ..... **Draw-thru**  
 Fan Performance ..... **3.00** in wg  
 Overall Efficiency ..... **43** %

<b>% Airflow</b>	100	90	80	70	60	50
<b>% kW</b>	100	77	57	42	30	21

<b>% Airflow</b>	40	30	20	10	0
<b>% kW</b>	15	13	10	7	5

### Duct System Data:

#### Supply Duct Data:

Duct Heat Gain ..... **0** %  
 Duct Leakage ..... **0** %

#### Return Duct or Plenum Data:

Return Air Via ..... **Ducted Return**

### Return Fan Data:

Fan Type ..... **Forward Curved with Variable Frequency Drive**  
 Fan Performance ..... **2.00** in wg  
 Overall Efficiency ..... **48** %

<b>% Airflow</b>	100	90	80	70	60	50
<b>% kW</b>	100	77	60	44	35	25

<b>% Airflow</b>	40	30	20	10	0
<b>% kW</b>	19	13	9	7	6

## 3. Zone Components:

### Space Assignments:

<b>Zone 1: Zone 1</b>	
4-Main Corr/Lobby	x1

## N4 Core/Main Corr. Input Data

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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4-N Corridor	x1
4-N Wing 1	x1
4-N Wing 2	x1
4-E. Toilet/Stair 3	x1
4-Stair 2	x1
4-W. Toilet/Stair 1	x1
<b>Zone 2: Zone 2</b>	
3-Main Corr/Lobby	x1
3-E. Toilet/Stair 3	x1
3-Stair 2	x1
3-W. Toilet/Stair 1	x1
<b>Zone 3: Zone 3</b>	
2-Main Corr/Lobby	x1
2-E. Toilet/Stair 3	x1
2-Stair 2	x1
2-W. Toilet/Stair 1	x1
<b>Zone 4: Zone 4</b>	
1-Main Corr/Lobby	x1
1-Lounge/Corridor	x1
1-E. Toilet/Stair 3	x1
1-Stair 2	x1
1-W. Toilet/Vest/Stair1	x1

### Thermostats and Zone Data:

Zone ..... **All**  
 Cooling T-stat: Occ. .... **75.0** °F  
 Cooling T-stat: Unocc. .... **85.0** °F  
 Heating T-stat: Occ. .... **70.0** °F  
 Heating T-stat: Unocc. .... **60.0** °F  
 T-stat Throttling Range ..... **0.10** °F  
 Diversity Factor ..... **100** %  
 Direct Exhaust Airflow ..... **0.0** CFM  
 Direct Exhaust Fan kW ..... **0.0** kW  
  
 Thermostat Schedule ..... **100% Occ. 24-7**  
 Unoccupied Cooling is ..... **Available**

### Supply Terminals Data:

Zone ..... **All**  
 Terminal Type ..... **VAV box with RH**  
 Minimum Airflow ..... **40** % of supply air  
  
 Reheat Coil Source ..... **Hot Water**  
 Reheat Coil Schedule ..... **JFMAMJJASOND**

### Zone Heating Units:

Zone ..... **All**  
 Zone Heating Unit Type ..... **None**  
  
 Zone Unit Heat Source ..... **Hot Water**  
 Zone Heating Unit Schedule ..... **JFMAMJJASOND**

### 4. Sizing Data (Computer-Generated):

#### System Sizing Data:

Cooling Supply Temperature ..... **55.0** °F  
 Supply Fan Airflow ..... **10536.5** CFM  
 Ventilation Airflow ..... **1154.7** CFM

#### Hydronic Sizing Specifications:

Chilled Water Delta-T ..... **12.0** °F  
 Hot Water Delta-T ..... **20.0** °F

#### Safety Factors:

Cooling Sensible ..... **0** %  
 Cooling Latent ..... **0** %  
 Heating ..... **0** %

#### Zone Sizing Data:

## N4 Core/Main Corr. Input Data

Project Name: ShipU. Old Main HVAC Study  
Prepared by: Century Engineering

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Zone Airflow Sizing Method ..... **Sum of space airflow rates**  
Space Airflow Sizing Method ..... **Individual peak space loads**

Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coil (MBH)	-
1	4537.9	-	192.0	-
2	1859.2	-	89.6	-
3	2002.6	-	108.5	
4	2136.8	-	111.9	

### 5. Equipment Data

No Equipment Data required for this system.

## NE Core Input Data

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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### 1. General Details:

Air System Name ..... **NE Core**  
 Equipment Type ..... **Chilled Water AHU**  
 Air System Type ..... **VAV**  
 Number of zones ..... **4**

### 2. System Components:

#### Ventilation Air Data:

Airflow Control ..... **Constant Ventilation Airflow**  
 Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Unocc. Damper Position ..... **Closed**  
 Damper Leak Rate ..... **0** %  
 Outdoor Air CO2 Level ..... **400** ppm

#### Economizer Data:

Control ..... **Non-integrated dry-bulb control**  
 Upper Cutoff ..... **55.0** °F  
 Lower Cutoff ..... **50.0** °F

#### Preheat Coil Data:

Setpoint ..... **60.0** °F  
 Heating Source ..... **Hot Water**  
 Schedule ..... **JFMAMJJASND**  
 Coil position ..... **Downstream of Mixing Point**

#### Central Cooling Data:

Supply Air Temperature ..... **55.0** °F  
 Coil Bypass Factor ..... **0.100**  
 Cooling Source ..... **Chilled Water**  
 Schedule ..... **JFMAMJJASND**  
 Capacity Control ..... **Constant Temperature - Fan On**

#### Supply Fan Data:

Fan Type ..... **BI/AF with Variable Frequency Drive**  
 Configuration ..... **Draw-thru**  
 Fan Performance ..... **3.00** in wg  
 Overall Efficiency ..... **43** %

<b>% Airflow</b>	100	90	80	70	60	50
<b>% kW</b>	100	77	57	42	30	21

<b>% Airflow</b>	40	30	20	10	0
<b>% kW</b>	15	13	10	7	5

#### Duct System Data:

##### Supply Duct Data:

Duct Heat Gain ..... **0** %  
 Duct Leakage ..... **0** %

##### Return Duct or Plenum Data:

Return Air Via ..... **Ducted Return**

#### Return Fan Data:

Fan Type ..... **Forward Curved with Variable Frequency Drive**  
 Fan Performance ..... **2.00** in wg  
 Overall Efficiency ..... **48** %

<b>% Airflow</b>	100	90	80	70	60	50
<b>% kW</b>	100	77	60	44	35	25

<b>% Airflow</b>	40	30	20	10	0
<b>% kW</b>	19	13	9	7	6

### 3. Zone Components:

#### Space Assignments:

<b>Zone 1: Zone 1</b>	
4-NE Corridor	x1

## NE Core Input Data

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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4-NE Wing 1	x1
4-NE Wing 2	x1
<b>Zone 2: Zone 2</b>	
3-NE Corridor	x1
3-NE Wing 1	x1
3-NE Wing 2	x1
3-NE Wing 3	x1
<b>Zone 3: Zone 3</b>	
2-NE Corridor	x1
2-NE Wing 1	x1
2-NE Wing 2	x1
2-NE Wing 3	x1
<b>Zone 4: Zone 4</b>	
1-NE Corridor	x1
1-NE Wing 1	x1
1-NE Wing 2	x1
1-NE Wing 3	x1

**Thermostats and Zone Data:**

Zone ..... All  
 Cooling T-stat: Occ. .... 75.0 °F  
 Cooling T-stat: Unocc. .... 85.0 °F  
 Heating T-stat: Occ. .... 70.0 °F  
 Heating T-stat: Unocc. .... 60.0 °F  
 T-stat Throttling Range ..... 0.10 °F  
 Diversity Factor ..... 100 %  
 Direct Exhaust Airflow ..... 0.0 CFM  
 Direct Exhaust Fan kW ..... 0.0 kW

Thermostat Schedule ..... 100% Occ. 24-7  
 Unoccupied Cooling is ..... Available

**Supply Terminals Data:**

Zone ..... All  
 Terminal Type ..... VAV box with RH  
 Minimum Airflow ..... 40 % of supply air

Reheat Coil Source ..... Hot Water  
 Reheat Coil Schedule ..... JFMAMJJASOND

**Zone Heating Units:**

Zone ..... All  
 Zone Heating Unit Type ..... None

Zone Unit Heat Source ..... Hot Water  
 Zone Heating Unit Schedule ..... JFMAMJJASOND

**4. Sizing Data (Computer-Generated):**

**System Sizing Data:**

Cooling Supply Temperature ..... 55.0 °F  
 Supply Fan Airflow ..... 10334.2 CFM  
 Ventilation Airflow ..... 716.0 CFM

**Hydronic Sizing Specifications:**

Chilled Water Delta-T ..... 12.0 °F  
 Hot Water Delta-T ..... 20.0 °F

**Safety Factors:**

Cooling Sensible ..... 0 %  
 Cooling Latent ..... 0 %  
 Heating ..... 0 %

**Zone Sizing Data:**

Zone Airflow Sizing Method ..... Sum of space airflow rates  
 Space Airflow Sizing Method ..... Individual peak space loads

Zone	Supply Airflow	Zone Htg Unit	Reheat Coil	-
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## NE Core Input Data

Project Name: ShipU. Old Main HVAC Study  
Prepared by: Century Engineering

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	(CFM)	(MBH)	(MBH)	-
1	1681.2	-	60.3	-
2	2416.3	-	87.9	-
3	3301.7	-	113.2	
4	2935.0	-	100.3	

### 5. Equipment Data

No Equipment Data required for this system.



## NW Core Input Data

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/08/2011  
 10:16AM

### 1. General Details:

Air System Name ..... **NW Core**  
 Equipment Type ..... **Chilled Water AHU**  
 Air System Type ..... **VAV**  
 Number of zones ..... **4**

### 2. System Components:

#### Ventilation Air Data:

Airflow Control ..... **Constant Ventilation Airflow**  
 Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Unocc. Damper Position ..... **Closed**  
 Damper Leak Rate ..... **0** %  
 Outdoor Air CO2 Level ..... **400** ppm

#### Economizer Data:

Control ..... **Non-integrated dry-bulb control**  
 Upper Cutoff ..... **55.0** °F  
 Lower Cutoff ..... **50.0** °F

#### Preheat Coil Data:

Setpoint ..... **60.0** °F  
 Heating Source ..... **Hot Water**  
 Schedule ..... **JFMAMJJASOND**  
 Coil position ..... **Downstream of Mixing Point**

#### Central Cooling Data:

Supply Air Temperature ..... **55.0** °F  
 Coil Bypass Factor ..... **0.100**  
 Cooling Source ..... **Chilled Water**  
 Schedule ..... **JFMAMJJASOND**  
 Capacity Control ..... **Constant Temperature - Fan On**

#### Supply Fan Data:

Fan Type ..... **BI/AF with Variable Frequency Drive**  
 Configuration ..... **Draw-thru**  
 Fan Performance ..... **3.00** in wg  
 Overall Efficiency ..... **43** %

<b>% Airflow</b>	100	90	80	70	60	50
<b>% kW</b>	100	77	57	42	30	21

<b>% Airflow</b>	40	30	20	10	0
<b>% kW</b>	15	13	10	7	5

#### Duct System Data:

##### Supply Duct Data:

Duct Heat Gain ..... **0** %  
 Duct Leakage ..... **0** %

##### Return Duct or Plenum Data:

Return Air Via ..... **Ducted Return**

#### Return Fan Data:

Fan Type ..... **Forward Curved with Variable Frequency Drive**  
 Fan Performance ..... **2.00** in wg  
 Overall Efficiency ..... **48** %

<b>% Airflow</b>	100	90	80	70	60	50
<b>% kW</b>	100	77	60	44	35	25

<b>% Airflow</b>	40	30	20	10	0
<b>% kW</b>	19	13	9	7	6

### 3. Zone Components:

#### Space Assignments:

<b>Zone 1: Zone 1</b>	
4-NW Corridor	x1

## NW Core Input Data

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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4-NW Wing 1	x1
4-NW Wing 2	x1
<b>Zone 2: Zone 2</b>	
3-NW Corridor	x1
3-NW Wing 1	x1
3-NW Wing 2	x1
3-NW Wing 3	x1
<b>Zone 3: Zone 3</b>	
2-NW Corridor	x1
2-NW Wing 1	x1
2-NW Wing 2	x1
2-NW Wing 3	x1
<b>Zone 4: Zone 4</b>	
1-NW Corridor	x1
1-NW Wing 1	x1
1-NW Wing 2	x1
1-NW Wing 3	x1
1-NW Wing 4	x1

### Thermostats and Zone Data:

Zone ..... **All**  
 Cooling T-stat: Occ. .... **75.0** °F  
 Cooling T-stat: Unocc. .... **85.0** °F  
 Heating T-stat: Occ. .... **70.0** °F  
 Heating T-stat: Unocc. .... **60.0** °F  
 T-stat Throttling Range ..... **0.10** °F  
 Diversity Factor ..... **100** %  
 Direct Exhaust Airflow ..... **0.0** CFM  
 Direct Exhaust Fan kW ..... **0.0** kW  
  
 Thermostat Schedule ..... **100% Occ. 24-7**  
 Unoccupied Cooling is ..... **Available**

### Supply Terminals Data:

Zone ..... **All**  
 Terminal Type ..... **VAV box with RH**  
 Minimum Airflow ..... **40** % of supply air  
  
 Reheat Coil Source ..... **Hot Water**  
 Reheat Coil Schedule ..... **JFMAMJJASOND**

### Zone Heating Units:

Zone ..... **All**  
 Zone Heating Unit Type ..... **None**  
  
 Zone Unit Heat Source ..... **Hot Water**  
 Zone Heating Unit Schedule ..... **JFMAMJJASOND**

### 4. Sizing Data (Computer-Generated):

#### System Sizing Data:

Cooling Supply Temperature ..... **55.0** °F  
 Supply Fan Airflow ..... **12001.7** CFM  
 Ventilation Airflow ..... **871.9** CFM

#### Hydronic Sizing Specifications:

Chilled Water Delta-T ..... **12.0** °F  
 Hot Water Delta-T ..... **20.0** °F

#### Safety Factors:

Cooling Sensible ..... **0** %  
 Cooling Latent ..... **0** %  
 Heating ..... **0** %

#### Zone Sizing Data:

Zone Airflow Sizing Method ..... **Sum of space airflow rates**  
 Space Airflow Sizing Method' ..... **Individual peak space loads**

## NW Core Input Data

Project Name: ShipU. Old Main HVAC Study  
Prepared by: Century Engineering

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Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coil (MBH)	-
1	1897.0	-	66.1	-
2	2655.2	-	95.3	-
3	3549.0	-	119.8	-
4	3900.5	-	130.7	-

### 5. Equipment Data

No Equipment Data required for this system.

## SE Core Input Data

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/08/2011  
 10:16AM

### 1. General Details:

Air System Name ..... **SE Core**  
 Equipment Type ..... **Chilled Water AHU**  
 Air System Type ..... **VAV**  
 Number of zones ..... **4**

### 2. System Components:

#### Ventilation Air Data:

Airflow Control ..... **Constant Ventilation Airflow**  
 Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Unocc. Damper Position ..... **Closed**  
 Damper Leak Rate ..... **0** %  
 Outdoor Air CO2 Level ..... **400** ppm

#### Economizer Data:

Control ..... **Non-integrated dry-bulb control**  
 Upper Cutoff ..... **55.0** °F  
 Lower Cutoff ..... **50.0** °F

#### Preheat Coil Data:

Setpoint ..... **60.0** °F  
 Heating Source ..... **Hot Water**  
 Schedule ..... **JFMAMJJASOND**  
 Coil position ..... **Downstream of Mixing Point**

#### Central Cooling Data:

Supply Air Temperature ..... **55.0** °F  
 Coil Bypass Factor ..... **0.100**  
 Cooling Source ..... **Chilled Water**  
 Schedule ..... **JFMAMJJASOND**  
 Capacity Control ..... **Constant Temperature - Fan On**

#### Supply Fan Data:

Fan Type ..... **BI/AF with Variable Frequency Drive**  
 Configuration ..... **Draw-thru**  
 Fan Performance ..... **3.00** in wg  
 Overall Efficiency ..... **43** %

<b>% Airflow</b>	100	90	80	70	60	50
<b>% kW</b>	100	77	57	42	30	21

<b>% Airflow</b>	40	30	20	10	0
<b>% kW</b>	15	13	10	7	5

#### Duct System Data:

##### Supply Duct Data:

Duct Heat Gain ..... **0** %  
 Duct Leakage ..... **0** %

##### Return Duct or Plenum Data:

Return Air Via ..... **Ducted Return**

#### Return Fan Data:

Fan Type ..... **Forward Curved with Variable Frequency Drive**  
 Fan Performance ..... **2.00** in wg  
 Overall Efficiency ..... **48** %

<b>% Airflow</b>	100	90	80	70	60	50
<b>% kW</b>	100	77	60	44	35	25

<b>% Airflow</b>	40	30	20	10	0
<b>% kW</b>	19	13	9	7	6

### 3. Zone Components:

#### Space Assignments:

<b>Zone 1: Zone 1</b>	
4-SE Corridor	x1

## SE Core Input Data

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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4-SE Wing 1	x1
4-SE Wing 2	x1
4-SE Wing 3	x1
<b>Zone 2: Zone 2</b>	
3-SE Corridor	x1
3-SE Wing 1	x1
3-SE Wing 2	x1
3-SE Wing 3	x1
<b>Zone 3: Zone 3</b>	
2-SE Corridor	x1
2-SE Wing 1	x1
2-SE Wing 2	x1
2-SE Wing 3	x1
<b>Zone 4: Zone 4</b>	
1-SE Corridor	x1
1-SE Wing 1	x1
1-SE Wing 2	x1
1-SE Wing 3	x1

### Thermostats and Zone Data:

Zone ..... **All**  
 Cooling T-stat: Occ. .... **75.0** °F  
 Cooling T-stat: Unocc. .... **85.0** °F  
 Heating T-stat: Occ. .... **70.0** °F  
 Heating T-stat: Unocc. .... **60.0** °F  
 T-stat Throttling Range ..... **0.10** °F  
 Diversity Factor ..... **100** %  
 Direct Exhaust Airflow ..... **0.0** CFM  
 Direct Exhaust Fan kW ..... **0.0** kW  
  
 Thermostat Schedule ..... **100% Occ. 24-7**  
 Unoccupied Cooling is ..... **Available**

### Supply Terminals Data:

Zone ..... **All**  
 Terminal Type ..... **VAV box with RH**  
 Minimum Airflow ..... **40** % of supply air  
  
 Reheat Coil Source ..... **Hot Water**  
 Reheat Coil Schedule ..... **JFMAMJJASOND**

### Zone Heating Units:

Zone ..... **All**  
 Zone Heating Unit Type ..... **None**  
  
 Zone Unit Heat Source ..... **Hot Water**  
 Zone Heating Unit Schedule ..... **JFMAMJJASOND**

### 4. Sizing Data (Computer-Generated):

#### System Sizing Data:

Cooling Supply Temperature ..... **55.0** °F  
 Supply Fan Airflow ..... **14243.3** CFM  
 Ventilation Airflow ..... **985.2** CFM

#### Hydronic Sizing Specifications:

Chilled Water Delta-T ..... **12.0** °F  
 Hot Water Delta-T ..... **20.0** °F

#### Safety Factors:

Cooling Sensible ..... **0** %  
 Cooling Latent ..... **0** %  
 Heating ..... **0** %

#### Zone Sizing Data:

Zone Airflow Sizing Method ..... **Sum of space airflow rates**  
 Space Airflow Sizing Method ..... **Individual peak space loads**

## SE Core Input Data

Project Name: ShipU. Old Main HVAC Study  
Prepared by: Century Engineering

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Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coll (MBH)	-
1	3342.0	-	108.1	-
2	3262.2	-	109.4	-
3	3903.3	-	127.4	-
4	3735.9	-	119.8	-

### 5. Equipment Data

No Equipment Data required for this system.

## Staff Office Bldg. Input Data

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/08/2011  
 10:16AM

### 1. General Details:

Air System Name ..... **Staff Office Bldg.**  
 Equipment Type ..... **Chilled Water AHU**  
 Air System Type ..... **Single Zone CAV**  
 Number of zones ..... **1**

### 2. System Components:

#### Ventilation Air Data:

Airflow Control ..... **Constant Ventilation Airflow**  
 Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Unocc. Damper Position ..... **Closed**  
 Damper Leak Rate ..... **0** %  
 Outdoor Air CO2 Level ..... **400** ppm

#### Economizer Data:

Control ..... **Non-integrated dry-bulb control**  
 Upper Cutoff ..... **55.0** °F  
 Lower Cutoff ..... **50.0** °F

#### Central Cooling Data:

Supply Air Temperature ..... **55.0** °F  
 Coil Bypass Factor ..... **0.100**  
 Cooling Source ..... **Chilled Water**  
 Schedule ..... **JFMAMJJASOND**  
 Capacity Control ..... **Cycled or Staged Capacity - Fan On**

#### Central Heating Data:

Supply Temperature ..... **95.0** °F  
 Heating Source ..... **Hot Water**  
 Schedule ..... **JFMAMJJASOND**  
 Capacity Control ..... **Cycled or Staged Capacity - Fan On**

#### Supply Fan Data:

Fan Type ..... **Backward Inclined or Airfoil (BI/AF)**  
 Configuration ..... **Draw-thru**  
 Fan Performance ..... **2.00** in wg  
 Overall Efficiency ..... **54** %

#### Duct System Data:

##### Supply Duct Data:

Duct Heat Gain ..... **0** %  
 Duct Leakage ..... **0** %

##### Return Duct or Plenum Data:

Return Air Via ..... **Ducted Return**

### 3. Zone Components:

#### Space Assignments:

<b>Zone 1: Zone 1</b>	
Inst. Research Bldg.	x1

#### Thermostats and Zone Data:

Zone ..... **All**  
 Cooling T-stat: Occ. .... **75.0** °F  
 Cooling T-stat: Unocc. .... **85.0** °F  
 Heating T-stat: Occ. .... **70.0** °F  
 Heating T-stat: Unocc. .... **60.0** °F  
 T-stat Throttling Range ..... **0.10** °F  
 Diversity Factor ..... **100** %  
 Direct Exhaust Airflow ..... **0.0** CFM  
 Direct Exhaust Fan kW ..... **0.0** kW  
  
 Thermostat Schedule ..... **100% Occ. 24-7**  
 Unoccupied Cooling is ..... **Available**

#### Supply Terminals Data:

Zone ..... **All**  
 Terminal Type ..... **Diffuser**  
 Minimum Airflow ..... **0.00** CFM/person

## Staff Office Bldg. Input Data

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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**Zone Heating Units:**

Zone ..... All  
 Zone Heating Unit Type ..... None  
  
 Zone Unit Heat Source ..... Hot Water  
 Zone Heating Unit Schedule ..... JFMAMJJASOND

**4. Sizing Data (Computer-Generated):**

**System Sizing Data:**

Cooling Supply Temperature ..... 55.0 °F  
 Supply Fan Airflow ..... 2594.4 CFM  
 Ventilation Airflow ..... 173.8 CFM  
 Heating Supply Temperature ..... 95.0 °F

**Hydronic Sizing Specifications:**

Chilled Water Delta-T ..... 12.0 °F  
 Hot Water Delta-T ..... 20.0 °F

**Safety Factors:**

Cooling Sensible ..... 0 %  
 Cooling Latent ..... 0 %  
 Heating ..... 0 %

**Zone Sizing Data:**

Zone Airflow Sizing Method ..... Sum of space airflow rates  
 Space Airflow Sizing Method ..... Individual peak space loads

Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coil (MBH)	- (CFM)
1	2594.4	-	-	

**5. Equipment Data**

No Equipment Data required for this system.



## SW Core Input Data

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/08/2011  
 10:16AM

### 1. General Details:

Air System Name ..... **SW Core**  
 Equipment Type ..... **Chilled Water AHU**  
 Air System Type ..... **VAV**  
 Number of zones ..... **4**

### 2. System Components:

#### Ventilation Air Data:

Airflow Control ..... **Constant Ventilation Airflow**  
 Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Unocc. Damper Position ..... **Closed**  
 Damper Leak Rate ..... **0** %  
 Outdoor Air CO2 Level ..... **400** ppm

#### Economizer Data:

Control ..... **Non-integrated dry-bulb control**  
 Upper Cutoff ..... **55.0** °F  
 Lower Cutoff ..... **50.0** °F

#### Preheat Coil Data:

Setpoint ..... **60.0** °F  
 Heating Source ..... **Hot Water**  
 Schedule ..... **JFMAMJJASOND**  
 Coil position ..... **Downstream of Mixing Point**

#### Central Cooling Data:

Supply Air Temperature ..... **55.0** °F  
 Coil Bypass Factor ..... **0.100**  
 Cooling Source ..... **Chilled Water**  
 Schedule ..... **JFMAMJJASOND**  
 Capacity Control ..... **Constant Temperature - Fan On**

#### Supply Fan Data:

Fan Type ..... **BI/AF with Variable Frequency Drive**  
 Configuration ..... **Draw-thru**  
 Fan Performance ..... **3.00** in wg  
 Overall Efficiency ..... **43** %

<b>% Airflow</b>	100	90	80	70	60	50
<b>% kW</b>	100	77	57	42	30	21

<b>% Airflow</b>	40	30	20	10	0
<b>% kW</b>	15	13	10	7	5

#### Duct System Data:

##### Supply Duct Data:

Duct Heat Gain ..... **0** %  
 Duct Leakage ..... **0** %

##### Return Duct or Plenum Data:

Return Air Via ..... **Ducted Return**

#### Return Fan Data:

Fan Type ..... **Forward Curved with Variable Frequency Drive**  
 Fan Performance ..... **2.00** in wg  
 Overall Efficiency ..... **48** %

<b>% Airflow</b>	100	90	80	70	60	50
<b>% kW</b>	100	77	60	44	35	25

<b>% Airflow</b>	40	30	20	10	0
<b>% kW</b>	19	13	9	7	6

### 3. Zone Components:

#### Space Assignments:

<b>Zone 1: Zone 1</b>	
4-SW Corridor	x1

## SW Core Input Data

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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4-SW Wing 1	x1
4-SW Wing 2	x1
4-SW Wing 3	x1
<b>Zone 2: Zone 2</b>	
3-SW Corridor	x1
3-SW Wing 1	x1
3-SW Wing 2	x1
3-SW Wing 3	x1
<b>Zone 3: Zone 3</b>	
2-SW Corridor	x1
2-SW Wing 1	x1
2-SW Wing 2	x1
2-SW Wing 3	x1
<b>Zone 4: Zone 4</b>	
1-SW Corridor	x1
1-SW Wing 1	x1
1-SW Wing 2	x1
1-SW Wing 3	x1

### Thermostats and Zone Data:

Zone ..... All  
 Cooling T-stat: Occ. .... 75.0 °F  
 Cooling T-stat: Unocc. .... 85.0 °F  
 Heating T-stat: Occ. .... 70.0 °F  
 Heating T-stat: Unocc. .... 60.0 °F  
 T-stat Throttling Range ..... 0.10 °F  
 Diversity Factor ..... 100 %  
 Direct Exhaust Airflow ..... 0.0 CFM  
 Direct Exhaust Fan kW ..... 0.0 kW

Thermostat Schedule ..... 100% Occ. 24-7  
 Unoccupied Cooling is ..... Available

### Supply Terminals Data:

Zone ..... All  
 Terminal Type ..... VAV box with RH  
 Minimum Airflow ..... 40 % of supply air

Reheat Coil Source ..... Hot Water  
 Reheat Coil Schedule ..... JFMAMJJASOND

### Zone Heating Units:

Zone ..... All  
 Zone Heating Unit Type ..... None

Zone Unit Heat Source ..... Hot Water  
 Zone Heating Unit Schedule ..... JFMAMJJASOND

### 4. Sizing Data (Computer-Generated):

#### System Sizing Data:

Cooling Supply Temperature ..... 55.0 °F  
 Supply Fan Airflow ..... 12603.0 CFM  
 Ventilation Airflow ..... 874.6 CFM

#### Hydronic Sizing Specifications:

Chilled Water Delta-T ..... 12.0 °F  
 Hot Water Delta-T ..... 20.0 °F

#### Safety Factors:

Cooling Sensible ..... 0 %  
 Cooling Latent ..... 0 %  
 Heating ..... 0 %

#### Zone Sizing Data:

Zone Airflow Sizing Method ..... Sum of space airflow rates  
 Space Airflow Sizing Method ..... Individual peak space loads

## SW Core Input Data

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Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coil (MBH)	-
1	3081.8	-	97.2	-
2	2883.7	-	96.7	-
3	3657.7	-	116.2	
4	2997.8	-	100.6	

### 5. Equipment Data

No Equipment Data required for this system.

# **Appendix B-4**

## **Air System Output Data**

## Air System Sizing Summary for 1st Floor

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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### Air System Information

Air System Name ..... <b>1st Floor</b>	Number of zones ..... <b>5</b>
Equipment Class ..... <b>CW AHU</b>	Floor Area ..... <b>16250.0</b> ft <sup>2</sup>
Air System Type ..... <b>VAV</b>	Location ..... <b>Harrisburg, Pennsylvania</b>

### Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM ..... <b>Sum of space airflow rates</b>	Calculation Months ..... <b>Jan to Dec</b>
Space CFM ..... <b>Individual peak space loads</b>	Sizing Data ..... <b>Calculated</b>

### Central Cooling Coil Sizing Data

Total coil load ..... <b>40.2</b> Tons	Load occurs at ..... <b>Jul 1600</b>
Total coil load ..... <b>482.6</b> MBH	OA DB / WB ..... <b>91.4 / 73.8</b> °F
Sensible coil load ..... <b>403.1</b> MBH	Entering DB / WB ..... <b>77.8 / 62.8</b> °F
Coil CFM at Jul 1600 ..... <b>14926</b> CFM	Leaving DB / WB ..... <b>52.5 / 51.2</b> °F
Max block CFM at Jul 1600 ..... <b>15505</b> CFM	Coil ADP ..... <b>49.7</b> °F
Sum of peak zone CFM ..... <b>15706</b> CFM	Bypass Factor ..... <b>0.100</b>
Sensible heat ratio ..... <b>0.835</b>	Resulting RH ..... <b>45</b> %
ft <sup>2</sup> /Ton ..... <b>404.1</b>	Design supply temp. .... <b>55.0</b> °F
BTU/(hr-ft <sup>2</sup> ) ..... <b>29.7</b>	Zone T-stat Check ..... <b>5 of 5</b> OK
Water flow @ 12.0 °F rise ..... <b>80.48</b> gpm	Max zone temperature deviation ..... <b>0.0</b> °F

### Preheat Coil Sizing Data

Max coil load ..... <b>40.2</b> MBH	Load occurs at ..... <b>Nov 0000</b>
Coil CFM at Nov 0000 ..... <b>6282</b> CFM	Ent. DB / Lvg DB ..... <b>54.0 / 60.0</b> °F
Max coil CFM ..... <b>15505</b> CFM	
Water flow @ 20.0 °F drop ..... <b>4.02</b> gpm	

### Supply Fan Sizing Data

Actual max CFM at Jul 1600 ..... <b>15505</b> CFM	Fan motor BHP ..... <b>17.02</b> BHP
Standard CFM ..... <b>15333</b> CFM	Fan motor kW ..... <b>12.69</b> kW
Actual max CFM/ft <sup>2</sup> ..... <b>0.95</b> CFM/ft <sup>2</sup>	Fan static ..... <b>3.00</b> in wg

### Return Fan Sizing Data

Actual max CFM at Jul 1600 ..... <b>15505</b> CFM	Fan motor BHP ..... <b>10.16</b> BHP
Standard CFM ..... <b>15333</b> CFM	Fan motor kW ..... <b>7.58</b> kW
Actual max CFM/ft <sup>2</sup> ..... <b>0.95</b> CFM/ft <sup>2</sup>	Fan static ..... <b>2.00</b> in wg

### Outdoor Ventilation Air Data

Design airflow CFM ..... <b>1233</b> CFM	CFM/person ..... <b>23.91</b> CFM/person
CFM/ft <sup>2</sup> ..... <b>0.08</b> CFM/ft <sup>2</sup>	

## Zone Sizing Summary for 1st Floor

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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 01:29PM

### Air System Information

Air System Name ..... 1st Floor  
 Equipment Class ..... CW AHU  
 Air System Type ..... VAV

Number of zones ..... 5  
 Floor Area ..... 16250.0 ft<sup>2</sup>  
 Location ..... Harrisburg, Pennsylvania

### Sizing Calculation Information

#### Zone and Space Sizing Method:

Zone CFM ..... Sum of space airflow rates  
 Space CFM ..... Individual peak space loads

Calculation Months ..... Jan to Dec  
 Sizing Data ..... Calculated

### Zone Sizing Data

Zone Name	Maximum Cooling Sensible (MBH)	Design Air Flow (CFM)	Minimum Air Flow (CFM)	Time of Peak Load	Maximum Heating Load (MBH)	Zone Floor Area (ft <sup>2</sup> )	Zone CFM/ft <sup>2</sup>
Zone 1	44.6	2137	855	Jul 1600	98.2	4610.0	0.46
Zone 2	82.5	3901	1560	Jul 1600	105.7	3675.0	1.06
Zone 3	61.6	2998	1199	Aug 1500	81.3	2640.0	1.14
Zone 4	61.9	2935	1174	Jul 1600	81.5	2440.0	1.20
Zone 5	75.2	3736	1494	Aug 1500	95.8	2885.0	1.29

### Zone Terminal Sizing Data

Zone Name	Reheat Coil Load (MBH)	Reheat Coil Water gpm @ 20.0 °F	Zone Htg Coil Load (MBH)	Zone Htg Water gpm @ 20.0 °F	Mixing Box Fan Airflow (CFM)
Zone 1	111.9	11.19	0.0	0.00	0
Zone 2	130.7	13.08	0.0	0.00	0
Zone 3	100.6	10.06	0.0	0.00	0
Zone 4	100.3	10.04	0.0	0.00	0
Zone 5	119.8	11.98	0.0	0.00	0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft <sup>2</sup> )	Space CFM/ft <sup>2</sup>
<b>Zone 1</b>							
1-Main Corr/Lobby	1	9.1	Jul 1500	427	30.0	2255.0	0.19
1-Lounge/Corridor	1	14.6	Jul 0900	681	25.5	905.0	0.75
1-Stair 2	1	3.7	Aug 1900	172	12.2	270.0	0.64
1-W. Toilet/Vest/Stair1	1	11.6	Jul 1700	545	17.3	680.0	0.80
1-E. Toilet/Stair 3	1	6.7	Jul 1400	312	13.3	500.0	0.62
<b>Zone 2</b>							
1-NW Corridor	1	1.6	Jul 1500	75	5.7	335.0	0.22
1-NW Wing 1	1	26.5	Jul 1700	1239	28.3	730.0	1.70
1-NW Wing 2	1	19.7	Jul 0900	920	25.1	715.0	1.29
1-NW Wing 3	1	13.1	Jul 1500	614	21.4	665.0	0.92
1-NW Wing 4	1	22.5	Jul 1700	1053	25.2	1230.0	0.86
<b>Zone 3</b>							
1-SW Corridor	1	2.7	Sep 1400	126	6.0	310.0	0.41
1-SW Wing 1	1	23.0	Jul 1700	1076	24.5	630.0	1.71
1-SW Wing 2	1	18.6	Aug 1400	871	24.8	850.0	1.03
1-SW Wing 3	1	19.7	Sep 1400	924	25.9	850.0	1.09
<b>Zone 4</b>							
1-NE Corridor	1	1.6	Jul 1500	76	5.8	335.0	0.23
1-NE Wing 1	1	18.9	Jul 0900	887	24.5	630.0	1.41
1-NE Wing 2	1	29.6	Jul 1700	1388	30.6	865.0	1.60
1-NE Wing 3	1	12.5	Jul 1500	585	20.6	610.0	0.96

## Zone Sizing Summary for 1st Floor

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft <sup>2</sup> )	Space CFM/ft <sup>2</sup>
<b>Zone 5</b>							
1-SE Corridor	1	7.3	Sep 1300	343	9.2	350.0	0.98
1-SE Wing 1	1	24.5	Jul 1400	1146	31.3	850.0	1.35
1-SE Wing 2	1	26.7	Jul 1700	1250	28.2	850.0	1.47
1-SE Wing 3	1	21.3	Sep 1400	997	27.1	835.0	1.19

# Ventilation Sizing Summary for 1st Floor

Project Name: ShipU, Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
01:29PM

## 1. Summary

Ventilation Sizing Method ..... Sum of Space OA Airflows  
 Design Ventilation Airflow Rate ..... 1233 CFM

## 2. Space Ventilation Analysis Table

Zone Name / Space Name	Mult.	Floor Area (ft²)	Maximum Occupants	Maximum Supply Air (CFM)	Required Outdoor Air (CFM/person)	Required Outdoor Air (CFM/ft²)	Required Outdoor Air (CFM)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (CFM)
<b>Zone 1</b>									
1-Main Corr/Lobby	1	2255.0	0.0	426.7	0.00	0.06	0.0	0.0	135.3
1-Lounge/Corridor	1	905.0	0.0	681.2	0.00	0.06	0.0	0.0	54.3
1-Stair 2	1	270.0	0.0	172.0	0.00	0.06	0.0	0.0	16.2
1-W. Toilet/Vest/Stair1	1	680.0	0.0	544.5	0.00	0.06	0.0	0.0	40.8
1-E. Toilet/Stair 3	1	500.0	0.0	312.5	0.00	0.06	0.0	0.0	30.0
<b>Zone 2</b>									
1-NW Corridor	1	335.0	0.0	74.5	0.00	0.06	0.0	0.0	20.1
1-NW Wing 1	1	730.0	3.7	1239.1	5.00	0.06	0.0	0.0	62.1
1-NW Wing 2	1	715.0	3.6	920.4	5.00	0.06	0.0	0.0	60.8
1-NW Wing 3	1	665.0	3.3	613.7	5.00	0.06	0.0	0.0	56.5
1-NW Wing 4	1	1230.0	6.2	1062.8	5.00	0.06	0.0	0.0	104.6
<b>Zone 3</b>									
1-SW Corridor	1	310.0	0.0	126.2	0.00	0.06	0.0	0.0	18.6
1-SW Wing 1	1	630.0	3.2	1076.3	5.00	0.06	0.0	0.0	53.6
1-SW Wing 2	1	850.0	4.3	871.5	5.00	0.06	0.0	0.0	72.3
1-SW Wing 3	1	850.0	4.3	923.9	5.00	0.06	0.0	0.0	72.3
<b>Zone 4</b>									
1-NE Corridor	1	335.0	0.0	75.9	0.00	0.06	0.0	0.0	20.1
1-NE Wing 1	1	630.0	3.2	886.8	5.00	0.06	0.0	0.0	53.6
1-NE Wing 2	1	865.0	4.3	1387.6	5.00	0.06	0.0	0.0	73.5
1-NE Wing 3	1	610.0	3.1	584.7	5.00	0.06	0.0	0.0	51.9
<b>Zone 5</b>									
1-SE Corridor	1	350.0	0.0	342.6	0.00	0.06	0.0	0.0	21.0
1-SE Wing 1	1	850.0	4.3	1146.3	5.00	0.06	0.0	0.0	72.3
1-SE Wing 2	1	850.0	4.3	1249.8	5.00	0.06	0.0	0.0	72.3
1-SE Wing 3	1	835.0	4.2	997.3	5.00	0.06	0.0	0.0	71.0
<b>Totals (incl. Space Multipliers)</b>				<b>15706.1</b>					<b>1232.8</b>



## Air System Design Load Summary for 1st Floor

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 91.4 °F / 73.8 °F			HEATING OA DB / WB 9.0 °F / 6.7 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	2716 ft²	123334	-	2716 ft²	-	-
Wall Transmission	4955 ft²	22245	-	4955 ft²	74965	-
Roof Transmission	0 ft²	0	-	0 ft²	0	-
Window Transmission	2716 ft²	35606	-	2716 ft²	162675	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	252 ft²	1009	-	252 ft²	4612	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	0 ft²	0	-	0 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	14765 W	50373	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	15465 W	52765	-	0	0	-
People	52	12629	10568	0	0	0
Infiltration	-	23748	36063	-	220340	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
<b>&gt;&gt; Total Zone Loads</b>	-	<b>321709</b>	<b>46630</b>	-	<b>462592</b>	<b>0</b>
Zone Conditioning	-	320302	46630	-	462035	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	14926 CFM	23643	-	6282 CFM	-4994	-
Ventilation Load	1233 CFM	19566	32862	1233 CFM	81162	0
Supply Fan Load	14926 CFM	39588	-	6282 CFM	-6630	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
<b>&gt;&gt; Total System Loads</b>	-	<b>403099</b>	<b>79492</b>	-	<b>531572</b>	<b>0</b>
Central Cooling Coil	-	403099	79501	-	-40180	0
Preheat Coil	-	0	-	-	9739	-
Terminal Reheat Coils	-	0	-	-	562013	-
<b>&gt;&gt; Total Conditioning</b>	-	<b>403099</b>	<b>79501</b>	-	<b>531572</b>	<b>0</b>
<b>Key:</b>	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

## Air System Sizing Summary for 2nd Floor

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
 01:29PM

### Air System Information

Air System Name ..... <b>2nd Floor</b>	Number of zones ..... <b>5</b>
Equipment Class ..... <b>CW AHU</b>	Floor Area ..... <b>14205.0</b> ft <sup>2</sup>
Air System Type ..... <b>VAV</b>	Location ..... <b>Harrisburg, Pennsylvania</b>

### Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM ..... <b>Sum of space airflow rates</b>	Calculation Months ..... <b>Jan to Dec</b>
Space CFM ..... <b>Individual peak space loads</b>	Sizing Data ..... <b>Calculated</b>

### Central Cooling Coil Sizing Data

Total coil load ..... <b>40.4</b> Tons	Load occurs at ..... <b>Jul 1600</b>
Total coil load ..... <b>484.5</b> MBH	OA DB / WB ..... <b>91.4 / 73.8</b> °F
Sensible coil load ..... <b>410.3</b> MBH	Entering DB / WB ..... <b>77.6 / 62.6</b> °F
Coil CFM at Jul 1600 ..... <b>15347</b> CFM	Leaving DB / WB ..... <b>52.6 / 51.2</b> °F
Max block CFM at Jul 1600 ..... <b>16145</b> CFM	Coil ADP ..... <b>49.8</b> °F
Sum of peak zone CFM ..... <b>16414</b> CFM	Bypass Factor ..... <b>0.100</b>
Sensible heat ratio ..... <b>0.847</b>	Resulting RH ..... <b>45</b> %
ft <sup>2</sup> /Ton ..... <b>351.8</b>	Design supply temp. .... <b>55.0</b> °F
BTU/(hr-ft <sup>2</sup> ) ..... <b>34.1</b>	Zone T-stat Check ..... <b>5 of 5</b> OK
Water flow @ 12.0 °F rise ..... <b>80.79</b> gpm	Max zone temperature deviation ..... <b>0.0</b> °F

### Preheat Coil Sizing Data

Max coil load ..... <b>42.0</b> MBH	Load occurs at ..... <b>Jan 1300</b>
Coil CFM at Jan 1300 ..... <b>6566</b> CFM	Ent. DB / Lvg DB ..... <b>54.0 / 60.0</b> °F
Max coil CFM ..... <b>16145</b> CFM	
Water flow @ 20.0 °F drop ..... <b>4.20</b> gpm	

### Supply Fan Sizing Data

Actual max CFM at Jul 1600 ..... <b>16145</b> CFM	Fan motor BHP ..... <b>17.72</b> BHP
Standard CFM ..... <b>15966</b> CFM	Fan motor kW ..... <b>13.21</b> kW
Actual max CFM/ft <sup>2</sup> ..... <b>1.14</b> CFM/ft <sup>2</sup>	Fan static ..... <b>3.00</b> in wg

### Return Fan Sizing Data

Actual max CFM at Jul 1600 ..... <b>16145</b> CFM	Fan motor BHP ..... <b>10.58</b> BHP
Standard CFM ..... <b>15966</b> CFM	Fan motor kW ..... <b>7.89</b> kW
Actual max CFM/ft <sup>2</sup> ..... <b>1.14</b> CFM/ft <sup>2</sup>	Fan static ..... <b>2.00</b> in wg

### Outdoor Ventilation Air Data

Design airflow CFM ..... <b>1080</b> CFM	CFM/person ..... <b>23.68</b> CFM/person
CFM/ft <sup>2</sup> ..... <b>0.08</b> CFM/ft <sup>2</sup>	

## Zone Sizing Summary for 2nd Floor

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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 01:29PM

### Air System Information

Air System Name ..... **2nd Floor**  
 Equipment Class ..... **CW AHU**  
 Air System Type ..... **VAV**

Number of zones ..... **5**  
 Floor Area ..... **14205.0** ft<sup>2</sup>  
 Location ..... **Harrisburg, Pennsylvania**

### Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM ..... **Sum of space airflow rates**  
 Space CFM ..... **Individual peak space loads**

Calculation Months ..... **Jan to Dec**  
 Sizing Data ..... **Calculated**

### Zone Sizing Data

Zone Name	Maximum Cooling Sensible (MBH)	Design Air Flow (CFM)	Minimum Air Flow (CFM)	Time of Peak Load	Maximum Heating Load (MBH)	Zone Floor Area (ft <sup>2</sup> )	Zone CFM/ft <sup>2</sup>
Zone 1	40.8	2003	801	Jul 1600	95.7	3630.0	0.55
Zone 2	74.3	3549	1420	Jul 1600	97.1	2580.0	1.38
Zone 3	73.3	3658	1463	Sep 1500	92.7	2620.0	1.40
Zone 4	68.9	3302	1321	Jul 1600	92.1	2395.0	1.38
Zone 5	76.8	3903	1561	Aug 1500	102.4	2980.0	1.31

### Zone Terminal Sizing Data

Zone Name	Reheat Coil Load (MBH)	Reheat Coil Water gpm @ 20.0 °F	Zone Htg Coil Load (MBH)	Zone Htg Water gpm @ 20.0 °F	Mixing Box Fan Airflow (CFM)
Zone 1	108.5	10.86	0.0	0.00	0
Zone 2	119.8	11.99	0.0	0.00	0
Zone 3	116.2	11.62	0.0	0.00	0
Zone 4	113.2	11.33	0.0	0.00	0
Zone 5	127.4	12.75	0.0	0.00	0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft <sup>2</sup> )	Space CFM/ft <sup>2</sup>
<b>Zone 1</b>							
2-Main Corr/Lobby	1	10.9	Jul 1500	510	43.6	2360.0	0.22
2-Stair 2	1	6.2	Sep 1400	292	14.2	270.0	1.08
2-W. Toilet/Stair 1	1	14.2	Jul 1700	665	19.0	500.0	1.33
2-E. Toilet/Stair 3	1	11.4	Jul 0900	536	19.0	500.0	1.07
<b>Zone 2</b>							
2-NW Corridor	1	4.5	Jul 1500	213	12.1	350.0	0.61
2-NW Wing 1	1	31.5	Jul 1700	1473	31.1	685.0	2.15
2-NW Wing 2	1	25.3	Jul 0900	1185	30.5	900.0	1.32
2-NW Wing 3	1	14.5	Jul 1500	678	23.5	645.0	1.05
<b>Zone 3</b>							
2-SW Corridor	1	3.8	Sep 1400	176	9.1	335.0	0.53
2-SW Wing 1	1	27.1	Jul 1700	1268	26.7	575.0	2.20
2-SW Wing 2	1	20.8	Aug 1400	975	26.7	845.0	1.15
2-SW Wing 3	1	26.5	Sep 1400	1239	30.3	865.0	1.43
<b>Zone 4</b>							
2-NE Corridor	1	4.5	Jul 1500	209	11.8	335.0	0.62
2-NE Wing 1	1	22.9	Jul 0900	1072	27.6	645.0	1.66
2-NE Wing 2	1	28.2	Jul 1700	1321	28.6	730.0	1.81
2-NE Wing 3	1	14.9	Jul 1500	699	24.0	685.0	1.02
<b>Zone 5</b>							
2-SE Corridor	1	4.1	Sep 1400	194	10.9	430.0	0.45

## Zone Sizing Summary for 2nd Floor

Project Name: ShipU. Old Main HVAC Study  
Prepared by: Century Engineering

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Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft <sup>2</sup> )	Space CFM/ft <sup>2</sup>
2-SE Wing 1	1	29.2	Jul 0900	1367	35.3	900.0	1.52
2-SE Wing 2	1	26.3	Aug 1600	1231	27.9	800.0	1.54
2-SE Wing 3	1	23.7	Sep 1400	1111	28.3	850.0	1.31

## Ventilation Sizing Summary for 2nd Floor

- 1. Summary**  
 Ventilation Sizing Method ..... Sum of Space OA Airflows  
 Design Ventilation Airflow Rate ..... 1080 CFM

**2. Space Ventilation Analysis Table**

Zone Name / Space Name	Mult.	Floor Area (ft <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (CFM)	Required Outdoor Air (CFM/person)	Required Outdoor Air (CFM/ft <sup>2</sup> )	Required Outdoor Air (CFM)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (CFM)
<b>Zone 1</b>									
2-Main Corrl/Lobby	1	2360.0	0.0	510.0	0.00	0.06	0.0	0.0	141.6
2-Stair 2	1	270.0	0.0	292.1	0.00	0.06	0.0	0.0	16.2
2-W. Toilet/Stair 1	1	500.0	0.0	664.8	0.00	0.06	0.0	0.0	30.0
2-E. Toilet/Stair 3	1	500.0	0.0	535.7	0.00	0.06	0.0	0.0	30.0
<b>Zone 2</b>									
2-NW Corridor	1	350.0	0.0	212.6	0.00	0.06	0.0	0.0	21.0
2-NW Wing 1	1	685.0	3.4	1472.7	5.00	0.06	0.0	0.0	58.2
2-NW Wing 2	1	900.0	4.5	1185.4	5.00	0.06	0.0	0.0	76.5
2-NW Wing 3	1	645.0	3.2	678.2	5.00	0.06	0.0	0.0	54.8
<b>Zone 3</b>									
2-SW Corridor	1	335.0	0.0	176.4	0.00	0.06	0.0	0.0	20.1
2-SW Wing 1	1	575.0	2.9	1267.8	5.00	0.06	0.0	0.0	48.9
2-SW Wing 2	1	845.0	4.2	974.9	5.00	0.06	0.0	0.0	71.8
2-SW Wing 3	1	865.0	4.3	1238.7	5.00	0.06	0.0	0.0	73.5
<b>Zone 4</b>									
2-NE Corridor	1	335.0	0.0	209.3	0.00	0.06	0.0	0.0	20.1
2-NE Wing 1	1	645.0	3.2	1071.6	5.00	0.06	0.0	0.0	54.8
2-NE Wing 2	1	730.0	3.7	1321.5	5.00	0.06	0.0	0.0	62.1
2-NE Wing 3	1	685.0	3.4	699.3	5.00	0.06	0.0	0.0	58.2
<b>Zone 5</b>									
2-SE Corridor	1	430.0	0.0	194.2	0.00	0.06	0.0	0.0	25.8
2-SE Wing 1	1	900.0	4.5	1367.3	5.00	0.06	0.0	0.0	76.5
2-SE Wing 2	1	800.0	4.0	1230.5	5.00	0.06	0.0	0.0	68.0
2-SE Wing 3	1	850.0	4.3	1111.2	5.00	0.06	0.0	0.0	72.3
<b>Totals (Incl. Space Multipliers)</b>				<b>16414.3</b>					<b>1080.4</b>

## Air System Design Load Summary for 2nd Floor

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 91.4 °F / 73.8 °F			HEATING OA DB / WB 9.0 °F / 6.7 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	3360 ft²	143517	-	3360 ft²	-	-
Wall Transmission	3937 ft²	17323	-	3937 ft²	59563	-
Roof Transmission	0 ft²	0	-	0 ft²	0	-
Window Transmission	3360 ft²	44052	-	3360 ft²	201261	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	63 ft²	252	-	63 ft²	1153	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	0 ft²	0	-	0 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	12935 W	44130	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	13688 W	46701	-	0	0	-
People	46	11177	9353	0	0	0
Infiltration	-	23497	35862	-	218019	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
<b>&gt;&gt; Total Zone Loads</b>	-	<b>330649</b>	<b>45216</b>	-	<b>479996</b>	<b>0</b>
Zone Conditioning	-	329285	45216	-	479411	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	15347 CFM	23869	-	6566 CFM	-5224	-
Ventilation Load	1080 CFM	17183	28946	1080 CFM	71134	0
Supply Fan Load	15347 CFM	39966	-	6566 CFM	-6944	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
<b>&gt;&gt; Total System Loads</b>	-	<b>410302</b>	<b>74162</b>	-	<b>538376</b>	<b>0</b>
Central Cooling Coil	-	410302	74168	-	-45521	0
Preheat Coil	-	0	-	-	0	-
Terminal Reheat Coils	-	0	-	-	583897	-
<b>&gt;&gt; Total Conditioning</b>	-	<b>410302</b>	<b>74168</b>	-	<b>538376</b>	<b>0</b>
<b>Key:</b>	Positive values are ckg loads Negative values are htg loads			Positive values are htg loads Negative values are ckg loads		

## Air System Sizing Summary for 3rd Floor

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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### Air System Information

Air System Name ..... <b>3rd Floor</b>	Number of zones ..... <b>5</b>
Equipment Class ..... <b>CW AHU</b>	Floor Area ..... <b>14210.0</b> ft <sup>2</sup>
Air System Type ..... <b>VAV</b>	Location ..... <b>Harrisburg, Pennsylvania</b>

### Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM ..... <b>Sum of space airflow rates</b>	Calculation Months ..... <b>Jan to Dec</b>
Space CFM ..... <b>Individual peak space loads</b>	Sizing Data ..... <b>Calculated</b>

### Central Cooling Coil Sizing Data

Total coil load ..... <b>33.6</b> Tons	Load occurs at ..... <b>Jul 1600</b>
Total coil load ..... <b>402.9</b> MBH	OA DB / WB ..... <b>91.4 / 73.8</b> °F
Sensible coil load ..... <b>333.8</b> MBH	Entering DB / WB ..... <b>77.9 / 62.9</b> °F
Coil CFM at Jul 1600 ..... <b>12331</b> CFM	Leaving DB / WB ..... <b>52.5 / 51.2</b> °F
Max block CFM at Jul 1600 ..... <b>12839</b> CFM	Coil ADP ..... <b>49.7</b> °F
Sum of peak zone CFM ..... <b>13077</b> CFM	Bypass Factor ..... <b>0.100</b>
Sensible heat ratio ..... <b>0.829</b>	Resulting RH ..... <b>45</b> %
ft <sup>3</sup> /Ton ..... <b>423.3</b>	Design supply temp. .... <b>55.0</b> °F
BTU/(hr-ft <sup>2</sup> ) ..... <b>28.4</b>	Zone T-stat Check ..... <b>5 of 5</b> OK
Water flow @ 12.0 °F rise ..... <b>67.18</b> gpm	Max zone temperature deviation ..... <b>0.0</b> °F

### Preheat Coil Sizing Data

Max coil load ..... <b>33.5</b> MBH	Load occurs at ..... <b>Jan 1300</b>
Coil CFM at Jan 1300 ..... <b>5231</b> CFM	Ent. DB / Lvg DB ..... <b>54.0 / 60.0</b> °F
Max coil CFM ..... <b>12839</b> CFM	
Water flow @ 20.0 °F drop ..... <b>3.35</b> gpm	

### Supply Fan Sizing Data

Actual max CFM at Jul 1600 ..... <b>12839</b> CFM	Fan motor BHP ..... <b>14.09</b> BHP
Standard CFM ..... <b>12697</b> CFM	Fan motor kW ..... <b>10.51</b> kW
Actual max CFM/ft <sup>2</sup> ..... <b>0.90</b> CFM/ft <sup>2</sup>	Fan static ..... <b>3.00</b> in wg

### Return Fan Sizing Data

Actual max CFM at Jul 1600 ..... <b>12839</b> CFM	Fan motor BHP ..... <b>8.42</b> BHP
Standard CFM ..... <b>12697</b> CFM	Fan motor kW ..... <b>6.28</b> kW
Actual max CFM/ft <sup>2</sup> ..... <b>0.90</b> CFM/ft <sup>2</sup>	Fan static ..... <b>2.00</b> in wg

### Outdoor Ventilation Air Data

Design airflow CFM ..... <b>1081</b> CFM	CFM/person ..... <b>23.67</b> CFM/person
CFM/ft <sup>2</sup> ..... <b>0.08</b> CFM/ft <sup>2</sup>	

## Zone Sizing Summary for 3rd Floor

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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### Air System Information

Air System Name ..... 3rd Floor  
 Equipment Class ..... CW AHU  
 Air System Type ..... VAV

Number of zones ..... 5  
 Floor Area ..... 14210.0 ft<sup>2</sup>  
 Location ..... Harrisburg, Pennsylvania

### Sizing Calculation Information

#### Zone and Space Sizing Method:

Zone CFM ..... Sum of space airflow rates  
 Space CFM ..... Individual peak space loads

Calculation Months ..... Jan to Dec  
 Sizing Data ..... Calculated

### Zone Sizing Data

Zone Name	Maximum Cooling Sensible (MBH)	Design Air Flow (CFM)	Minimum Air Flow (CFM)	Time of Peak Load	Maximum Heating Load (MBH)	Zone Floor Area (ft <sup>2</sup> )	Zone CFM/ft <sup>2</sup>
Zone 1	38.4	1859	744	Jul 1600	77.7	3705.0	0.50
Zone 2	56.1	2655	1062	Jul 1600	78.3	2495.0	1.06
Zone 3	58.6	2884	1153	Aug 1500	78.2	2655.0	1.09
Zone 4	51.1	2416	967	Jul 1600	72.5	2290.0	1.06
Zone 5	66.3	3262	1305	Aug 1500	88.5	3065.0	1.06

### Zone Terminal Sizing Data

Zone Name	Reheat Coil Load (MBH)	Reheat Coil Water gpm @ 20.0 °F	Zone Htg Coil Load (MBH)	Zone Htg Water gpm @ 20.0 °F	Mixing Box Fan Airflow (CFM)
Zone 1	89.6	8.96	0.0	0.00	0
Zone 2	95.3	9.54	0.0	0.00	0
Zone 3	96.7	9.68	0.0	0.00	0
Zone 4	87.9	8.80	0.0	0.00	0
Zone 5	109.4	10.94	0.0	0.00	0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft <sup>2</sup> )	Space CFM/ft <sup>2</sup>
<b>Zone 1</b>							
3-Main Corr/Lobby	1	13.7	Jul 1600	643	35.7	2435.0	0.26
3-Stair 2	1	5.6	Sep 1400	261	12.5	270.0	0.97
3-W. Toilet/Stair 1	1	11.3	Jul 1700	527	14.7	500.0	1.05
3-E. Toilet/Stair 3	1	9.1	Jul 0900	428	14.7	500.0	0.86
<b>Zone 2</b>							
3-NW Corridor	1	2.8	Jul 1500	130	7.5	345.0	0.38
3-NW Wing 1	1	23.7	Jul 1700	1109	26.8	750.0	1.48
3-NW Wing 2	1	18.2	Jul 1400	852	24.2	750.0	1.14
3-NW Wing 3	1	12.1	Jul 1500	565	19.9	650.0	0.87
<b>Zone 3</b>							
3-SW Corridor	1	2.2	Aug 1500	104	6.1	345.0	0.30
3-SW Wing 1	1	18.0	Jul 1700	843	21.4	595.0	1.42
3-SW Wing 2	1	15.8	Jul 1400	741	21.4	595.0	1.25
3-SW Wing 3	1	25.5	Sep 1400	1196	29.3	1120.0	1.07
<b>Zone 4</b>							
3-NE Corridor	1	1.7	Jul 1500	79	5.6	305.0	0.26
3-NE Wing 1	1	16.8	Jul 1400	787	22.7	610.0	1.29
3-NE Wing 2	1	21.1	Jul 1700	988	24.3	730.0	1.35
3-NE Wing 3	1	12.0	Jul 1500	562	19.8	645.0	0.87
<b>Zone 5</b>							
3-SE Corridor	1	2.3	Aug 1500	109	6.5	375.0	0.29



## Zone Sizing Summary for 3rd Floor

Project Name: ShipU. Old Main HVAC Study  
Prepared by: Century Engineering

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Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft <sup>2</sup> )	Space CFM/ft <sup>2</sup>
3-SE Wing 1	1	23.1	Jul 1400	1082	30.5	920.0	1.18
3-SE Wing 2	1	21.6	Aug 1600	1012	25.8	920.0	1.10
3-SE Wing 3	1	22.6	Sep 1400	1059	25.7	850.0	1.25

# Ventilation Sizing Summary for 3rd Floor

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
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## 1. Summary

Ventilation Sizing Method ..... Sum of Space OA Airflows  
 Design Ventilation Airflow Rate ..... 1081 CFM

## 2. Space Ventilation Analysis Table

Zone Name / Space Name	Mult.	Floor Area (ft <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (CFM)	Required Outdoor Air (CFM/person)	Required Outdoor Air (CFM/ft <sup>2</sup> )	Required Outdoor Air (CFM)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (CFM)
<b>Zone 1</b>									
3-Main Corr/Lobby	1	2435.0	0.0	643.0	0.00	0.06	0.0	0.0	146.1
3-Stair 2	1	270.0	0.0	261.1	0.00	0.06	0.0	0.0	16.2
3-W. Toilet/Stair 1	1	500.0	0.0	527.0	0.00	0.06	0.0	0.0	30.0
3-E. Toilet/Stair 3	1	500.0	0.0	428.2	0.00	0.06	0.0	0.0	30.0
<b>Zone 2</b>									
3-NW Corridor	1	345.0	0.0	129.5	0.00	0.06	0.0	0.0	20.7
3-NW Wing 1	1	750.0	3.8	1108.9	5.00	0.06	0.0	0.0	63.8
3-NW Wing 2	1	750.0	3.8	852.1	5.00	0.06	0.0	0.0	63.8
3-NW Wing 3	1	650.0	3.3	564.7	5.00	0.06	0.0	0.0	55.3
<b>Zone 3</b>									
3-SW Corridor	1	345.0	0.0	103.8	0.00	0.06	0.0	0.0	20.7
3-SW Wing 1	1	595.0	3.0	842.7	5.00	0.06	0.0	0.0	50.6
3-SW Wing 2	1	595.0	3.0	741.3	5.00	0.06	0.0	0.0	50.6
3-SW Wing 3	1	1120.0	5.6	1195.9	5.00	0.06	0.0	0.0	95.2
<b>Zone 4</b>									
3-NE Corridor	1	305.0	0.0	79.3	0.00	0.06	0.0	0.0	18.3
3-NE Wing 1	1	610.0	3.1	786.6	5.00	0.06	0.0	0.0	51.9
3-NE Wing 2	1	730.0	3.7	988.4	5.00	0.06	0.0	0.0	62.1
3-NE Wing 3	1	645.0	3.2	562.1	5.00	0.06	0.0	0.0	54.8
<b>Zone 5</b>									
3-SE Corridor	1	375.0	0.0	109.4	0.00	0.06	0.0	0.0	22.5
3-SE Wing 1	1	920.0	4.6	1081.8	5.00	0.06	0.0	0.0	78.2
3-SE Wing 2	1	920.0	4.6	1011.6	5.00	0.06	0.0	0.0	78.2
3-SE Wing 3	1	850.0	4.3	1059.3	5.00	0.06	0.0	0.0	72.3
<b>Totals (incl. Space Multipliers)</b>				<b>13076.6</b>					<b>1081.0</b>

## Air System Design Load Summary for 3rd Floor

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 91.4 °F / 73.8 °F			HEATING OA DB / WB 9.0 °F / 6.7 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	2077 ft²	92768	-	2077 ft²	-	-
Wall Transmission	5264 ft²	23080	-	5264 ft²	79625	-
Roof Transmission	0 ft²	0	-	0 ft²	0	-
Window Transmission	2077 ft²	27233	-	2077 ft²	124422	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	0 ft²	0	-	0 ft²	0	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	0 ft²	0	-	0 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	12941 W	44151	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	13703 W	46752	-	0	0	-
People	46	11190	9363	0	0	0
Infiltration	-	20595	31057	-	191086	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
<b>&gt;&gt; Total Zone Loads</b>	-	<b>265769</b>	<b>40420</b>	-	<b>395133</b>	<b>0</b>
Zone Conditioning	-	264598	40420	-	394660	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	12331 CFM	19466	-	5231 CFM	-4164	-
Ventilation Load	1081 CFM	17165	28615	1081 CFM	71171	0
Supply Fan Load	12331 CFM	32595	-	5231 CFM	-5538	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
<b>&gt;&gt; Total System Loads</b>	-	<b>333824</b>	<b>69035</b>	-	<b>456129</b>	<b>0</b>
Central Cooling Coil	-	333824	69041	-	-33470	0
Preheat Coil	-	0	-	-	11699	-
Terminal Reheat Coils	-	0	-	-	477900	-
<b>&gt;&gt; Total Conditioning</b>	-	<b>333824</b>	<b>69041</b>	-	<b>456129</b>	<b>0</b>
<b>Key:</b>	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

## Air System Sizing Summary for 4th Floor

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
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### Air System Information

Air System Name ..... <b>4th Floor</b>	Number of zones ..... <b>6</b>
Equipment Class ..... <b>CW AHU</b>	Floor Area ..... <b>16000.0</b> ft <sup>2</sup>
Air System Type ..... <b>VAV</b>	Location ..... <b>Harrisburg, Pennsylvania</b>

### Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM ..... <b>Sum of space airflow rates</b>	Calculation Months ..... <b>Jan to Dec</b>
Space CFM ..... <b>Individual peak space loads</b>	Sizing Data ..... <b>Calculated</b>

### Central Cooling Coil Sizing Data

Total coil load ..... <b>37.1</b> Tons	Load occurs at ..... <b>Jul 1600</b>
Total coil load ..... <b>444.8</b> MBH	OA DB / WB ..... <b>91.4 / 73.8</b> °F
Sensible coil load ..... <b>370.3</b> MBH	Entering DB / WB ..... <b>77.9 / 62.9</b> °F
Coil CFM at Jul 1600 ..... <b>13687</b> CFM	Leaving DB / WB ..... <b>52.5 / 51.2</b> °F
Max block CFM at Jul 1600 ..... <b>14324</b> CFM	Coil ADP ..... <b>49.7</b> °F
Sum of peak zone CFM ..... <b>14540</b> CFM	Bypass Factor ..... <b>0.100</b>
Sensible heat ratio ..... <b>0.832</b>	Resulting RH ..... <b>45</b> %
ft <sup>2</sup> /Ton ..... <b>431.6</b>	Design supply temp. .... <b>55.0</b> °F
BTU/(hr-ft <sup>2</sup> ) ..... <b>27.8</b>	Zone T-stat Check ..... <b>6 of 6</b> OK
Water flow @ 12.0 °F rise ..... <b>74.18</b> gpm	Max zone temperature deviation ..... <b>0.0</b> °F

### Preheat Coil Sizing Data

Max coil load ..... <b>37.2</b> MBH	Load occurs at ..... <b>Jan 1300</b>
Coil CFM at Jan 1300 ..... <b>5816</b> CFM	Ent. DB / Lvg DB ..... <b>54.0 / 60.0</b> °F
Max coil CFM ..... <b>14324</b> CFM	
Water flow @ 20.0 °F drop ..... <b>3.72</b> gpm	

### Supply Fan Sizing Data

Actual max CFM at Jul 1600 ..... <b>14324</b> CFM	Fan motor BHP ..... <b>15.72</b> BHP
Standard CFM ..... <b>14165</b> CFM	Fan motor kW ..... <b>11.72</b> kW
Actual max CFM/ft <sup>2</sup> ..... <b>0.90</b> CFM/ft <sup>2</sup>	Fan static ..... <b>3.00</b> in wg

### Return Fan Sizing Data

Actual max CFM at Jul 1600 ..... <b>14324</b> CFM	Fan motor BHP ..... <b>9.39</b> BHP
Standard CFM ..... <b>14165</b> CFM	Fan motor kW ..... <b>7.00</b> kW
Actual max CFM/ft <sup>2</sup> ..... <b>0.90</b> CFM/ft <sup>2</sup>	Fan static ..... <b>2.00</b> in wg

### Outdoor Ventilation Air Data

Design airflow CFM ..... <b>1208</b> CFM	CFM/person ..... <b>24.34</b> CFM/person
CFM/ft <sup>2</sup> ..... <b>0.08</b> CFM/ft <sup>2</sup>	

## Zone Sizing Summary for 4th Floor

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
 01:29PM

### Air System Information

Air System Name ..... 4th Floor  
 Equipment Class ..... CW AHU  
 Air System Type ..... VAV

Number of zones ..... 6  
 Floor Area ..... 16000.0 ft<sup>2</sup>  
 Location ..... Harrisburg, Pennsylvania

### Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM ..... Sum of space airflow rates  
 Space CFM ..... Individual peak space loads

Calculation Months ..... Jan to Dec  
 Sizing Data ..... Calculated

### Zone Sizing Data

Zone Name	Maximum Cooling Sensible (MBH)	Design Air Flow (CFM)	Minimum Air Flow (CFM)	Time of Peak Load	Maximum Heating Load (MBH)	Zone Floor Area (ft <sup>2</sup> )	Zone CFM/ft <sup>2</sup>
Zone 1	43.6	2088	835	Jul 1600	79.1	3340.0	0.63
Zone 2	39.5	1897	759	Jul 1600	53.9	1940.0	0.98
Zone 3	50.9	2450	980	Jul 1600	83.8	3080.0	0.80
Zone 4	35.0	1681	672	Jul 1600	49.5	1715.0	0.98
Zone 5	62.5	3082	1233	Aug 1600	77.4	2795.0	1.10
Zone 6	68.0	3342	1337	Aug 1500	86.7	3130.0	1.07

### Zone Terminal Sizing Data

Zone Name	Reheat Coil Load (MBH)	Reheat Coil Water gpm @ 20.0 °F	Zone Htg Coil Load (MBH)	Zone Htg Water gpm @ 20.0 °F	Mixing Box Fan Airflow (CFM)
Zone 1	92.5	9.25	0.0	0.00	0
Zone 2	66.1	6.61	0.0	0.00	0
Zone 3	99.5	9.95	0.0	0.00	0
Zone 4	60.3	6.04	0.0	0.00	0
Zone 5	97.2	9.72	0.0	0.00	0
Zone 6	108.1	10.81	0.0	0.00	0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft <sup>2</sup> )	Space CFM/ft <sup>2</sup>
<b>Zone 1</b>							
4-Main Corr/Lobby	1	17.5	Jul 1600	821	35.8	2070.0	0.40
4-Stair 2	1	6.0	Sep 1400	279	12.6	270.0	1.03
4-W. Toilet/Stair 1	1	11.6	Jul 1700	545	15.4	500.0	1.09
4-E. Toilet/Stair 3	1	9.5	Jul 1500	442	15.4	500.0	0.88
<b>Zone 2</b>							
4-NW Corridor	1	4.6	Jul 1500	214	10.2	440.0	0.49
4-NW Wing 1	1	19.9	Jul 1700	931	22.9	750.0	1.24
4-NW Wing 2	1	16.1	Jul 1300	752	20.9	750.0	1.00
<b>Zone 3</b>							
4-N Corridor	1	6.2	Jul 1500	292	30.5	970.0	0.30
4-N Wing 1	1	24.2	Jul 1700	1135	26.6	1055.0	1.08
4-N Wing 2	1	21.9	Jul 1300	1023	26.6	1055.0	0.97
<b>Zone 4</b>							
4-NE Corridor	1	4.6	Jul 1500	214	10.2	440.0	0.49
4-NE Wing 1	1	14.6	Jul 1400	682	19.5	630.0	1.08
4-NE Wing 2	1	16.8	Jul 1700	786	19.9	645.0	1.22
<b>Zone 5</b>							
4-SW Corridor	1	6.4	Sep 1400	300	10.2	440.0	0.68
4-SW Wing 1	1	16.8	Jul 1700	788	19.5	595.0	1.32

## Zone Sizing Summary for 4th Floor

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft <sup>2</sup> )	Space CFM/ft <sup>2</sup>
4-SW Wing 2	1	18.3	Jul 1700	854	21.0	695.0	1.23
4-SW Wing 3	1	24.3	Sep 1400	1140	26.8	1065.0	1.07
<b>Zone 6</b>							
4-SE Corridor	1	6.4	Sep 1400	300	10.2	440.0	0.68
4-SE Wing 1	1	22.2	Jul 1400	1039	28.3	920.0	1.13
4-SE Wing 2	1	17.8	Jul 1700	834	20.5	665.0	1.25
4-SE Wing 3	1	25.0	Sep 1400	1169	27.6	1105.0	1.06

# Ventilation Sizing Summary for 4th Floor

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
01:29PM

## 1. Summary

Ventilation Sizing Method ..... Sum of Space OA Airflows  
 Design Ventilation Airflow Rate ..... 1208 CFM

## 2. Space Ventilation Analysis Table

Zone Name / Space Name	Mult.	Floor Area (ft <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (CFM)	Required Outdoor Air (CFM/person)	Required Outdoor Air (CFM/ft <sup>2</sup> )	Required Outdoor Air (CFM)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (CFM)
<b>Zone 1</b>									
4-Main Corr/Lobby	1	2070.0	0.0	820.7	0.00	0.06	0.0	0.0	124.2
4-Stair 2	1	270.0	0.0	279.4	0.00	0.06	0.0	0.0	16.2
4-W. Toilet/Stair 1	1	500.0	0.0	545.2	0.00	0.06	0.0	0.0	30.0
4-E. Toilet/Stair 3	1	500.0	0.0	442.5	0.00	0.06	0.0	0.0	30.0
<b>Zone 2</b>									
4-NW Corridor	1	440.0	0.0	213.6	0.00	0.06	0.0	0.0	26.4
4-NW Wing 1	1	750.0	3.8	931.2	5.00	0.06	0.0	0.0	63.8
4-NW Wing 2	1	750.0	3.8	752.3	5.00	0.06	0.0	0.0	63.8
<b>Zone 3</b>									
4-N Corridor	1	970.0	0.0	292.1	0.00	0.06	0.0	0.0	58.2
4-N Wing 1	1	1055.0	5.3	1134.9	5.00	0.06	0.0	0.0	89.7
4-N Wing 2	1	1055.0	5.3	1023.0	5.00	0.06	0.0	0.0	89.7
<b>Zone 4</b>									
4-NE Corridor	1	440.0	0.0	213.6	0.00	0.06	0.0	0.0	26.4
4-NE Wing 1	1	630.0	3.2	681.9	5.00	0.06	0.0	0.0	53.6
4-NE Wing 2	1	645.0	3.2	785.7	5.00	0.06	0.0	0.0	54.8
<b>Zone 5</b>									
4-SW Corridor	1	440.0	0.0	299.8	0.00	0.06	0.0	0.0	26.4
4-SW Wing 1	1	595.0	3.0	787.8	5.00	0.06	0.0	0.0	50.6
4-SW Wing 2	1	695.0	3.5	854.4	5.00	0.06	0.0	0.0	59.1
4-SW Wing 3	1	1065.0	5.3	1139.8	5.00	0.06	0.0	0.0	90.5
<b>Zone 6</b>									
4-SE Corridor	1	440.0	0.0	299.8	0.00	0.06	0.0	0.0	26.4
4-SE Wing 1	1	920.0	4.6	1038.8	5.00	0.06	0.0	0.0	78.2
4-SE Wing 2	1	665.0	3.3	834.4	5.00	0.06	0.0	0.0	56.5
4-SE Wing 3	1	1105.0	5.5	1169.0	5.00	0.06	0.0	0.0	93.9
<b>Totals (Incl. Space Multipliers)</b>				<b>14539.8</b>					<b>1208.3</b>

## Air System Design Load Summary for 4th Floor

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/08/2011  
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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 91.4 °F / 73.8 °F			HEATING OA DB / WB 9.0 °F / 6.7 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	1530 ft²	75616	-	1530 ft²	-	-
Wall Transmission	5717 ft²	25843	-	5717 ft²	86489	-
Roof Transmission	15730 ft²	41669	-	15730 ft²	42477	-
Window Transmission	1530 ft²	20063	-	1530 ft²	91665	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	21 ft²	84	-	21 ft²	384	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	418 ft²	-1737	-	418 ft²	12540	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	14483 W	49410	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	14895 W	50821	-	0	0	-
People	50	12163	10178	0	0	0
Infiltration	-	21218	32203	-	196874	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
<b>&gt;&gt; Total Zone Loads</b>	-	<b>295150</b>	<b>42381</b>	-	<b>430429</b>	<b>0</b>
Zone Conditioning	-	293689	42381	-	429901	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	13687 CFM	21449	-	5816 CFM	-4626	-
Ventilation Load	1208 CFM	19200	32191	1208 CFM	79550	0
Supply Fan Load	13687 CFM	35915	-	5816 CFM	-6145	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
<b>&gt;&gt; Total System Loads</b>	-	<b>370254</b>	<b>74572</b>	-	<b>498679</b>	<b>0</b>
Central Cooling Coil	-	370254	74578	-	-37204	0
Preheat Coil	-	0	-	-	13428	-
Terminal Reheat Coils	-	0	-	-	522455	-
<b>&gt;&gt; Total Conditioning</b>	-	<b>370254</b>	<b>74578</b>	-	<b>498679</b>	<b>0</b>
<b>Key:</b>	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		



## Air System Sizing Summary for Chapel

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
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### Air System Information

Air System Name ..... <b>Chapel</b>	Number of zones ..... <b>1</b>
Equipment Class ..... <b>CW AHU</b>	Floor Area ..... <b>5555.0</b> ft <sup>2</sup>
Air System Type ..... <b>SZCAV</b>	Location ..... <b>Harrisburg, Pennsylvania</b>

### Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM ..... <b>Sum of space airflow rates</b>	Calculation Months ..... <b>Jan to Dec</b>
Space CFM ..... <b>Individual peak space loads</b>	Sizing Data ..... <b>Calculated</b>

### Central Cooling Coil Sizing Data

Total coil load ..... <b>41.0</b> Tons	Load occurs at ..... <b>Jul 1600</b>
Total coil load ..... <b>492.1</b> MBH	OA DB / WB ..... <b>91.4 / 73.8</b> °F
Sensible coil load ..... <b>368.6</b> MBH	Entering DB / WB ..... <b>76.8 / 65.2</b> °F
Coil CFM at Jul 1600 ..... <b>16979</b> CFM	Leaving DB / WB ..... <b>56.5 / 55.4</b> °F
Max block CFM ..... <b>16979</b> CFM	Coil ADP ..... <b>54.2</b> °F
Sum of peak zone CFM ..... <b>16979</b> CFM	Bypass Factor ..... <b>0.100</b>
Sensible heat ratio ..... <b>0.749</b>	Resulting RH ..... <b>55</b> %
ft <sup>3</sup> /Ton ..... <b>135.5</b>	Design supply temp. .... <b>55.0</b> °F
BTU/(hr-ft <sup>2</sup> ) ..... <b>88.6</b>	Zone T-stat Check ..... <b>1 of 1</b> OK
Water flow @ 12.0 °F rise ..... <b>82.07</b> gpm	Max zone temperature deviation ..... <b>0.0</b> °F

### Central Heating Coil Sizing Data

Max coil load ..... <b>534.3</b> MBH	Load occurs at ..... <b>Des Htg</b>
Coil CFM at Des Htg ..... <b>16979</b> CFM	BTU/(hr-ft <sup>2</sup> ) ..... <b>96.2</b>
Max coil CFM ..... <b>16979</b> CFM	Ent. DB / Lvg DB ..... <b>63.4 / 92.9</b> °F
Water flow @ 20.0 °F drop ..... <b>53.46</b> gpm	

### Supply Fan Sizing Data

Actual max CFM ..... <b>16979</b> CFM	Fan motor BHP ..... <b>9.89</b> BHP
Standard CFM ..... <b>16791</b> CFM	Fan motor kW ..... <b>7.38</b> kW
Actual max CFM/ft <sup>2</sup> ..... <b>3.06</b> CFM/ft <sup>2</sup>	Fan static ..... <b>2.00</b> in wg

### Outdoor Ventilation Air Data

Design airflow CFM ..... <b>1918</b> CFM	CFM/person ..... <b>6.05</b> CFM/person
CFM/ft <sup>2</sup> ..... <b>0.35</b> CFM/ft <sup>2</sup>	

## Zone Sizing Summary for Chapel

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

### Air System Information

Air System Name ..... Chapel  
 Equipment Class ..... CW AHU  
 Air System Type ..... SZCAV

Number of zones ..... 1  
 Floor Area ..... 5555.0 ft<sup>2</sup>  
 Location ..... Harrisburg, Pennsylvania

### Sizing Calculation Information

#### Zone and Space Sizing Method:

Zone CFM ..... Sum of space airflow rates  
 Space CFM ..... Individual peak space loads

Calculation Months ..... Jan to Dec  
 Sizing Data ..... Calculated

### Zone Sizing Data

Zone Name	Maximum Cooling Sensible (MBH)	Design Air Flow (CFM)	Minimum Air Flow (CFM)	Time of Peak Load	Maximum Heating Load (MBH)	Zone Floor Area (ft <sup>2</sup> )	Zone CFM/ft <sup>2</sup>
Zone 1	308.5	16979	16979	Jul 1600	431.5	5555.0	3.06

### Zone Terminal Sizing Data

No Zone Terminal Sizing Data required for this system.

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft <sup>2</sup> )	Space CFM/ft <sup>2</sup>
<b>Zone 1</b>							
2-Chapel Assembly	1	217.2	Jul 1600	10170	249.7	3170.0	3.21
2-Chap. Platform/Storage	1	91.2	Jul 1600	6809	181.8	2385.0	2.85

## Ventilation Sizing Summary for Chapel

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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### 1. Summary

Ventilation Sizing Method .....  
 Design Ventilation Airflow Rate ..... **1918** CFM

Sum of Space OA Airflows .....

### 2. Space Ventilation Analysis Table

Zone Name / Space Name	Mult.	Floor Area (ft <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (CFM)	Required Outdoor Air (CFM/person)	Required Outdoor Air (CFM/ft <sup>2</sup> )	Required Outdoor Air (CFM)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (CFM)
Zone 1									
2-Chapel Assembly	1	3170.0	317.0	10170.2	5.00	0.06	0.0	0.0	1775.2
2-Chap. Platform/Storage	1	2385.0	0.0	6808.8	5.00	0.06	0.0	0.0	143.1
<b>Totals (Incl. Space Multipliers)</b>				<b>16979.1</b>					<b>1918.3</b>

## Air System Design Load Summary for Chapel

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 91.4 °F / 73.8 °F			HEATING OA DB / WB 9.0 °F / 6.7 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	2354 ft²	105398	-	2354 ft²	-	-
Wall Transmission	3826 ft²	18847	-	3826 ft²	57879	-
Roof Transmission	2385 ft²	5972	-	2385 ft²	6440	-
Window Transmission	2354 ft²	30865	-	2354 ft²	141014	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	0 ft²	0	-	0 ft²	0	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	0 ft²	0	-	0 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	9721 W	33166	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	3578 W	12206	-	0	0	-
People	317	77660	64985	0	0	0
Infiltration	-	24378	24581	-	226193	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
<b>&gt;&gt; Total Zone Loads</b>	-	<b>308492</b>	<b>89566</b>	-	<b>431526</b>	<b>0</b>
Zone Conditioning	-	309679	89566	-	433904	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	16979 CFM	0	-	16979 CFM	0	-
Ventilation Load	1918 CFM	33778	33957	1918 CFM	125619	0
Supply Fan Load	16979 CFM	25174	-	16979 CFM	-25174	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
<b>&gt;&gt; Total System Loads</b>	-	<b>368631</b>	<b>123523</b>	-	<b>534349</b>	<b>0</b>
Central Cooling Coil	-	368631	123498	-	0	0
Central Heating Coil	-	0	-	-	534349	-
<b>&gt;&gt; Total Conditioning</b>	-	<b>368631</b>	<b>123498</b>	-	<b>534349</b>	<b>0</b>
<b>Key:</b>	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

## Air System Sizing Summary for N4 Core/Main Corr.

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
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### Air System Information

Air System Name ..... <b>N4 Core/Main Corr.</b>	Number of zones ..... <b>4</b>
Equipment Class ..... <b>CW AHU</b>	Floor Area ..... <b>18365.0</b> ft <sup>2</sup>
Air System Type ..... <b>VAV</b>	Location ..... <b>Harrisburg, Pennsylvania</b>

### Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM ..... <b>Sum of space airflow rates</b>	Calculation Months ..... <b>Jan to Dec</b>
Space CFM ..... <b>Individual peak space loads</b>	Sizing Data ..... <b>Calculated</b>

### Central Cooling Coil Sizing Data

Total coil load ..... <b>29.1</b> Tons	Load occurs at ..... <b>Jul 1600</b>
Total coil load ..... <b>349.4</b> MBH	OA DB / WB ..... <b>91.4 / 73.8</b> °F
Sensible coil load ..... <b>277.4</b> MBH	Entering DB / WB ..... <b>78.3 / 63.6</b> °F
Coil CFM at Jul 1600 ..... <b>10095</b> CFM	Leaving DB / WB ..... <b>52.5 / 51.2</b> °F
Max block CFM at Jul 1600 ..... <b>10537</b> CFM	Coil ADP ..... <b>49.7</b> °F
Sum of peak zone CFM ..... <b>10537</b> CFM	Bypass Factor ..... <b>0.100</b>
Sensible heat ratio ..... <b>0.794</b>	Resulting RH ..... <b>46</b> %
ft <sup>2</sup> /Ton ..... <b>630.8</b>	Design supply temp. .... <b>55.0</b> °F
BTU/(hr-ft <sup>2</sup> ) ..... <b>19.0</b>	Zone T-stat Check ..... <b>4 of 4</b> OK
Water flow @ 12.0 °F rise ..... <b>58.26</b> gpm	Max zone temperature deviation ..... <b>0.0</b> °F

### Preheat Coil Sizing Data

Max coil load ..... <b>28.1</b> MBH	Load occurs at ..... <b>Des Htg</b>
Coil CFM at Des Htg ..... <b>4215</b> CFM	Ent. DB / Lvg DB ..... <b>53.8 / 60.0</b> °F
Max coil CFM ..... <b>10537</b> CFM	
Water flow @ 20.0 °F drop ..... <b>2.81</b> gpm	

### Supply Fan Sizing Data

Actual max CFM at Jul 1600 ..... <b>10537</b> CFM	Fan motor BHP ..... <b>11.57</b> BHP
Standard CFM ..... <b>10420</b> CFM	Fan motor kW ..... <b>8.62</b> kW
Actual max CFM/ft <sup>2</sup> ..... <b>0.57</b> CFM/ft <sup>2</sup>	Fan static ..... <b>3.00</b> in wg

### Return Fan Sizing Data

Actual max CFM at Jul 1600 ..... <b>10537</b> CFM	Fan motor BHP ..... <b>6.91</b> BHP
Standard CFM ..... <b>10420</b> CFM	Fan motor kW ..... <b>5.15</b> kW
Actual max CFM/ft <sup>2</sup> ..... <b>0.57</b> CFM/ft <sup>2</sup>	Fan static ..... <b>2.00</b> in wg

### Outdoor Ventilation Air Data

Design airflow CFM ..... <b>1155</b> CFM	CFM/person ..... <b>109.45</b> CFM/person
CFM/ft <sup>2</sup> ..... <b>0.06</b> CFM/ft <sup>2</sup>	

## Air System Sizing Summary for N4 Core/Main Corr.

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
 01:29PM

### Air System Information

Air System Name ..... **N4 Core/Main Corr.**  
 Equipment Class ..... **CW AHU**  
 Air System Type ..... **VAV**

Number of zones ..... **4**  
 Floor Area ..... **18365.0** ft<sup>2</sup>  
 Location ..... **Harrisburg, Pennsylvania**

### Sizing Calculation Information

Zone and Space Sizing Method:  
 Zone CFM ..... **Sum of space airflow rates**  
 Space CFM ..... **Individual peak space loads**

Calculation Months ..... **Jan to Dec**  
 Sizing Data ..... **Calculated**

### Zone Sizing Data

Zone Name	Maximum Cooling Sensible (MBH)	Design Air Flow (CFM)	Minimum Air Flow (CFM)	Time of Peak Load	Maximum Heating Load (MBH)	Zone Floor Area (ft <sup>2</sup> )	Zone CFM/ft <sup>2</sup>
Zone 1	94.5	4538	1815	Jul 1600	162.9	6420.0	0.71
Zone 2	38.4	1859	744	Jul 1600	77.7	3705.0	0.50
Zone 3	40.8	2003	801	Jul 1600	95.7	3630.0	0.55
Zone 4	44.6	2137	855	Jul 1600	98.2	4610.0	0.46

### Zone Terminal Sizing Data

Zone Name	Reheat Coil Load (MBH)	Reheat Coil Water gpm @ 20.0 °F	Zone Htg Coil Load (MBH)	Zone Htg Water gpm @ 20.0 °F	Mixing Box Fan Airflow (CFM)
Zone 1	192.0	19.21	0.0	0.00	0
Zone 2	89.6	8.96	0.0	0.00	0
Zone 3	108.5	10.86	0.0	0.00	0
Zone 4	111.9	11.19	0.0	0.00	0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft <sup>2</sup> )	Space CFM/ft <sup>2</sup>
<b>Zone 1</b>							
4-Main Corr/Lobby	1	17.5	Jul 1600	821	35.8	2070.0	0.40
4-N Corridor	1	6.2	Jul 1500	292	30.5	970.0	0.30
4-N Wing 1	1	24.2	Jul 1700	1135	26.6	1055.0	1.08
4-N Wing 2	1	21.9	Jul 1300	1023	26.6	1055.0	0.97
4-E. Toilet/Stair 3	1	9.5	Jul 1500	442	15.4	500.0	0.88
4-Stair 2	1	6.0	Sep 1400	279	12.6	270.0	1.03
4-W. Toilet/Stair 1	1	11.6	Jul 1700	545	15.4	500.0	1.09
<b>Zone 2</b>							
3-Main Corr/Lobby	1	13.7	Jul 1600	643	35.7	2435.0	0.26
3-E. Toilet/Stair 3	1	9.1	Jul 0900	428	14.7	500.0	0.86
3-Stair 2	1	5.6	Sep 1400	261	12.5	270.0	0.97
3-W. Toilet/Stair 1	1	11.3	Jul 1700	527	14.7	500.0	1.05
<b>Zone 3</b>							
2-Main Corr/Lobby	1	10.9	Jul 1500	510	43.6	2360.0	0.22
2-E. Toilet/Stair 3	1	11.4	Jul 0900	536	19.0	500.0	1.07
2-Stair 2	1	6.2	Sep 1400	292	14.2	270.0	1.08
2-W. Toilet/Stair 1	1	14.2	Jul 1700	665	19.0	500.0	1.33
<b>Zone 4</b>							
1-Main Corr/Lobby	1	9.1	Jul 1500	427	30.0	2255.0	0.19
1-Lounge/Corridor	1	14.6	Jul 0900	681	25.5	905.0	0.75
1-E. Toilet/Stair 3	1	6.7	Jul 1400	312	13.3	500.0	0.62
1-Stair 2	1	3.7	Aug 1900	172	12.2	270.0	0.64

## Zone Sizing Summary for N4 Core/Main Corr.

Project Name: ShipU. Old Main HVAC Study  
Prepared by: Century Engineering

12/06/2011  
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Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft²)	Space CFM/ft²
1-W. Toilet/Vest/Stair1	1	11.6	Jul 1700	545	17.3	680.0	0.80

# Ventilation Sizing Summary for N4 Core/Main Corr.

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
01:29PM

## 1. Summary

Ventilation Sizing Method .....  
 Design Ventilation Airflow Rate ..... **Sum of Space OA Airflows** ..... **1155** CFM

## 2. Space Ventilation Analysis Table

Zone Name / Space Name	Mult.	Floor Area (ft²)	Maximum Occupants	Maximum Supply Air (CFM)	Required Outdoor Air (CFM/person)	Required Outdoor Air (CFM/ft²)	Required Outdoor Air (CFM)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (CFM)
<b>Zone 1</b>									
4-Main Corr/Lobby	1	2070.0	0.0	820.7	0.00	0.06	0.0	0.0	124.2
4-N Corridor	1	970.0	0.0	292.1	0.00	0.06	0.0	0.0	58.2
4-N Wing 1	1	1055.0	5.3	1134.9	5.00	0.06	0.0	0.0	89.7
4-N Wing 2	1	1055.0	5.3	1023.0	5.00	0.06	0.0	0.0	89.7
4-E. Toilet/Stair 3	1	500.0	0.0	442.5	0.00	0.06	0.0	0.0	30.0
4-Stair 2	1	270.0	0.0	279.4	0.00	0.06	0.0	0.0	16.2
4-W. Toilet/Stair 1	1	500.0	0.0	545.2	0.00	0.06	0.0	0.0	30.0
<b>Zone 2</b>									
3-Main Corr/Lobby	1	2435.0	0.0	643.0	0.00	0.06	0.0	0.0	146.1
3-E. Toilet/Stair 3	1	500.0	0.0	428.2	0.00	0.06	0.0	0.0	30.0
3-Stair 2	1	270.0	0.0	261.1	0.00	0.06	0.0	0.0	16.2
3-W. Toilet/Stair 1	1	500.0	0.0	527.0	0.00	0.06	0.0	0.0	30.0
<b>Zone 3</b>									
2-Main Corr/Lobby	1	2360.0	0.0	510.0	0.00	0.06	0.0	0.0	141.6
2-E. Toilet/Stair 3	1	500.0	0.0	535.7	0.00	0.06	0.0	0.0	30.0
2-Stair 2	1	270.0	0.0	292.1	0.00	0.06	0.0	0.0	16.2
2-W. Toilet/Stair 1	1	500.0	0.0	664.8	0.00	0.06	0.0	0.0	30.0
<b>Zone 4</b>									
1-Main Corr/Lobby	1	2255.0	0.0	426.7	0.00	0.06	0.0	0.0	135.3
1-Lounge/Corridor	1	905.0	0.0	681.2	0.00	0.06	0.0	0.0	54.3
1-E. Toilet/Stair 3	1	500.0	0.0	312.5	0.00	0.06	0.0	0.0	30.0
1-Stair 2	1	270.0	0.0	172.0	0.00	0.06	0.0	0.0	16.2
1-W. Toilet/Vest/Stair1	1	680.0	0.0	544.5	0.00	0.06	0.0	0.0	40.8
<b>Totals (incl. Space Multipliers)</b>				<b>10536.5</b>					<b>1154.7</b>



## Air System Design Load Summary for N4 Core/Main Corr.

Project Name: ShipU, Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 91.4 °F / 73.8 °F			HEATING OA DB / WB 9.0 °F / 6.7 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	1374 ft²	75271	-	1374 ft²	-	-
Wall Transmission	4025 ft²	20045	-	4025 ft²	60889	-
Roof Transmission	6150 ft²	15996	-	6150 ft²	16607	-
Window Transmission	1374 ft²	18016	-	1374 ft²	82309	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	147 ft²	589	-	147 ft²	2690	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	418 ft²	-1737	-	418 ft²	12540	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	14301 W	48791	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	3165 W	10799	-	0	0	-
People	11	2585	2163	0	0	0
Infiltration	-	27954	40455	-	259370	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
<b>&gt;&gt; Total Zone Loads</b>	-	<b>218309</b>	<b>42618</b>	-	<b>434406</b>	<b>0</b>
Zone Conditioning	-	216632	42618	-	433930	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	10095 CFM	15879	-	4215 CFM	-3339	-
Ventilation Load	1155 CFM	18338	29332	1155 CFM	76017	0
Supply Fan Load	10095 CFM	26589	-	4215 CFM	-4414	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
<b>&gt;&gt; Total System Loads</b>	-	<b>277438</b>	<b>71950</b>	-	<b>502194</b>	<b>0</b>
Central Cooling Coil	-	277438	71955	-	-26921	0
Preheat Coil	-	0	-	-	28114	-
Terminal Reheat Coils	-	0	-	-	501001	-
<b>&gt;&gt; Total Conditioning</b>	-	<b>277438</b>	<b>71955</b>	-	<b>502194</b>	<b>0</b>
<b>Key:</b>	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

## Air System Sizing Summary for NE Core

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
 01:29PM

### Air System Information

Air System Name ..... <b>NE Core</b>	Number of zones ..... <b>4</b>
Equipment Class ..... <b>CW AHU</b>	Floor Area ..... <b>8840.0</b> ft <sup>2</sup>
Air System Type ..... <b>VAV</b>	Location ..... <b>Harrisburg, Pennsylvania</b>

### Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM ..... <b>Sum of space airflow rates</b>	Calculation Months ..... <b>Jan to Dec</b>
Space CFM ..... <b>Individual peak space loads</b>	Sizing Data ..... <b>Calculated</b>

### Central Cooling Coil Sizing Data

Total coil load ..... <b>26.5</b> Tons	Load occurs at ..... <b>Jul 1600</b>
Total coil load ..... <b>317.8</b> MBH	OA DB / WB ..... <b>91.4 / 73.8</b> °F
Sensible coil load ..... <b>270.8</b> MBH	Entering DB / WB ..... <b>77.7 / 62.5</b> °F
Coil CFM at Jul 1600 ..... <b>10068</b> CFM	Leaving DB / WB ..... <b>52.5 / 51.1</b> °F
Max block CFM at Jul 1600 ..... <b>10334</b> CFM	Coil ADP ..... <b>49.7</b> °F
Sum of peak zone CFM ..... <b>10334</b> CFM	Bypass Factor ..... <b>0.100</b>
Sensible heat ratio ..... <b>0.852</b>	Resulting RH ..... <b>44</b> %
ft <sup>2</sup> /Ton ..... <b>333.8</b>	Design supply temp. .... <b>55.0</b> °F
BTU/(hr-ft <sup>2</sup> ) ..... <b>35.9</b>	Zone T-stat Check ..... <b>4 of 4</b> OK
Water flow @ 12.0 °F rise ..... <b>52.99</b> gpm	Max zone temperature deviation ..... <b>0.0</b> °F

### Preheat Coil Sizing Data

Max coil load ..... <b>26.4</b> MBH	Load occurs at ..... <b>Nov 0100</b>
Coil CFM at Nov 0100 ..... <b>4134</b> CFM	Ent. DB / Lvg DB ..... <b>54.0 / 60.0</b> °F
Max coil CFM ..... <b>10334</b> CFM	
Water flow @ 20.0 °F drop ..... <b>2.64</b> gpm	

### Supply Fan Sizing Data

Actual max CFM at Jul 1600 ..... <b>10334</b> CFM	Fan motor BHP ..... <b>11.34</b> BHP
Standard CFM ..... <b>10220</b> CFM	Fan motor kW ..... <b>8.46</b> kW
Actual max CFM/ft <sup>2</sup> ..... <b>1.17</b> CFM/ft <sup>2</sup>	Fan static ..... <b>3.00</b> in wg

### Return Fan Sizing Data

Actual max CFM at Jul 1600 ..... <b>10334</b> CFM	Fan motor BHP ..... <b>6.77</b> BHP
Standard CFM ..... <b>10220</b> CFM	Fan motor kW ..... <b>5.05</b> kW
Actual max CFM/ft <sup>2</sup> ..... <b>1.17</b> CFM/ft <sup>2</sup>	Fan static ..... <b>2.00</b> in wg

### Outdoor Ventilation Air Data

Design airflow CFM ..... <b>716</b> CFM	CFM/person ..... <b>19.29</b> CFM/person
CFM/ft <sup>2</sup> ..... <b>0.08</b> CFM/ft <sup>2</sup>	

## Zone Sizing Summary for NE Core

Project Name: ShipU. Old Main HVAC Study  
Prepared by: Century Engineering

12/06/2011  
01:29PM

### Air System Information

Air System Name ..... **NE Core**  
Equipment Class ..... **CW AHU**  
Air System Type ..... **VAV**

Number of zones ..... **4**  
Floor Area ..... **8840.0** ft<sup>2</sup>  
Location ..... **Harrisburg, Pennsylvania**

### Sizing Calculation Information

#### Zone and Space Sizing Method:

Zone CFM ..... **Sum of space airflow rates**  
Space CFM ..... **Individual peak space loads**

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

### Zone Sizing Data

Zone Name	Maximum Cooling Sensible (MBH)	Design Air Flow (CFM)	Minimum Air Flow (CFM)	Time of Peak Load	Maximum Heating Load (MBH)	Zone Floor Area (ft <sup>2</sup> )	Zone CFM/ft <sup>2</sup>
Zone 1	35.0	1681	672	Jul 1600	49.5	1715.0	0.98
Zone 2	51.1	2416	967	Jul 1600	72.5	2290.0	1.06
Zone 3	68.9	3302	1321	Jul 1600	92.1	2395.0	1.38
Zone 4	61.9	2935	1174	Jul 1600	81.5	2440.0	1.20

### Zone Terminal Sizing Data

Zone Name	Reheat Coil Load (MBH)	Reheat Coll Water gpm @ 20.0 °F	Zone Htg Coil Load (MBH)	Zone Htg Water gpm @ 20.0 °F	Mixing Box Fan Airflow (CFM)
Zone 1	60.3	6.04	0.0	0.00	0
Zone 2	87.9	8.80	0.0	0.00	0
Zone 3	113.2	11.33	0.0	0.00	0
Zone 4	100.3	10.04	0.0	0.00	0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft <sup>2</sup> )	Space CFM/ft <sup>2</sup>
<b>Zone 1</b>							
4-NE Corridor	1	4.6	Jul 1500	214	10.2	440.0	0.49
4-NE Wing 1	1	14.6	Jul 1400	682	19.5	630.0	1.08
4-NE Wing 2	1	16.8	Jul 1700	786	19.9	645.0	1.22
<b>Zone 2</b>							
3-NE Corridor	1	1.7	Jul 1500	79	5.6	305.0	0.26
3-NE Wing 1	1	16.8	Jul 1400	787	22.7	610.0	1.29
3-NE Wing 2	1	21.1	Jul 1700	988	24.3	730.0	1.35
3-NE Wing 3	1	12.0	Jul 1500	562	19.8	645.0	0.87
<b>Zone 3</b>							
2-NE Corridor	1	4.5	Jul 1500	209	11.8	335.0	0.62
2-NE Wing 1	1	22.9	Jul 0900	1072	27.6	645.0	1.66
2-NE Wing 2	1	28.2	Jul 1700	1321	28.6	730.0	1.81
2-NE Wing 3	1	14.9	Jul 1500	699	24.0	685.0	1.02
<b>Zone 4</b>							
1-NE Corridor	1	1.6	Jul 1500	76	5.8	335.0	0.23
1-NE Wing 1	1	18.9	Jul 0900	887	24.5	630.0	1.41
1-NE Wing 2	1	29.6	Jul 1700	1388	30.6	865.0	1.60
1-NE Wing 3	1	12.5	Jul 1500	585	20.6	610.0	0.96

## Ventilation Sizing Summary for NE Core

### 1. Summary

Ventilation Sizing Method .....  
 Design Ventilation Airflow Rate ..... 716 CFM

Sum of Space OA Airflows ..... 716 CFM

### 2. Space Ventilation Analysis Table

Zone Name / Space Name	Mult.	Floor Area (ft <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (CFM)	Required Outdoor Air (CFM/person)	Required Outdoor Air (CFM/ft <sup>2</sup> )	Required Outdoor Air (CFM)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (CFM)
<b>Zone 1</b>									
4-NE Corridor	1	440.0	0.0	213.6	0.00	0.06	0.0	0.0	26.4
4-NE Wing 1	1	630.0	3.2	681.9	5.00	0.06	0.0	0.0	53.6
4-NE Wing 2	1	645.0	3.2	785.7	5.00	0.06	0.0	0.0	54.8
<b>Zone 2</b>									
3-NE Corridor	1	305.0	0.0	79.3	0.00	0.06	0.0	0.0	18.3
3-NE Wing 1	1	610.0	3.1	786.6	5.00	0.06	0.0	0.0	51.9
3-NE Wing 2	1	730.0	3.7	988.4	5.00	0.06	0.0	0.0	62.1
3-NE Wing 3	1	645.0	3.2	562.1	5.00	0.06	0.0	0.0	54.8
<b>Zone 3</b>									
2-NE Corridor	1	335.0	0.0	209.3	0.00	0.06	0.0	0.0	20.1
2-NE Wing 1	1	645.0	3.2	1071.6	5.00	0.06	0.0	0.0	54.8
2-NE Wing 2	1	730.0	3.7	1321.5	5.00	0.06	0.0	0.0	62.1
2-NE Wing 3	1	685.0	3.4	699.3	5.00	0.06	0.0	0.0	58.2
<b>Zone 4</b>									
1-NE Corridor	1	335.0	0.0	75.9	0.00	0.06	0.0	0.0	20.1
1-NE Wing 1	1	630.0	3.2	866.8	5.00	0.06	0.0	0.0	53.6
1-NE Wing 2	1	865.0	4.3	1387.6	5.00	0.06	0.0	0.0	73.5
1-NE Wing 3	1	610.0	3.1	584.7	5.00	0.06	0.0	0.0	51.9
<b>Totals (Incl. Space Multipliers)</b>				<b>10334.2</b>					<b>716.0</b>

## Air System Design Load Summary for NE Core

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
 01:30PM

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 91.4 °F / 73.8 °F			HEATING OA DB / WB 9.0 °F / 6.7 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	2012 ft²	84063	-	2012 ft²	-	-
Wall Transmission	3337 ft²	13142	-	3337 ft²	50479	-
Roof Transmission	1715 ft²	4305	-	1715 ft²	4631	-
Window Transmission	2012 ft²	26383	-	2012 ft²	120537	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	42 ft²	168	-	42 ft²	769	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	0 ft²	0	-	0 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	8486 W	28952	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	11138 W	38000	-	0	0	-
People	37	9095	7611	0	0	0
Infiltration	-	12843	19876	-	119164	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
<b>&gt;&gt; Total Zone Loads</b>	-	<b>216952</b>	<b>27487</b>	-	<b>295579</b>	<b>0</b>
Zone Conditioning	-	216098	27487	-	295204	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	10068 CFM	16217	-	4134 CFM	-3275	-
Ventilation Load	716 CFM	11343	19452	716 CFM	47140	0
Supply Fan Load	10068 CFM	27155	-	4134 CFM	-4329	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
<b>&gt;&gt; Total System Loads</b>	-	<b>270813</b>	<b>46939</b>	-	<b>334739</b>	<b>0</b>
Central Cooling Coil	-	270813	46945	-	-26404	0
Preheat Coil	-	0	-	-	156	-
Terminal Reheat Coils	-	0	-	-	360987	-
<b>&gt;&gt; Total Conditioning</b>	-	<b>270813</b>	<b>46945</b>	-	<b>334739</b>	<b>0</b>
<b>Key:</b>	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

## Air System Sizing Summary for NW Core

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
 01:30PM

### Air System Information

Air System Name ..... <b>NW Core</b>	Number of zones ..... <b>4</b>
Equipment Class ..... <b>CW AHU</b>	Floor Area ..... <b>10690.0</b> ft <sup>2</sup>
Air System Type ..... <b>VAV</b>	Location ..... <b>Harrisburg, Pennsylvania</b>

### Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM ..... <b>Sum of space airflow rates</b>	Calculation Months ..... <b>Jan to Dec</b>
Space CFM ..... <b>Individual peak space loads</b>	Sizing Data ..... <b>Calculated</b>

### Central Cooling Coil Sizing Data

Total coil load ..... <b>31.1</b> Tons	Load occurs at ..... <b>Jul 1600</b>
Total coil load ..... <b>372.7</b> MBH	OA DB / WB ..... <b>91.4 / 73.8</b> °F
Sensible coil load ..... <b>315.8</b> MBH	Entering DB / WB ..... <b>77.7 / 62.6</b> °F
Coil CFM at Jul 1600 ..... <b>11714</b> CFM	Leaving DB / WB ..... <b>52.5 / 51.1</b> °F
Max block CFM at Jul 1600 ..... <b>12002</b> CFM	Coil ADP ..... <b>49.7</b> °F
Sum of peak zone CFM ..... <b>12002</b> CFM	Bypass Factor ..... <b>0.100</b>
Sensible heat ratio ..... <b>0.847</b>	Resulting RH ..... <b>45</b> %
ft <sup>2</sup> /Ton ..... <b>344.1</b>	Design supply temp. .... <b>55.0</b> °F
BTU/(hr-ft <sup>2</sup> ) ..... <b>34.9</b>	Zone T-stat Check ..... <b>4 of 4</b> OK
Water flow @ 12.0 °F rise ..... <b>62.16</b> gpm	Max zone temperature deviation ..... <b>0.0</b> °F

### Preheat Coil Sizing Data

Max coil load ..... <b>30.7</b> MBH	Load occurs at ..... <b>Nov 0000</b>
Coil CFM at Nov 0000 ..... <b>4801</b> CFM	Ent. DB / Lvg DB ..... <b>54.0 / 60.0</b> °F
Max coil CFM ..... <b>12002</b> CFM	
Water flow @ 20.0 °F drop ..... <b>3.07</b> gpm	

### Supply Fan Sizing Data

Actual max CFM at Jul 1600 ..... <b>12002</b> CFM	Fan motor BHP ..... <b>13.17</b> BHP
Standard CFM ..... <b>11869</b> CFM	Fan motor kW ..... <b>9.82</b> kW
Actual max CFM/ft <sup>2</sup> ..... <b>1.12</b> CFM/ft <sup>2</sup>	Fan static ..... <b>3.00</b> in wg

### Return Fan Sizing Data

Actual max CFM at Jul 1600 ..... <b>12002</b> CFM	Fan motor BHP ..... <b>7.87</b> BHP
Standard CFM ..... <b>11869</b> CFM	Fan motor kW ..... <b>5.87</b> kW
Actual max CFM/ft <sup>2</sup> ..... <b>1.12</b> CFM/ft <sup>2</sup>	Fan static ..... <b>2.00</b> in wg

### Outdoor Ventilation Air Data

Design airflow CFM ..... <b>872</b> CFM	CFM/person ..... <b>18.91</b> CFM/person
CFM/ft <sup>2</sup> ..... <b>0.08</b> CFM/ft <sup>2</sup>	

## Air System Sizing Summary for NW Core

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
 01:30PM

### Air System Information

Air System Name ..... **NW Core**  
 Equipment Class ..... **CW AHU**  
 Air System Type ..... **VAV**

Number of zones ..... **4**  
 Floor Area ..... **10690.0** ft<sup>2</sup>  
 Location ..... **Harrisburg, Pennsylvania**

### Sizing Calculation Information

#### Zone and Space Sizing Method:

Zone CFM ..... **Sum of space airflow rates**  
 Space CFM ..... **Individual peak space loads**

Calculation Months ..... **Jan to Dec**  
 Sizing Data ..... **Calculated**

### Zone Sizing Data

Zone Name	Maximum Cooling Sensible (MBH)	Design Air Flow (CFM)	Minimum Air Flow (CFM)	Time of Peak Load	Maximum Heating Load (MBH)	Zone Floor Area (ft <sup>2</sup> )	Zone CFM/ft <sup>2</sup>
Zone 1	39.5	1897	759	Jul 1600	53.9	1940.0	0.98
Zone 2	56.1	2655	1062	Jul 1600	78.3	2495.0	1.06
Zone 3	74.3	3549	1420	Jul 1600	97.1	2580.0	1.38
Zone 4	82.5	3901	1560	Jul 1600	105.7	3675.0	1.06

### Zone Terminal Sizing Data

Zone Name	Reheat Coil Load (MBH)	Reheat Coil Water gpm @ 20.0 °F	Zone Htg Coil Load (MBH)	Zone Htg Water gpm @ 20.0 °F	Mixing Box Fan Airflow (CFM)
Zone 1	66.1	6.61	0.0	0.00	0
Zone 2	95.3	9.54	0.0	0.00	0
Zone 3	119.8	11.99	0.0	0.00	0
Zone 4	130.7	13.08	0.0	0.00	0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft <sup>2</sup> )	Space CFM/ft <sup>2</sup>
<b>Zone 1</b>							
4-NW Corridor	1	4.6	Jul 1500	214	10.2	440.0	0.49
4-NW Wing 1	1	19.9	Jul 1700	931	22.9	750.0	1.24
4-NW Wing 2	1	16.1	Jul 1300	752	20.9	750.0	1.00
<b>Zone 2</b>							
3-NW Corridor	1	2.8	Jul 1500	130	7.5	345.0	0.38
3-NW Wing 1	1	23.7	Jul 1700	1109	26.8	750.0	1.48
3-NW Wing 2	1	18.2	Jul 1400	852	24.2	750.0	1.14
3-NW Wing 3	1	12.1	Jul 1500	565	19.9	650.0	0.87
<b>Zone 3</b>							
2-NW Corridor	1	4.5	Jul 1500	213	12.1	350.0	0.61
2-NW Wing 1	1	31.5	Jul 1700	1473	31.1	685.0	2.15
2-NW Wing 2	1	25.3	Jul 0900	1185	30.5	900.0	1.32
2-NW Wing 3	1	14.5	Jul 1500	678	23.5	645.0	1.05
<b>Zone 4</b>							
1-NW Corridor	1	1.6	Jul 1500	75	5.7	335.0	0.22
1-NW Wing 1	1	26.5	Jul 1700	1239	28.3	730.0	1.70
1-NW Wing 2	1	19.7	Jul 0900	920	25.1	715.0	1.29
1-NW Wing 3	1	13.1	Jul 1500	614	21.4	665.0	0.92
1-NW Wing 4	1	22.5	Jul 1700	1053	25.2	1230.0	0.86

# Ventilation Sizing Summary for NW Core

Project Name: ShipU, Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
01:30PM

## 1. Summary

Ventilation Sizing Method ..... Sum of Space OA Airflows  
 Design Ventilation Airflow Rate ..... 872 CFM

## 2. Space Ventilation Analysis Table

Zone Name / Space Name	Mult.	Floor Area (ft²)	Maximum Occupants	Maximum Supply Air (CFM)	Required Outdoor Air (CFM/person)	Required Outdoor Air (CFM/ft²)	Required Outdoor Air (CFM)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (CFM)
<b>Zone 1</b>									
4-NW Corridor	1	440.0	0.0	213.6	0.00	0.06	0.0	0.0	26.4
4-NW Wing 1	1	750.0	3.8	931.2	5.00	0.06	0.0	0.0	63.8
4-NW Wing 2	1	750.0	3.8	752.3	5.00	0.06	0.0	0.0	63.8
<b>Zone 2</b>									
3-NW Corridor	1	345.0	0.0	129.5	0.00	0.06	0.0	0.0	20.7
3-NW Wing 1	1	750.0	3.8	1108.9	5.00	0.06	0.0	0.0	63.8
3-NW Wing 2	1	750.0	3.8	852.1	5.00	0.06	0.0	0.0	63.8
3-NW Wing 3	1	650.0	3.3	584.7	5.00	0.06	0.0	0.0	55.3
<b>Zone 3</b>									
2-NW Corridor	1	350.0	0.0	212.6	0.00	0.06	0.0	0.0	21.0
2-NW Wing 1	1	685.0	3.4	1472.7	5.00	0.06	0.0	0.0	58.2
2-NW Wing 2	1	900.0	4.5	1185.4	5.00	0.06	0.0	0.0	76.5
2-NW Wing 3	1	645.0	3.2	678.2	5.00	0.06	0.0	0.0	54.8
<b>Zone 4</b>									
1-NW Corridor	1	335.0	0.0	74.5	0.00	0.06	0.0	0.0	20.1
1-NW Wing 1	1	730.0	3.7	1239.1	5.00	0.06	0.0	0.0	62.1
1-NW Wing 2	1	715.0	3.6	920.4	5.00	0.06	0.0	0.0	60.8
1-NW Wing 3	1	665.0	3.3	613.7	5.00	0.06	0.0	0.0	56.5
1-NW Wing 4	1	1230.0	6.2	1052.8	5.00	0.06	0.0	0.0	104.6
<b>Totals (incl. Space Multipliers)</b>				<b>12001.7</b>					<b>871.9</b>



## Air System Design Load Summary for NW Core

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
 01:30PM

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 91.4 °F / 73.8 °F			HEATING OA DB / WB 9.0 °F / 6.7 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	2172 ft²	95644	-	2172 ft²	-	-
Wall Transmission	3659 ft²	14136	-	3659 ft²	55351	-
Roof Transmission	1940 ft²	4858	-	1940 ft²	5239	-
Window Transmission	2172 ft²	28480	-	2172 ft²	130120	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	21 ft²	84	-	21 ft²	384	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	0 ft²	0	-	0 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	10323 W	35217	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	13830 W	47187	-	0	0	-
People	46	11294	9451	0	0	0
Infiltration	-	15517	23906	-	143973	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
<b>&gt;&gt; Total Zone Loads</b>	-	<b>252417</b>	<b>33357</b>	-	<b>335067</b>	<b>0</b>
Zone Conditioning	-	251413	33357	-	334649	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	11714 CFM	18913	-	4801 CFM	-3803	-
Ventilation Load	872 CFM	13808	23579	872 CFM	57402	0
Supply Fan Load	11714 CFM	31669	-	4801 CFM	-5028	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
<b>&gt;&gt; Total System Loads</b>	-	<b>315804</b>	<b>56936</b>	-	<b>383220</b>	<b>0</b>
Central Cooling Coil	-	315804	56946	-	-30664	0
Preheat Coil	-	0	-	-	2837	-
Terminal Reheat Coils	-	0	-	-	411047	-
<b>&gt;&gt; Total Conditioning</b>	-	<b>315804</b>	<b>56946</b>	-	<b>383220</b>	<b>0</b>
<b>Key:</b>	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

## Air System Sizing Summary for SE Core

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
 01:30PM

### Air System Information

Air System Name ..... <b>SE Core</b>	Number of zones ..... <b>4</b>
Equipment Class ..... <b>CW AHU</b>	Floor Area ..... <b>12060.0</b> ft <sup>2</sup>
Air System Type ..... <b>VAV</b>	Location ..... <b>Harrisburg, Pennsylvania</b>

### Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM ..... <b>Sum of space airflow rates</b>	Calculation Months ..... <b>Jan to Dec</b>
Space CFM ..... <b>Individual peak space loads</b>	Sizing Data ..... <b>Calculated</b>

### Central Cooling Coil Sizing Data

Total coil load ..... <b>35.2</b> Tons	Load occurs at ..... <b>Aug 1500</b>
Total coil load ..... <b>422.2</b> MBH	OA DB / WB ..... <b>92.0 / 74.0</b> °F
Sensible coil load ..... <b>358.4</b> MBH	Entering DB / WB ..... <b>77.7 / 62.6</b> °F
Coil CFM at Aug 1500 ..... <b>13389</b> CFM	Leaving DB / WB ..... <b>52.6 / 51.3</b> °F
Max block CFM at Aug 1500 ..... <b>14243</b> CFM	Coil ADP ..... <b>49.8</b> °F
Sum of peak zone CFM ..... <b>14243</b> CFM	Bypass Factor ..... <b>0.100</b>
Sensible heat ratio ..... <b>0.849</b>	Resulting RH ..... <b>45</b> %
ft <sup>2</sup> /Ton ..... <b>342.8</b>	Design supply temp. .... <b>55.0</b> °F
BTU/(hr-ft <sup>2</sup> ) ..... <b>35.0</b>	Zone T-stat Check ..... <b>4 of 4</b> OK
Water flow @ 12.0 °F rise ..... <b>70.40</b> gpm	Max zone temperature deviation ..... <b>0.0</b> °F

### Preheat Coil Sizing Data

Max coil load ..... <b>36.4</b> MBH	Load occurs at ..... <b>Jan 1300</b>
Coil CFM at Jan 1300 ..... <b>5697</b> CFM	Ent. DB / Lvg DB ..... <b>54.0 / 60.0</b> °F
Max coil CFM ..... <b>14243</b> CFM	
Water flow @ 20.0 °F drop ..... <b>3.64</b> gpm	

### Supply Fan Sizing Data

Actual max CFM at Aug 1500 ..... <b>14243</b> CFM	Fan motor BHP ..... <b>15.63</b> BHP
Standard CFM ..... <b>14085</b> CFM	Fan motor kW ..... <b>11.66</b> kW
Actual max CFM/ft <sup>2</sup> ..... <b>1.18</b> CFM/ft <sup>2</sup>	Fan static ..... <b>3.00</b> in wg

### Return Fan Sizing Data

Actual max CFM at Aug 1500 ..... <b>14243</b> CFM	Fan motor BHP ..... <b>9.34</b> BHP
Standard CFM ..... <b>14085</b> CFM	Fan motor kW ..... <b>6.96</b> kW
Actual max CFM/ft <sup>2</sup> ..... <b>1.18</b> CFM/ft <sup>2</sup>	Fan static ..... <b>2.00</b> in wg

### Outdoor Ventilation Air Data

Design airflow CFM ..... <b>985</b> CFM	CFM/person ..... <b>18.83</b> CFM/person
CFM/ft <sup>2</sup> ..... <b>0.08</b> CFM/ft <sup>2</sup>	

## Air System Sizing Summary for SE Core

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
 01:30PM

### Air System Information

Air System Name ..... **SE Core**  
 Equipment Class ..... **CW AHU**  
 Air System Type ..... **VAV**

Number of zones ..... **4**  
 Floor Area ..... **12060.0** ft<sup>2</sup>  
 Location ..... **Harrisburg, Pennsylvania**

### Sizing Calculation Information

Zone and Space Sizing Method:  
 Zone CFM ..... **Sum of space airflow rates**  
 Space CFM ..... **Individual peak space loads**

Calculation Months ..... **Jan to Dec**  
 Sizing Data ..... **Calculated**

### Zone Sizing Data

Zone Name	Maximum Cooling Sensible (MBH)	Design Air Flow (CFM)	Minimum Air Flow (CFM)	Time of Peak Load	Maximum Heating Load (MBH)	Zone Floor Area (ft <sup>2</sup> )	Zone CFM/ft <sup>2</sup>
Zone 1	68.0	3342	1337	Aug 1500	86.7	3130.0	1.07
Zone 2	66.3	3262	1305	Aug 1500	88.5	3065.0	1.06
Zone 3	78.8	3903	1561	Aug 1500	102.4	2980.0	1.31
Zone 4	75.2	3736	1494	Aug 1500	95.8	2885.0	1.29

### Zone Terminal Sizing Data

Zone Name	Reheat Coil Load (MBH)	Reheat Coil Water gpm @ 20.0 °F	Zone Htg Coil Load (MBH)	Zone Htg Water gpm @ 20.0 °F	Mixing Box Fan Airflow (CFM)
Zone 1	108.1	10.81	0.0	0.00	0
Zone 2	109.4	10.94	0.0	0.00	0
Zone 3	127.4	12.75	0.0	0.00	0
Zone 4	119.8	11.98	0.0	0.00	0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft <sup>2</sup> )	Space CFM/ft <sup>2</sup>
<b>Zone 1</b>							
4-SE Corridor	1	6.4	Sep 1400	300	10.2	440.0	0.68
4-SE Wing 1	1	22.2	Jul 1400	1039	28.3	920.0	1.13
4-SE Wing 2	1	17.8	Jul 1700	834	20.5	665.0	1.25
4-SE Wing 3	1	25.0	Sep 1400	1169	27.6	1105.0	1.06
<b>Zone 2</b>							
3-SE Corridor	1	2.3	Aug 1500	109	6.5	375.0	0.29
3-SE Wing 1	1	23.1	Jul 1400	1082	30.5	920.0	1.18
3-SE Wing 2	1	21.6	Aug 1600	1012	25.8	920.0	1.10
3-SE Wing 3	1	22.6	Sep 1400	1059	25.7	850.0	1.25
<b>Zone 3</b>							
2-SE Corridor	1	4.1	Sep 1400	194	10.9	430.0	0.45
2-SE Wing 1	1	29.2	Jul 0900	1367	35.3	900.0	1.52
2-SE Wing 2	1	26.3	Aug 1600	1231	27.9	800.0	1.54
2-SE Wing 3	1	23.7	Sep 1400	1111	28.3	850.0	1.31
<b>Zone 4</b>							
1-SE Corridor	1	7.3	Sep 1300	343	9.2	350.0	0.98
1-SE Wing 1	1	24.5	Jul 1400	1146	31.3	850.0	1.35
1-SE Wing 2	1	26.7	Jul 1700	1250	28.2	850.0	1.47
1-SE Wing 3	1	21.3	Sep 1400	997	27.1	835.0	1.19

# Ventilation Sizing Summary for SE Core

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
01:30PM

## 1. Summary

Ventilation Sizing Method .....  
 Design Ventilation Airflow Rate ..... **Sum of Space OA Airflows** ..... **985** CFM

## 2. Space Ventilation Analysis Table

Zone Name / Space Name	Mult.	Floor Area (ft²)	Maximum Occupants	Maximum Supply Air (CFM)	Required Outdoor Air (CFM/person)	Required Outdoor Air (CFM/ft²)	Required Outdoor Air (CFM)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (CFM)
<b>Zone 1</b>									
4-SE Corridor	1	440.0	0.0	299.8	0.00	0.06	0.0	0.0	26.4
4-SE Wing 1	1	920.0	4.6	1038.8	5.00	0.06	0.0	0.0	78.2
4-SE Wing 2	1	665.0	3.3	834.4	5.00	0.06	0.0	0.0	56.5
4-SE Wing 3	1	1105.0	5.5	1169.0	5.00	0.06	0.0	0.0	93.9
<b>Zone 2</b>									
3-SE Corridor	1	375.0	0.0	109.4	0.00	0.06	0.0	0.0	22.5
3-SE Wing 1	1	920.0	4.6	1081.8	5.00	0.06	0.0	0.0	78.2
3-SE Wing 2	1	920.0	4.6	1011.6	5.00	0.06	0.0	0.0	78.2
3-SE Wing 3	1	850.0	4.3	1059.3	5.00	0.06	0.0	0.0	72.3
<b>Zone 3</b>									
2-SE Corridor	1	430.0	0.0	194.2	0.00	0.06	0.0	0.0	25.8
2-SE Wing 1	1	900.0	4.5	1367.3	5.00	0.06	0.0	0.0	76.5
2-SE Wing 2	1	800.0	4.0	1230.5	5.00	0.06	0.0	0.0	68.0
2-SE Wing 3	1	850.0	4.3	1111.2	5.00	0.06	0.0	0.0	72.3
<b>Zone 4</b>									
1-SE Corridor	1	350.0	0.0	342.6	0.00	0.06	0.0	0.0	21.0
1-SE Wing 1	1	850.0	4.3	1146.3	5.00	0.06	0.0	0.0	72.3
1-SE Wing 2	1	850.0	4.3	1249.8	5.00	0.06	0.0	0.0	72.3
1-SE Wing 3	1	835.0	4.2	997.3	5.00	0.06	0.0	0.0	71.0
<b>Totals (incl. Space Multipliers)</b>				<b>14243.3</b>					<b>985.2</b>

## Air System Design Load Summary for SE Core

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 92.0 °F / 74.0 °F			HEATING OA DB / WB 9.0 °F / 6.7 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	2224 ft²	104686	-	2224 ft²	-	-
Wall Transmission	4597 ft²	21372	-	4597 ft²	69549	-
Roof Transmission	3130 ft²	8325	-	3130 ft²	8452	-
Window Transmission	2224 ft²	29623	-	2224 ft²	133199	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	63 ft²	256	-	63 ft²	1153	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	0 ft²	0	-	0 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	11661 W	39784	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	15698 W	53559	-	0	0	-
People	52	12819	10727	0	0	0
Infiltration	-	17951	26602	-	161031	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	288375	37329	-	373384	0
Zone Conditioning	-	287291	37329	-	372919	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	13389 CFM	20481	-	5697 CFM	-4514	-
Ventilation Load	985 CFM	16287	26509	985 CFM	64863	0
Supply Fan Load	13389 CFM	34294	-	5697 CFM	-5967	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	358352	63837	-	427301	0
Central Cooling Coil	-	358353	63848	-	-36392	0
Preheat Coil	-	0	-	-	107	-
Terminal Reheat Coils	-	0	-	-	463586	-
>> Total Conditioning	-	358353	63848	-	427301	0
<b>Key:</b>	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

# Air System Sizing Summary for Staff Office Bldg.

Project Name: ShipU. Old Main HVAC Study  
Prepared by: Century Engineering

## Air System Information

Air System Name .....	Staff Office Bldg.	Number of zones .....	1
Equipment Class .....	CW AHU	Floor Area .....	2045.0 ft <sup>2</sup>
Air System Type .....	SZCAV	Location .....	Harrisburg, Pennsylvania

## Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM .....	Sum of space airflow rates	Calculation Months .....	Jan to Dec
Space CFM .....	Individual peak space loads	Sizing Data .....	Calculated

## Central Cooling Coil Sizing Data

Total coil load .....	5.9 Tons	Load occurs at .....	Jul 1500
Total coil load .....	70.8 MBH	OA DB / WB .....	92.0 / 74.0 °F
Sensible coil load .....	60.6 MBH	Entering DB / WB .....	76.1 / 62.7 °F
Coil CFM at Jul 1500 .....	2594 CFM	Leaving DB / WB .....	54.2 / 53.0 °F
Max block CFM .....	2594 CFM	Coil ADP .....	51.8 °F
Sum of peak zone CFM .....	2594 CFM	Bypass Factor .....	0.100
Sensible heat ratio .....	0.856	Resulting RH .....	47 %
ft <sup>3</sup> /Ton .....	346.7	Design supply temp. ....	55.0 °F
BTU/(hr-ft <sup>2</sup> ) .....	34.6	Zone T-stat Check .....	1 of 1 OK
Water flow @ 12.0 °F rise .....	11.80 gpm	Max zone temperature deviation .....	0.0 °F

## Central Heating Coil Sizing Data

Max coil load .....	77.0 MBH	Load occurs at .....	Des Htg
Coil CFM at Des Htg .....	2594 CFM	BTU/(hr-ft <sup>2</sup> ) .....	37.7
Max coil CFM .....	2594 CFM	Ent. DB / Lvg DB .....	65.8 / 93.6 °F
Water flow @ 20.0 °F drop .....	7.71 gpm		

## Supply Fan Sizing Data

Actual max CFM .....	2594 CFM	Fan motor BHP .....	1.51 BHP
Standard CFM .....	2566 CFM	Fan motor kW .....	1.13 kW
Actual max CFM/ft <sup>2</sup> .....	1.27 CFM/ft <sup>2</sup>	Fan static .....	2.00 in wg

## Outdoor Ventilation Air Data

Design airflow CFM .....	174 CFM	CFM/person .....	17.00 CFM/person
CFM/ft <sup>2</sup> .....	0.09 CFM/ft <sup>2</sup>		



## Ventilation Sizing Summary for Staff Office Bldg.

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
 01:30PM

### 1. Summary

Ventilation Sizing Method .....  
 Design Ventilation Airflow Rate ..... 174 CFM  
 Sum of Space OA Airflows .....

### 2. Space Ventilation Analysis Table

Zone Name / Space Name	Mult.	Floor Area (ft <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (CFM)	Required Outdoor Air (CFM/person)	Required Outdoor Air (CFM/ft <sup>2</sup> )	Required Outdoor Air (CFM)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (CFM)
Zone 1									
Inst. Research Bldg.	1	2045.0	10.2	2594.4	5.00	0.06	0.0	0.0	173.8
<b>Totals (incl. Space Multipliers)</b>				<b>2594.4</b>					<b>173.8</b>



## Air System Design Load Summary for Staff Office Bldg.

Project Name: ShipU. Old Main HVAC Study  
Prepared by: Century Engineering

12/06/2011  
01:30PM

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 92.0 °F / 74.0 °F			HEATING OA DB / WB 9.0 °F / 6.7 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	350 ft²	14456	-	350 ft²	-	-
Wall Transmission	1076 ft²	4709	-	1076 ft²	16277	-
Roof Transmission	2040 ft²	6223	-	2040 ft²	5509	-
Window Transmission	350 ft²	4663	-	350 ft²	20968	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	84 ft²	342	-	84 ft²	1537	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	0 ft²	0	-	0 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	2045 W	6977	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	3068 W	10466	-	0	0	-
People	10	2505	2096	0	0	0
Infiltration	-	2785	3795	-	24981	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
<b>&gt;&gt; Total Zone Loads</b>	-	<b>53125</b>	<b>5891</b>	-	<b>69272</b>	<b>0</b>
Zone Conditioning	-	53584	5891	-	69553	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	2594 CFM	0	-	2594 CFM	0	-
Ventilation Load	174 CFM	3164	4300	174 CFM	11306	0
Supply Fan Load	2594 CFM	3846	-	2594 CFM	-3846	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
<b>&gt;&gt; Total System Loads</b>	-	<b>60595</b>	<b>10191</b>	-	<b>77012</b>	<b>0</b>
Central Cooling Coil	-	60595	10196	-	0	0
Central Heating Coil	-	0	-	-	77012	-
<b>&gt;&gt; Total Conditioning</b>	-	<b>60595</b>	<b>10196</b>	-	<b>77012</b>	<b>0</b>
<b>Key:</b>	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

# Air System Sizing Summary for SW Core

Project Name: ShipU. Old Main HVAC Study  
Prepared by: Century Engineering

12/06/2011  
01:30PM

## Air System Information

Air System Name .....	SW Core	Number of zones .....	4
Equipment Class .....	CW AHU	Floor Area .....	10710.0 ft <sup>2</sup>
Air System Type .....	VAV	Location .....	Harrisburg, Pennsylvania

## Sizing Calculation Information

### Zone and Space Sizing Method:

Zone CFM .....	Sum of space airflow rates	Calculation Months .....	Jan to Dec
Space CFM .....	Individual peak space loads	Sizing Data .....	Calculated

## Central Cooling Coil Sizing Data

Total coil load .....	31.2 Tons	Load occurs at .....	Aug 1500
Total coil load .....	374.3 MBH	OA DB / WB .....	92.0 / 74.0 °F
Sensible coil load .....	317.7 MBH	Entering DB / WB .....	77.7 / 62.6 °F
Coil CFM at Aug 1500 .....	11864 CFM	Leaving DB / WB .....	52.6 / 51.2 °F
Max block CFM at Aug 1500 .....	12603 CFM	Coil ADP .....	49.8 °F
Sum of peak zone CFM .....	12621 CFM	Bypass Factor .....	0.100
Sensible heat ratio .....	0.849	Resulting RH .....	45 %
ft <sup>2</sup> /Ton .....	343.3	Design supply temp. ....	55.0 °F
BTU/(hr-ft <sup>2</sup> ) .....	35.0	Zone T-stat Check .....	4 of 4 OK
Water flow @ 12.0 °F rise .....	62.42 gpm	Max zone temperature deviation .....	0.0 °F

## Preheat Coil Sizing Data

Max coil load .....	32.3 MBH	Load occurs at .....	Feb 1300
Coil CFM at Feb 1300 .....	5048 CFM	Ent. DB / Lvg DB .....	54.0 / 60.0 °F
Max coil CFM .....	12603 CFM		
Water flow @ 20.0 °F drop .....	3.23 gpm		

## Supply Fan Sizing Data

Actual max CFM at Aug 1500 .....	12603 CFM	Fan motor BHP .....	13.83 BHP
Standard CFM .....	12463 CFM	Fan motor kW .....	10.32 kW
Actual max CFM/ft <sup>2</sup> .....	1.18 CFM/ft <sup>2</sup>	Fan static .....	3.00 in wg

## Return Fan Sizing Data

Actual max CFM at Aug 1500 .....	12603 CFM	Fan motor BHP .....	8.26 BHP
Standard CFM .....	12463 CFM	Fan motor kW .....	6.16 kW
Actual max CFM/ft <sup>2</sup> .....	1.18 CFM/ft <sup>2</sup>	Fan static .....	2.00 in wg

## Outdoor Ventilation Air Data

Design airflow CFM .....	875 CFM	CFM/person .....	18.85 CFM/person
CFM/ft <sup>2</sup> .....	0.08 CFM/ft <sup>2</sup>		

## Zone Sizing Summary for SW Core

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
 01:30PM

### Air System Information

Air System Name ..... **SW Core**  
 Equipment Class ..... **CW AHU**  
 Air System Type ..... **VAV**

Number of zones ..... **4**  
 Floor Area ..... **10710.0** ft<sup>2</sup>  
 Location ..... **Harrisburg, Pennsylvania**

### Sizing Calculation Information

#### Zone and Space Sizing Method:

Zone CFM ..... **Sum of space airflow rates**  
 Space CFM ..... **Individual peak space loads**

Calculation Months ..... **Jan to Dec**  
 Sizing Data ..... **Calculated**

### Zone Sizing Data

Zone Name	Maximum Cooling Sensible (MBH)	Design Air Flow (CFM)	Minimum Air Flow (CFM)	Time of Peak Load	Maximum Heating Load (MBH)	Zone Floor Area (ft <sup>2</sup> )	Zone CFM/ft <sup>2</sup>
Zone 1	62.5	3082	1233	Aug 1600	77.4	2795.0	1.10
Zone 2	58.6	2884	1153	Aug 1500	78.2	2655.0	1.09
Zone 3	73.3	3658	1463	Sep 1500	92.7	2620.0	1.40
Zone 4	61.6	2998	1199	Aug 1500	81.3	2640.0	1.14

### Zone Terminal Sizing Data

Zone Name	Reheat Coil Load (MBH)	Reheat Coil Water gpm @ 20.0 °F	Zone Htg Coil Load (MBH)	Zone Htg Water gpm @ 20.0 °F	Mixing Box Fan Airflow (CFM)
Zone 1	97.2	9.72	0.0	0.00	0
Zone 2	96.7	9.68	0.0	0.00	0
Zone 3	116.2	11.62	0.0	0.00	0
Zone 4	100.6	10.06	0.0	0.00	0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft <sup>2</sup> )	Space CFM/ft <sup>2</sup>
<b>Zone 1</b>							
4-SW Corridor	1	6.4	Sep 1400	300	10.2	440.0	0.68
4-SW Wing 1	1	16.8	Jul 1700	788	19.5	595.0	1.32
4-SW Wing 2	1	18.3	Jul 1700	854	21.0	695.0	1.23
4-SW Wing 3	1	24.3	Sep 1400	1140	26.8	1065.0	1.07
<b>Zone 2</b>							
3-SW Corridor	1	2.2	Aug 1500	104	6.1	345.0	0.30
3-SW Wing 1	1	18.0	Jul 1700	843	21.4	595.0	1.42
3-SW Wing 2	1	15.8	Jul 1400	741	21.4	595.0	1.25
3-SW Wing 3	1	25.5	Sep 1400	1196	29.3	1120.0	1.07
<b>Zone 3</b>							
2-SW Corridor	1	3.8	Sep 1400	176	9.1	335.0	0.53
2-SW Wing 1	1	27.1	Jul 1700	1268	26.7	575.0	2.20
2-SW Wing 2	1	20.8	Aug 1400	975	26.7	845.0	1.15
2-SW Wing 3	1	26.5	Sep 1400	1239	30.3	865.0	1.43
<b>Zone 4</b>							
1-SW Corridor	1	2.7	Sep 1400	126	6.0	310.0	0.41
1-SW Wing 1	1	23.0	Jul 1700	1076	24.5	630.0	1.71
1-SW Wing 2	1	18.6	Aug 1400	871	24.8	850.0	1.03
1-SW Wing 3	1	19.7	Sep 1400	924	25.9	850.0	1.09

## Ventilation Sizing Summary for SW Core

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
 01:30PM

### 1. Summary

Ventilation Sizing Method ..... Sum of Space OA Airflows  
 Design Ventilation Airflow Rate ..... 875 CFM

### 2. Space Ventilation Analysis Table

Zone Name / Space Name	Mult.	Floor Area (ft <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (CFM)	Required Outdoor Air (CFM/person)	Required Outdoor Air (CFM/ft <sup>2</sup> )	Required Outdoor Air (CFM)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (CFM)
<b>Zone 1</b>									
4-SW Corridor	1	440.0	0.0	299.8	0.00	0.06	0.0	0.0	26.4
4-SW Wing 1	1	595.0	3.0	787.8	5.00	0.06	0.0	0.0	50.6
4-SW Wing 2	1	695.0	3.5	854.4	5.00	0.06	0.0	0.0	59.1
4-SW Wing 3	1	1065.0	5.3	1139.8	5.00	0.06	0.0	0.0	90.5
<b>Zone 2</b>									
3-SW Corridor	1	345.0	0.0	103.8	0.00	0.06	0.0	0.0	20.7
3-SW Wing 1	1	595.0	3.0	842.7	5.00	0.06	0.0	0.0	50.6
3-SW Wing 2	1	595.0	3.0	741.3	5.00	0.06	0.0	0.0	50.6
3-SW Wing 3	1	1120.0	5.6	1195.9	5.00	0.06	0.0	0.0	95.2
<b>Zone 3</b>									
2-SW Corridor	1	335.0	0.0	176.4	0.00	0.06	0.0	0.0	20.1
2-SW Wing 1	1	575.0	2.9	1267.8	5.00	0.06	0.0	0.0	48.9
2-SW Wing 2	1	845.0	4.2	974.9	5.00	0.06	0.0	0.0	71.8
2-SW Wing 3	1	865.0	4.3	1238.7	5.00	0.06	0.0	0.0	73.5
<b>Zone 4</b>									
1-SW Corridor	1	310.0	0.0	126.2	0.00	0.06	0.0	0.0	18.6
1-SW Wing 1	1	630.0	3.2	1076.3	5.00	0.06	0.0	0.0	53.6
1-SW Wing 2	1	850.0	4.3	871.5	5.00	0.06	0.0	0.0	72.3
1-SW Wing 3	1	850.0	4.3	923.9	5.00	0.06	0.0	0.0	72.3
<b>Totals (incl. Space Multipliers)</b>				<b>12621.1</b>					<b>874.6</b>

## Air System Design Load Summary for SW Core

Project Name: ShipU. Old Main HVAC Study  
 Prepared by: Century Engineering

12/06/2011  
 01:30PM

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 92.0 °F / 74.0 °F			HEATING OA DB / WB 9.0 °F / 6.7 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	1901 ft²	92904	-	1901 ft²	-	-
Wall Transmission	4255 ft²	18905	-	4255 ft²	64373	-
Roof Transmission	2795 ft²	8097	-	2795 ft²	7547	-
Window Transmission	1901 ft²	25322	-	1901 ft²	113859	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	63 ft²	256	-	63 ft²	1153	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	0 ft²	0	-	0 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	10353 W	35319	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	13920 W	47494	-	0	0	-
People	46	11367	9512	0	0	0
Infiltration	-	15917	23592	-	142782	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
<b>&gt;&gt; Total Zone Loads</b>	-	<b>255581</b>	<b>33104</b>	-	<b>329714</b>	<b>0</b>
Zone Conditioning	-	254565	33104	-	329304	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	11864 CFM	18187	-	5048 CFM	-4001	-
Ventilation Load	875 CFM	14455	23536	875 CFM	57580	0
Supply Fan Load	11864 CFM	30452	-	5048 CFM	-5292	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
<b>&gt;&gt; Total System Loads</b>	-	<b>317659</b>	<b>56640</b>	-	<b>377591</b>	<b>0</b>
Central Cooling Coil	-	317659	56656	-	-32251	0
Preheat Coil	-	0	-	-	198	-
Terminal Reheat Coils	-	0	-	-	409645	-
<b>&gt;&gt; Total Conditioning</b>	-	<b>317659</b>	<b>56656</b>	-	<b>377591</b>	<b>0</b>
<b>Key:</b>	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

# **Appendix C**

## **Sample Equipment Submittals**

# **Appendix C-1**

**McQuay**



## Submittal Package

**Prepared For:**

**Date:** 10/28/2011

**Job Number:** KY8MGV

**Job Name:** Shippensburg Old Main

**Prepared By:**

*{Insert Your Text here...}*

**Sold To:**

**Customer P.O. Number:**

---

Notes



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# Technical Data Sheet for AHU-40 Ton

<b>QUOTE ID</b>	KY8MGV(XX.000)	<b>REP. OFFICE</b>	TriState HVAC-York
<b>JOB NAME</b>	Shippensburg Old Main	<b>SALESPERSON</b>	SW
<b>MODEL NUMBER</b>	CAH030GDAC	<b>ENGINEER</b>	
<b>UNIT TAGGING</b>	AHU-40 Ton	<b>VERSION</b>	9.43

Unit configuration	Inline horizontal		
Drive (handing) location	Right		
	<b>SUPPLY</b>	<b>RETURN / EXHAUST</b>	
Air volume	13000	14000	s cfm
Altitude	0	0	ft
Turning loss	0.00	0.00	in WC.
External static	1.50	1.00	in WC.
Total static	3.00	1.08	in WC.
External H x W	60 x 98	60 x 98 (Not including base rails)	ins

<b>CASING DETAILS</b>	
Outer panel	Standard G90 galv steel (unpainted)
Liner	Galvanized steel (Unless noted per section)
Insulation	R-13 Injected Foam (Unless noted per section)
Frame	2 ins
Base	6" formed channel
Sound baffles	None (Unless noted per section)
Tread Plate floor liner	None (unless noted per section)
Shrink wrapping	No

<b>1 RETURN/EXHAUST FAN SECTION(56 ins)</b>				<b>SECTION</b>	<b>1</b>
Air volume	14000	cfm	Motor power	10.0	HP
External static pressure	1.00	ins WC	Motor type	ODP	
Total static pressure	1.08	ins WC	Frame size	215 T frame	
Cabinet static pressure	0	ins WC	Electrical supply	460/60/3	
Type	Centrifugal DWDI		Motor efficiency	Premium	
Blade type/Class	Forward Curved / 2		Motor speed	1750	rpm
Quantity of Fans	1		Block-off Plate	No	
Fan wheel diameter	22.25	ins	Motor pole	4	
Brake horsepower	8.47	HP	Full load current	12.8	A
Operating/Max speed	580 / 1030	rpm	Lock rotor current	106	A
Orientation	Top horizontal		Motor supplier	Generic	
Air modulation	None		Actual drive service fac.	1.42	
Drip pan	None		Bearing type	Standard - L50 (200K)	
Drip pan side	-		Outlet velocity	2222	ft/m
Wheel guard	None		Inlet screen	None	
Belt guard	None		Outlet screen	None	
Inspection port	None		Motor location	To Side of Fan	
Material type	N/A		Number of blades	N/A	

<b>DRIVES *</b>			
Fan sheave	2B5V136	Motor sheave	2BK50H
Number of belts	2	Belt	BX70

\* McQuay reserves the right to provide a different but equivalent drive package.

<b>ANTI-VIBRATION MOUNTS / SPRINGS</b>	
Type	Spring
Seismic restraint	None

<b>DOOR DATA</b>			
Door location	Drive side	Window size	None
Door width	16 ins	Light	None

<b>1 RETURN/EXHAUST FAN SECTION(56 ins)</b>	<b>SECTION 1</b>
---	------------------

Door opening                      Outward

<b>VFD / STARTER / DISCONNECT DATA</b>
--

Selection type	VFD - NEMA 1	Vendor	ABB
Auxiliary Control	Combination Disconnect and Bypass	Voltage	460
Disconnect Type	Fused		
Mounting	Door Side	H x W x D	19.09 x 7.42 x 9.89    ins
Enclosure	NEMA 1	Coil Voltage	N/A
Line Reactor	None	Hand Off Auto Switch	None
120V Ctrl Transformer	Provided		
VFD Quantity	1		

<b>2 ECONOMIZER(64 ins)</b>	<b>SECTION 1 &amp; 2</b>
-----------------------------	--------------------------

Drip pan                              None                              Drip side  
 Floor grating                      No

	OUTSIDE AIR	RETURN AIR	EXHAUST AIR	
Length x Width	28.00 x 94.00	28.00 x 94.00	28.00 x 94.00	ins
Location	Top	Internal	Top	
Dampers	UltraSeal Low Leak	UltraSeal Low Leak	UltraSeal Low Leak	
Actuation	-	-	-	
Hoods				
Rated cfm	13000	14000	14000	cfm
Air pressure drop	0.07	0.08	0.08	in WC
Quantity	1	1	1	

<b>DOOR DATA</b>
------------------

Door location	Drive side	Window size	None
Door width	28                      ins	Light	None
Door opening	Outward		

<b>3 PANEL FILTER(12 ins)</b>	<b>SECTION 2</b>
-------------------------------	------------------

Type	Pleated	Clean air press. drop	0.30	ins WC
Efficiency	MERV 8	Mean air press. drop	0.65	ins WC
Face velocity	397                      fpm	Dirty air press. drop	1.00	ins WC
Face area	32.7                      ft2	Access	Side	
Air volume	13000                      cfm			

<b>BANK ARRANGEMENT</b>
-------------------------

<b>No. of Filters</b>	<b>Size H x W x D</b>	
8.0	20 x 24 x 2	ins
4.0	12 x 24 x 2	

<b>DOOR DATA</b>
------------------

Door location	Drive side	Window size	None
Door width	8                              ins	Light	None
Door opening	Outward		

<b>SPECIAL</b>
----------------

Intersept Antimicrobial treatment

Tread Plate floor liner	None		
Liner	(As casing details)		
Insulation	(As casing details)		
Sound baffles	None		
Special static pressure	-	ins WC	Filter Gauge    None

<b>4 HOT WATER COIL(24 ins)</b>	<b>SECTION 2</b>
---------------------------------	------------------

Coil model	5WH0902B		Number of coils	2	
Capacity	743531	Btu/h	Number of rows	2	
			Fins per inch	9	
Air volume	13000	cfm			
Entering db	40.0	F	Entering water	160.0	F
Leaving db	92.3	F	Leaving water	139.1	F
Finned height x length	24 x 82	ins	Water flow rate	71.10	gpm
Face area	27.33	ft2	Water pressure drop	6.80	ftHD
Face velocity	476	ft/m	Water velocity	4.70	ft/s
Coil air pressure drop	0.16	ins WC			
			Fluid volume	9.0	gal
			Fluid weight	76.00	lb
Connection type	Threaded		Fin material	Aluminum (.0075)	
Connection Qty x size	2 x 2.50	ins	Tube material	Copper (.020)	
Connection location	Drive side		Header material	Copper	
Connection material	Carbon steel		Case material	Galvanized track	
Glycol type (%)	- (0 %)		Drip pan	None	
Fouling Factor	0		Drip pan side	-	
			Turbospirals	No	
Coil code	5WH0902B		Electro-fin coat	None	

<b>DOOR DATA</b>
------------------

Door location	Drive side		Window size	None
Door width	14	ins	Light	None
Door opening	Outward			

<b>5 CHILLED WATER COIL(28 ins)</b>	<b>SECTION 2</b>
-------------------------------------	------------------

Coil model	5WL1205B		Number of coils	2	
Total capacity	530433	Btu/h	Number of rows	5	
Sensible capacity	365565	Btu/h	Fins per inch	12	
Air volume	13000	cfm			
Entering db/wb	80.0 / 67.0	F	Entering water	45.0	F
Leaving db/wb	54.3 / 53.7	F	Leaving water	55.2	F
Finned height x length	24 x 85	ins	Water flow rate	104.10	gpm
Face area	28.33	ft2	Water pressure drop	12.90	ftHD
Face velocity	459	ft/m	Water velocity	4.70	ft/s
Coil air pressure drop	0.61	ins WC			
			Fluid volume	19.0	gal
			Fluid weight	162.00	lb
Connection type	Threaded		Fin material	Aluminum (.0075)	
Connection Qty x size	2 x 2.00	ins	Tube material	Copper (.020)	
Connection location	Drive side		Header material	Copper	
Connection material	Carbon steel		Case material	Galv. steel	
Glycol type (%)	- (0 %)		Drain pan	Stainless steel	
Fouling Factor	0		Drain pan side	Drive side	
			Turbospirals	No	
Coil code	5WL1205B		Electro-fin coat	None	

<b>6 SUPPLY FAN SECTION(58 ins)</b>	<b>SECTION 3</b>
-------------------------------------	------------------

Air volume	13000	cfm	Motor power	15.0	HP
External static pressure	1.50	ins WC	Motor type	ODP	
Total static pressure	3.00	ins WC	Frame size	254 T frame	
Cabinet static pressure	0	ins WC	Electrical supply	460/60/3	
Type	Centrifugal DWDI		Motor efficiency	Premium	
Blade type/Class	Airfoil / 2		Motor speed	1750	rpm
Quantity of Fans	1		Block-off Plate	No	
Fan wheel diameter	24.00	ins	Motor pole	4	
Brake horsepower	9.28	HP	Full load current	18.9	A
Operating/Max speed	1554 / 2255	rpm	Lock rotor current	118	A
Orientation	Top horizontal		Motor supplier	Generic	
Air modulation	None		Actual drive service fac.	1.34	
Drip pan	None		Bearing type	Standard - L50 (200K)	
Drip pan side	-		Outlet velocity	1847	ft/m
Wheel guard	None		Inlet screen	None	
Belt guard	None		Outlet screen	None	
Inspection port	None		Motor location	To Side of Fan	
Material type	N/A		Number of blades	N/A	

<b>DRIVES *</b>
-----------------

Fan sheave	2B5V54	Motor sheave	2B5V48
Number of belts	2	Belt	5VX560

\* McQuay reserves the right to provide a different but equivalent drive package.

<b>ANTI-VIBRATION MOUNTS / SPRINGS</b>
--

Type	Spring
Seismic restraint	None

<b>DOOR DATA</b>
------------------

Door location	Drive side	Window size	None
Door width	18 ins	Light	None
Door opening	Outward		

<b>VFD / STARTER / DISCONNECT DATA</b>
--

Selection type	VFD - NEMA 1	Vendor	ABB
Auxiliary Control	Combination Disconnect and Bypass	Voltage	460
Disconnect Type	Fused		
Mounting	Door Side	H x W x D	19.09 x 7.42 x 9.89 ins
Enclosure	NEMA 1	Coil Voltage	N/A
Line Reactor	None	Hand Off Auto Switch	None
120V Ctrl Transformer	Provided		
VFD Quantity	1		

<b>NOTES</b>
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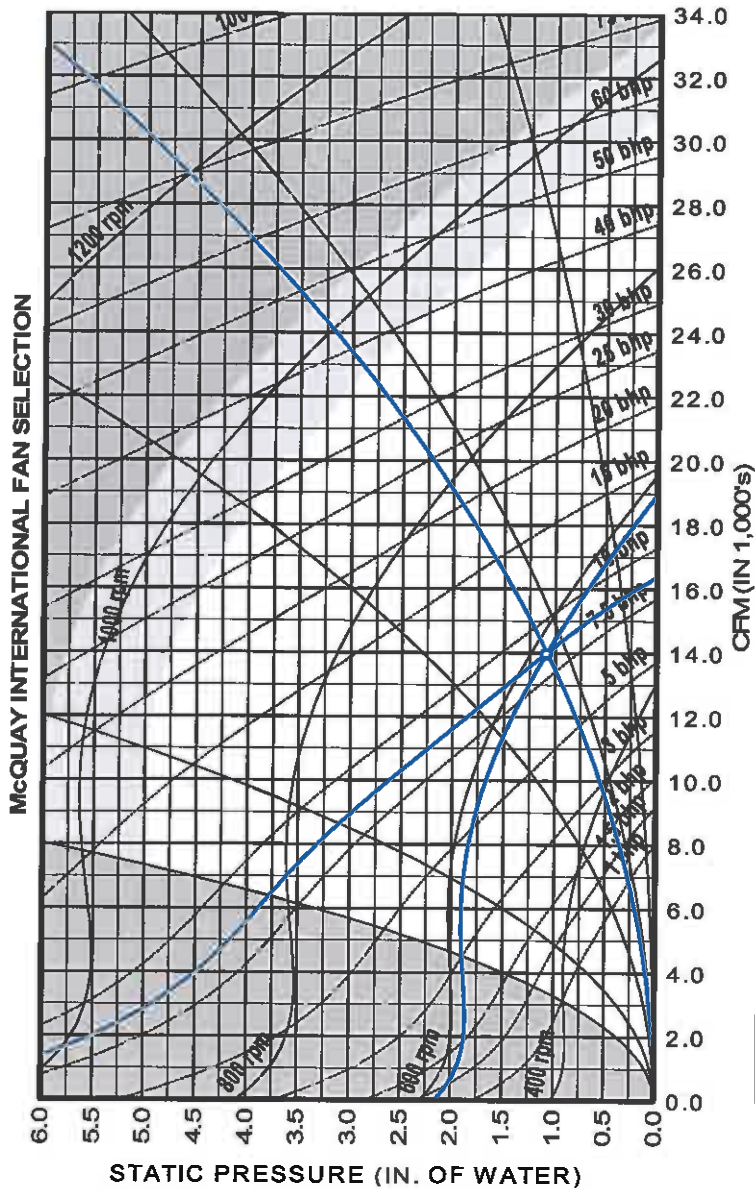
Supply fan performance is certified in accordance with the Central Station Air-Handling Unit Certification Program, which is based on ARI Standard 430.  
 As a standalone component, unit meets or exceeds requirements of ASHRAE 90.1 - 2007. The approving authority is responsible for compliance of multi-component building systems.

<b>SHIPPING SECTION DETAILS</b>
---------------------------------

	Length (inches)	Weight (lb)
Section 1	88	1746
Section 2	96	2502
Section 3	58	1703
<b>TOTALS</b>	<b>242.00 (Lower level total)</b>	<b>5951 (Entire unit weight)</b>

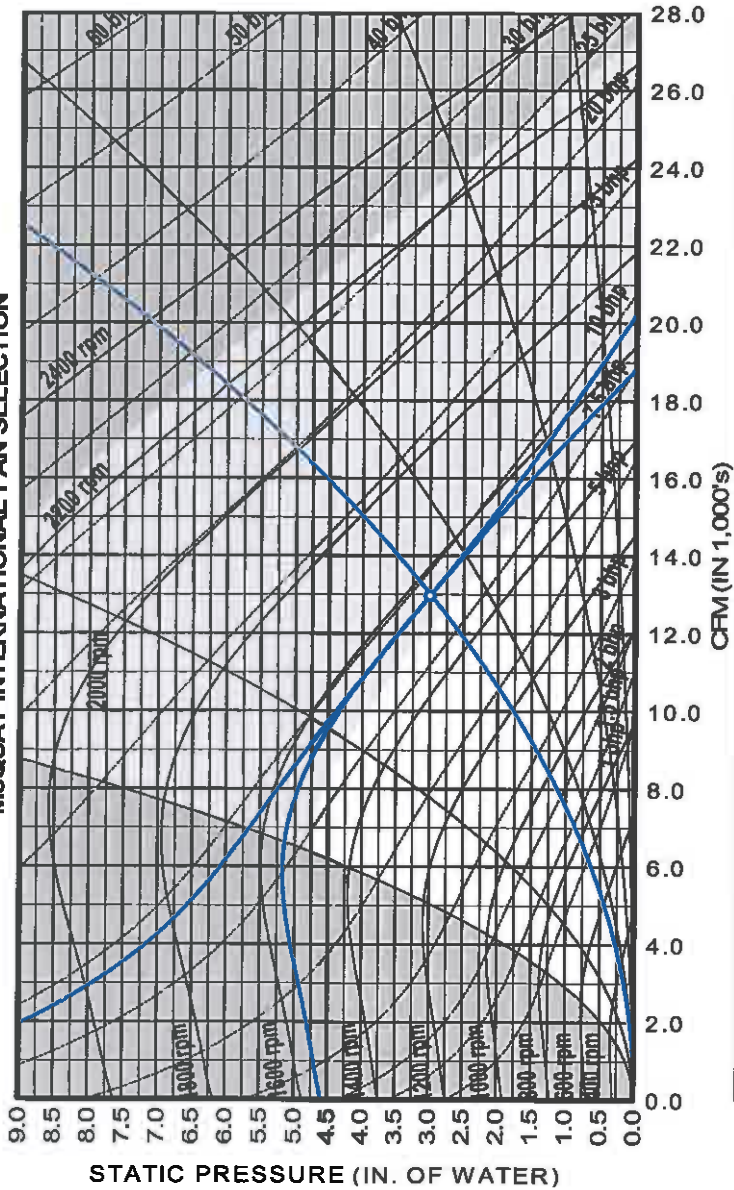
<b>UNIT SOUND</b>	<b>63 Hz</b>	<b>125 Hz</b>	<b>250 Hz</b>	<b>500 Hz</b>	<b>1000 Hz</b>	<b>2000 Hz</b>	<b>4000 Hz</b>	<b>8000 Hz</b>
Radiated	88	88	83	75	69	61	44	36
Unit discharge	90	92	93	88	85	79	75	67
Unit return	95	94	92	90	88	83	78	71


# Fan Curve for AHU-40 Ton



22.25" Forward Curved Ret/Exh Fan at Standard Conditions					
Air volume	14000	cfm	Fan speed	580	rpm
Total static	1.08	insWg	Max speed	1030	rpm
Brake horsepower	8.5	bhp	Efficiency	28.0	%
Unit tagging	AHU-40 Ton		Date	October-28-2011	
Job name	Shippensburg Old Main		Time	13:54	

**McQUAY INTERNATIONAL FAN SELECTION**



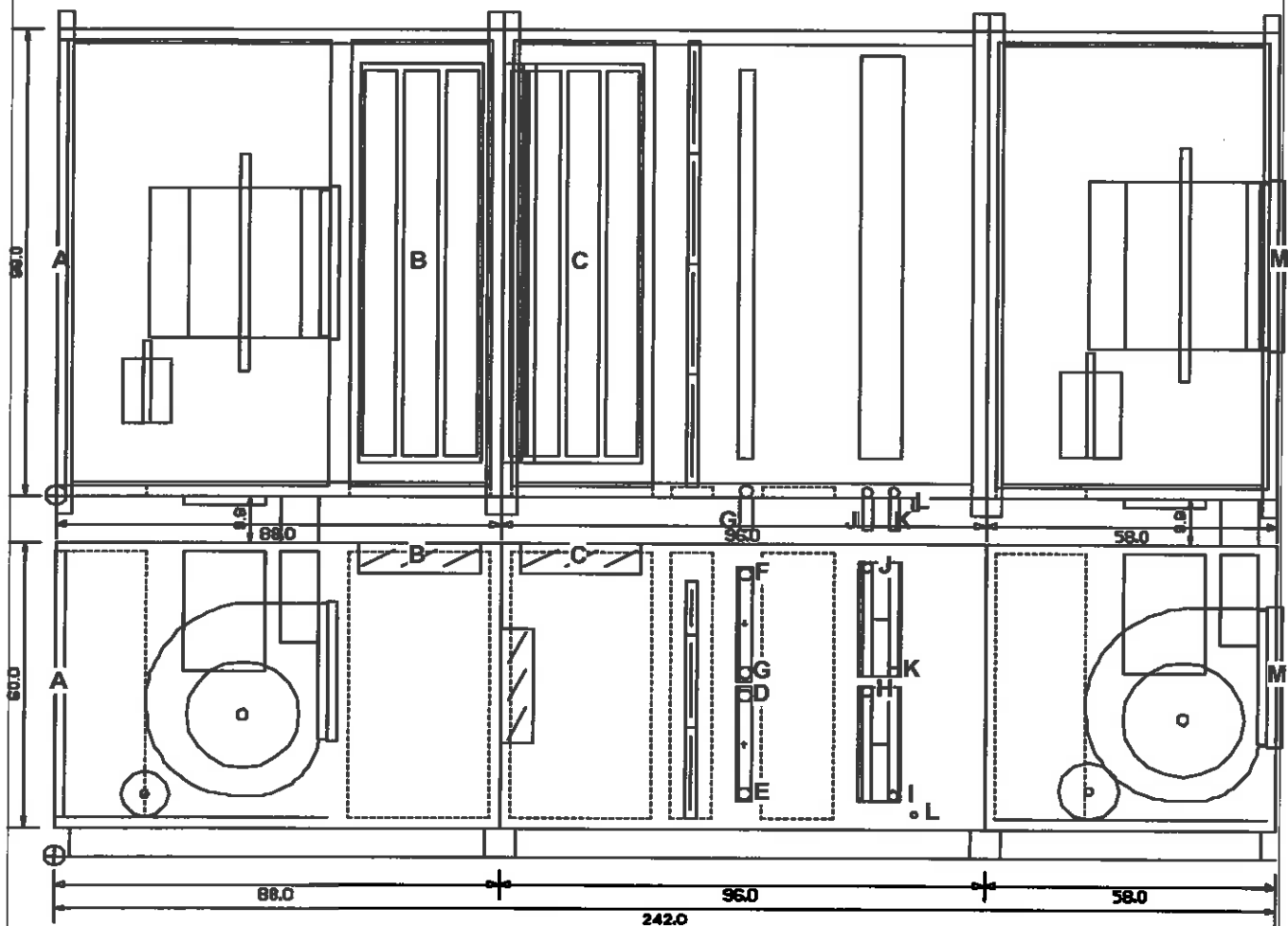
24.00" Airfoil Supply Fan at Standard Conditions					
Air volume	13000	cfm	Fan speed	1554	rpm
Total static	3.00	insWg	Max speed	2255	rpm
Brake horsepower	9.3	bhp	Efficiency	66.0	%
Unit tagging	AHU-40 Ton		Date	October-28-2011	
Job name	Shippensburg Old Main		Time	13:54	
 Supply fan performance is certified in accordance with the Central Station Air-Handling Unit Certification Program, which is based on ARI Standard 430.					



# Drawing for AHU-40 Ton

Opening	X	Y	Z	W(Width)	H(Height)
A Exhaust inlet	0.00	2.00	8.00	94.00	56.00
B Damper	58.00	2.00	66.00	94.00	28.00
C Damper	90.00	2.00	66.00	94.00	28.00
D Hot water outlet	136.57	-7.00	34.05	2.50ins. MPS	-
E Hot water inlet	136.57	-7.00	13.40	2.50ins. MPS	-
F Hot water outlet	136.57	-7.00	59.45	2.50ins. MPS	-
G Hot water inlet	136.57	-7.00	38.80	2.50ins. MPS	-
H Cold water outlet	160.60	-7.00	34.94	2.00ins. MPS	-
I Cold water inlet	165.85	-7.00	13.06	2.00ins. MPS	-
J Cold water outlet	160.60	-7.00	60.94	2.00ins. MPS	-
K Cold water inlet	165.85	-7.00	39.06	2.00ins. MPS	-
L Condensate drain conn.	170.00	-2.90	9.00	1.25ins. MPS	-
M Fan discharge	243.00	31.03	23.61	35.95	29.51

Dimensions measured from ⊕



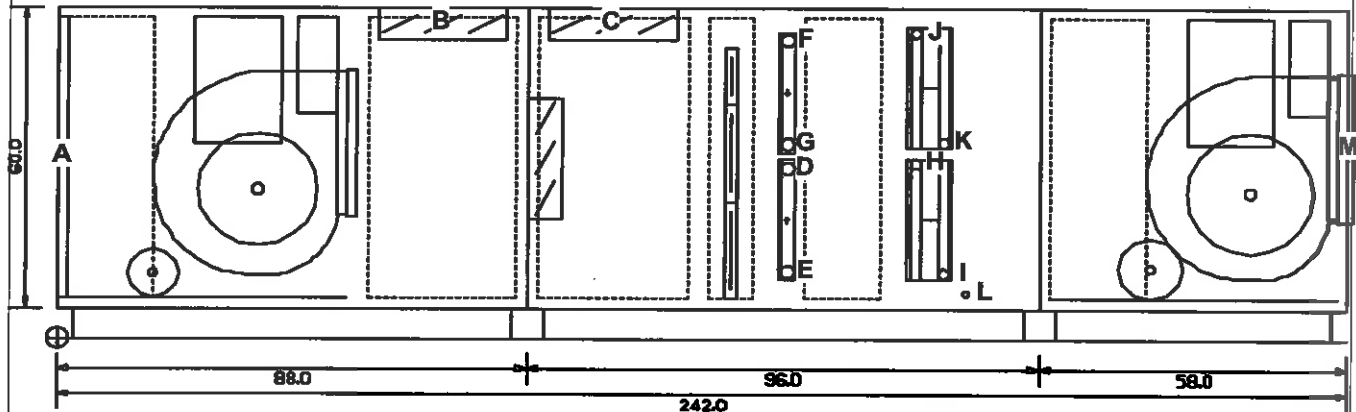
NOTE: Base 6.00ins deep, Cross members extend 4ins on each side of the unit.

VIEW: General Arrangement No Ends  
 DRAWN: October-28-2011 (13:53)  
 JOB NAME: Shippensburg Old Main  
 UNIT TAGGING: AHU-40 Ton  
 MODEL: CAH030GDAC



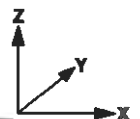
Opening	X	Y	Z	W(Width)	H(Height)
A Exhaust inlet	0.00	2.00	8.00	94.00	56.00
B Damper	58.00	2.00	66.00	94.00	28.00
C Damper	90.00	2.00	66.00	94.00	28.00
D Hot water outlet	136.57	-7.00	34.05	2.50ins. MPS	
E Hot water inlet	136.57	-7.00	13.40	2.50ins. MPS	
F Hot water outlet	136.57	-7.00	59.45	2.50ins. MPS	
G Hot water inlet	136.57	-7.00	38.80	2.50ins. MPS	
H Cold water outlet	160.60	-7.00	34.94	2.00ins. MPS	
I Cold water inlet	165.85	-7.00	13.06	2.00ins. MPS	
J Cold water outlet	160.60	-7.00	60.94	2.00ins. MPS	
K Cold water inlet	165.85	-7.00	39.06	2.00ins. MPS	
L Condensate drain conn.	170.00	-2.90	9.00	1.25ins. MPS	
M Fan discharge	243.00	31.03	23.61	35.95	29.51

Dimensions measured from ⊕



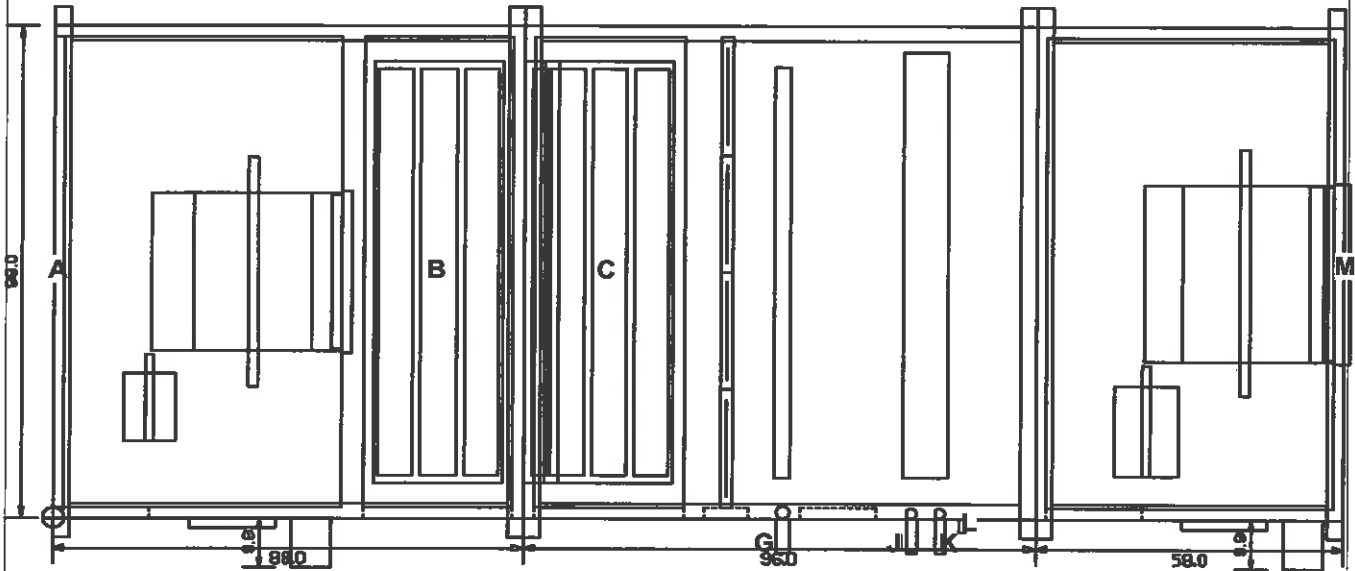
NOTE: Base 6.00ins deep, Cross members extend 4ins on each side of the unit.

VIEW: Right Side  
 DRAWN: October-28-2011 (13:53)  
 JOB NAME: Shippensburg Old Main  
 UNIT TAGGING: AHU-40 Ton  
 MODEL: CAH030GDAC



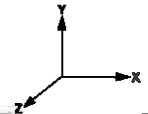
Opening	X	Y	Z	W(Width)	H(Height)
A Exhaust inlet	0.00	2.00	8.00	94.00	56.00
B Damper	58.00	2.00	66.00	94.00	28.00
C Damper	90.00	2.00	66.00	94.00	28.00
D Hot water outlet	136.57	-7.00	34.05	2.50ins. MPS	-
E Hot water inlet	136.57	-7.00	13.40	2.50ins. MPS	-
F Hot water outlet	136.57	-7.00	59.45	2.50ins. MPS	-
G Hot water inlet	136.57	-7.00	38.80	2.50ins. MPS	-
H Cold water outlet	160.60	-7.00	34.94	2.00ins. MPS	-
I Cold water inlet	165.85	-7.00	13.06	2.00ins. MPS	-
J Cold water outlet	160.60	-7.00	60.94	2.00ins. MPS	-
K Cold water inlet	165.85	-7.00	39.06	2.00ins. MPS	-
L Condensate drain conn.	170.00	-2.90	9.00	1.25ins. MPS	-
M Fan discharge	243.00	31.03	23.61	35.95	29.51

Dimensions measured from ⊕



NOTE: Base 6.00ins deep, Cross members extend 4ins on each side of the unit.

VIEW: Top  
 DRAWN: October-28-2011 (13:53)  
 JOB NAME: Shippensburg Old Main  
 UNIT TAGGING: AHU-40 Ton  
 MODEL: CAH030GDAC



# Technical Data Sheet for AHU-80 ton

<b>QUOTE ID</b>	KY8MGV(XX.001)	<b>REP. OFFICE</b>	TriState HVAC-York
<b>JOB NAME</b>	Shippensburg Old Main	<b>SALESPERSON</b>	SW
<b>MODEL NUMBER</b>	CAH065GDAC	<b>ENGINEER</b>	
<b>UNIT TAGGING</b>	AHU-80 ton	<b>VERSION</b>	9.43

Unit configuration	Inline horizontal		
Drive (handing) location	Right		
	<b>SUPPLY</b>	<b>RETURN / EXHAUST</b>	
Air volume	26000	28000	s cfm
Altitude	0	0	ft
Turning loss	0.00	0.00	in WC.
External static	1.50	1.00	in WC.
Total static	2.78	1.06	in WC.
External H x W	92 x 136	92 x 136 (Not including base rails)	ins

<b>CASING DETAILS</b>	
Outer panel	Standard G90 galv steel (unpainted)
Liner	Galvanized steel (Unless noted per section)
Insulation	R-13 Injected Foam (Unless noted per section)
Frame	2 ins
Base	6" formed channel
Sound baffles	None (Unless noted per section)
Tread Plate floor liner	None (unless noted per section)
Shrink wrapping	No

<b>1 RETURN/EXHAUST FAN SECTION(82 ins)</b>				<b>SECTION</b>	<b>1</b>
Air volume	28000	cfm	Motor power	15.0	HP
External static pressure	1.00	ins WC	Motor type	ODP	
Total static pressure	1.06	ins WC	Frame size	254 T frame	
Cabinet static pressure	0	ins WC	Electrical supply	460/60/3	
Type	Centrifugal DWDI		Motor efficiency	Premium	
Blade type/Class	Forward Curved / 2		Motor speed	1750	rpm
Quantity of Fans	1		Block-off Plate	No	
Fan wheel diameter	33.00	ins	Motor pole	4	
Brake horsepower	11.15	HP	Full load current	18.9	A
Operating/Max speed	351 / 763	rpm	Lock rotor current	118	A
Orientation	Top horizontal		Motor supplier	Generic	
Air modulation	None		Actual drive service fac.	1.38	
Drip pan	None		Bearing type	Standard - L50 (200K)	
Drip pan side	-		Outlet velocity	2363	ft/m
Wheel guard	None		Inlet screen	None	
Belt guard	None		Outlet screen	None	
Inspection port	None		Motor location	To Side of Fan	
Material type	N/A		Number of blades	N/A	

<b>DRIVES *</b>			
Fan sheave	3TB250	Motor sheave	3B5V48
Number of belts	3	Belt	B116

\* McQuay reserves the right to provide a different but equivalent drive package.

<b>ANTI-VIBRATION MOUNTS / SPRINGS</b>	
Type	Spring
Seismic restraint	None

<b>DOOR DATA</b>			
Door location	Drive side	Window size	None
Door width	30	Light	None
Door opening	Outward		

**VFD / STARTER / DISCONNECT DATA**

Selection type	VFD - NEMA 1	Vendor	ABB
Auxiliary Control	Combination Disconnect and Bypass	Voltage	460
Disconnect Type	Fused		
Mounting	Door Side	H x W x D	19.09 x 7.42 x 9.89 ins
Enclosure	NEMA 1	Coil Voltage	N/A
Line Reactor	None	Hand Off Auto Switch	None
120V Ctrl Transformer	Provided		
VFD Quantity	1		

**2 ECONOMIZER(92 ins) SECTION 2**

Drip pan	None	Drip side	-
Floor grating	No		

	OUTSIDE AIR	RETURN AIR	EXHAUST AIR	
Length x Width	42.00 x 132.00	42.00 x 132.00	42.00 x 132.00	ins
Location	Top	Internal	Top	
Dampers	UltraSeal Low Leak	UltraSeal Low Leak	UltraSeal Low Leak	
Actuation	-	-	-	
Hoods				
Rated cfm	26000	28000	28000	cfm
Air pressure drop	0.05	0.06	0.06	in WC
Quantity	1	1	1	

**DOOR DATA**

Door location	Drive side	Window size	None
Door width	30 ins	Light	None
Door opening	Outward		

**3 PANEL FILTER(12 ins) SECTION 3**

Type	Pleated	Clean air press. drop	0.26	ins WC
Efficiency	MERV 8	Mean air press. drop	0.63	ins WC
Face velocity	353 fpm	Dirty air press. drop	1.00	ins WC
Face area	73.6 ft2	Access	Side	
Air volume	26000 cfm			

**BANK ARRANGEMENT**

No. of Filters	Size H x W x D	
3.0	24 x 24 x 2	Ins
15.0	24 x 20 x 2	
3.0	24 x 12 x 2	
5.0	12 x 24 x 2	

**DOOR DATA**

Door location	Drive side	Window size	None
Door width	8 ins	Light	None
Door opening	Outward		

**SPECIAL**

Intersept Antimicrobial treatment				
Tread Plate floor liner	None			
Liner	(As casing details)			
Insulation	(As casing details)			
Sound baffles	None			
Special static pressure	-	ins WC	Filter Gauge	None

<b>4 HOT WATER COIL(24 ins)</b>	<b>SECTION 3</b>
---------------------------------	------------------

Coil model	5WB1202B	Number of coils	2
Capacity	1455556	Btu/h	Number of rows
			2
			Fins per inch
			12
Air volume	26000	cfm	
Entering db	40.0	F	Entering water
Leaving db	91.2	F	160.0
Finned height x length	39 x 120	ins	Leaving water
Face area	65.00	ft2	139.5
Face velocity	400	ft/m	Water flow rate
Coil air pressure drop	0.15	ins WC	142.20
			Water pressure drop
			8.80
			Water velocity
			5.80
			Fluid volume
			11.0
			Fluid weight
			99.00
			gal
			lb
Connection type	Threaded		Fin material
Connection Qty x size	2 x 2.50	ins	Aluminum (.0075)
Connection location	Drive side		Tube material
Connection material	Carbon steel		Copper (.020)
Glycol type (%)	- (0 %)		Header material
Fouling Factor	0		Copper
			Case material
			Galvanized track
			Drip pan
			None
			Drip pan side
			-
			Turbospirals
			No
Coil code	5WB1202B		Electro-fin coat
			None

<b>DOOR DATA</b>
------------------

Door location	Drive side	Window size	None
Door width	14	ins	Light
Door opening	Outward		None

<b>5 CHILLED WATER COIL(28 ins)</b>	<b>SECTION 3</b>
-------------------------------------	------------------

Coil model	5WS0806B	Number of coils	2
Total capacity	1062272	Btu/h	Number of rows
Sensible capacity	725066	Btu/h	6
			Fins per inch
			8
Air volume	26000	cfm	
Entering db/wb	80.0 / 67.0	F	Entering water
Leaving db/wb	54.5 / 53.7	F	45.0
Finned height x length	39 x 123	ins	Leaving water
Face area	66.63	ft2	55.2
Face velocity	390	ft/m	Water flow rate
Coil air pressure drop	0.44	ins WC	208.20
			Water pressure drop
			16.00
			Water velocity
			4.30
			Fluid volume
			51.0
			Fluid weight
			431.00
			gal
			lb
Connection type	Threaded		Fin material
Connection Qty x size	2 x 2.50	ins	Aluminum (.0075)
Connection location	Drive side		Tube material
Connection material	Carbon steel		Copper (.020)
Glycol type (%)	- (0 %)		Header material
Fouling Factor	0		Copper
			Case material
			Galv. steel
			Drain pan
			Stainless steel
			Drain pan side
			Drive side
			Turbospirals
			No
Coil code	5WS0806B		Electro-fin coat
			None

<b>6 SUPPLY FAN SECTION(80 ins)</b>	<b>SECTION 4</b>
-------------------------------------	------------------

Air volume	26000	cfm	Motor power	20.0	HP
External static pressure	1.50	ins WC	Motor type	ODP	
Total static pressure	2.78	ins WC	Frame size	256 T frame	
Cabinet static pressure	0	ins WC	Electrical supply	460/60/3	
Type	Centrifugal DWDI				
Blade type/Class	Airfoil / 2				
Quantity of Fans	1				
Fan wheel diameter	33.00	ins	Motor efficiency	Premium	
Brake horsepower	16.48	HP	Motor speed	1750	rpm
Operating/Max speed	1006 / 1579	rpm	Block-off Plate	No	
Orientation	Top horizontal				
Air modulation	None				
Drip pan	None				
Drip pan side	-				
Wheel guard	None				
Belt guard	None				
Inspection port	None				
Material type	N/A				
			Motor pole	4	
			Full load current	24.5	A
			Lock rotor current	160.8	A
			Motor supplier	Generic	
			Actual drive service fac.	1.31	
			Bearing type	Standard - L50 (200K)	
			Outlet velocity	2271	ft/m
			Inlet screen	None	
			Outlet screen	None	
			Motor location	To Side of Fan	
			Number of blades	N/A	

<b>DRIVES *</b>
-----------------

Fan sheave	2B5V90	Motor sheave	2B5V52
Number of belts	2	Belt	5VX880

\* McQuay reserves the right to provide a different but equivalent drive package.

<b>ANTI-VIBRATION MOUNTS / SPRINGS</b>
--

Type	Spring
Seismic restraint	None

<b>DOOR DATA</b>
------------------

Door location	Drive side	Window size	None
Door width	30 ins	Light	None
Door opening	Outward		

<b>VFD / STARTER / DISCONNECT DATA</b>
--

Selection type	VFD - NEMA 1	Vendor	ABB
Auxiliary Control	Combination Disconnect and Bypass	Voltage	460
Disconnect Type	Fused		
Mounting	Door Side	H x W x D	23.58 x 10.49 x 10.25 ins
Enclosure	NEMA 1	Coil Voltage	N/A
Line Reactor	None	Hand Off Auto Switch	None
120V Ctrl Transformer	Provided		
VFD Quantity	1		

<b>NOTES</b>
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Supply fan performance is certified in accordance with the Central Station Air-Handling Unit Certification Program, which is based on ARI Standard 430.  
 As a standalone component, unit meets or exceeds requirements of ASHRAE 90.1 - 2007. The approving authority is responsible for compliance of multi-component building systems.

<b>SHIPPING SECTION DETAILS</b>
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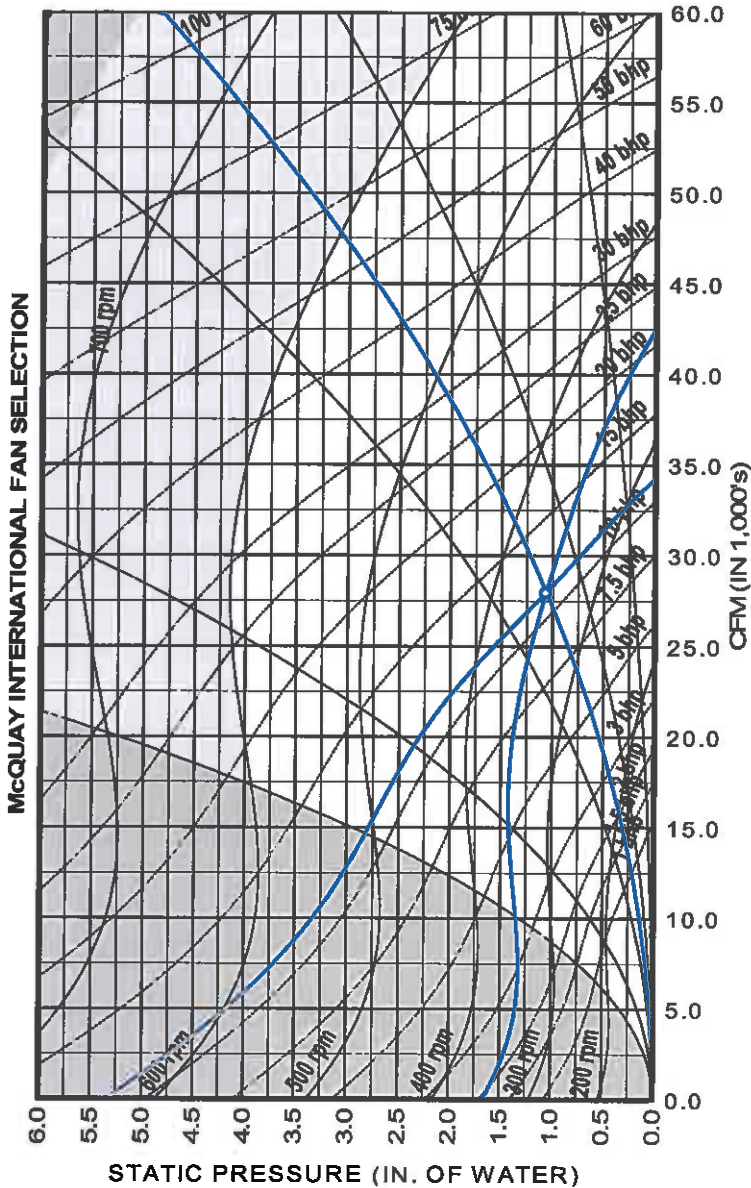
	Length (inches)	Weight (lb)	
Section 1	82	3283	
Section 2	92	1704	
Section 3	64	3702	
Section 4	80	3549	
<b>TOTALS</b>	<b>318.00 (Lower level total)</b>	<b>12238 (Entire unit weight)</b>	

<b>UNIT SOUND</b>	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Radiated	85	89	80	73	67	58	42	33
Unit discharge	92	97	92	90	87	81	77	69
AHU-80 ton								



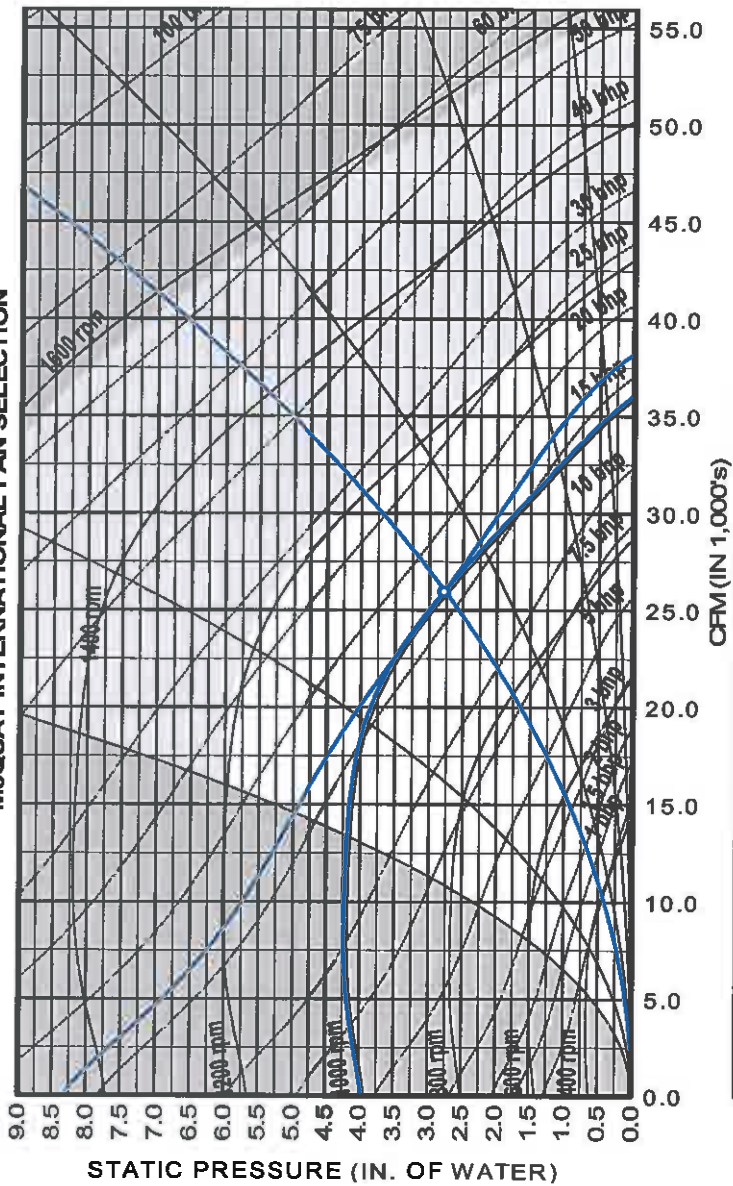



# Fan Curve for AHU-80 ton



Unit tagging		AHU-80 ton		Date		October-28-2011	
Job name		Shippensburg Old Main		Time		13:54	

**McQUAY INTERNATIONAL FAN SELECTION**

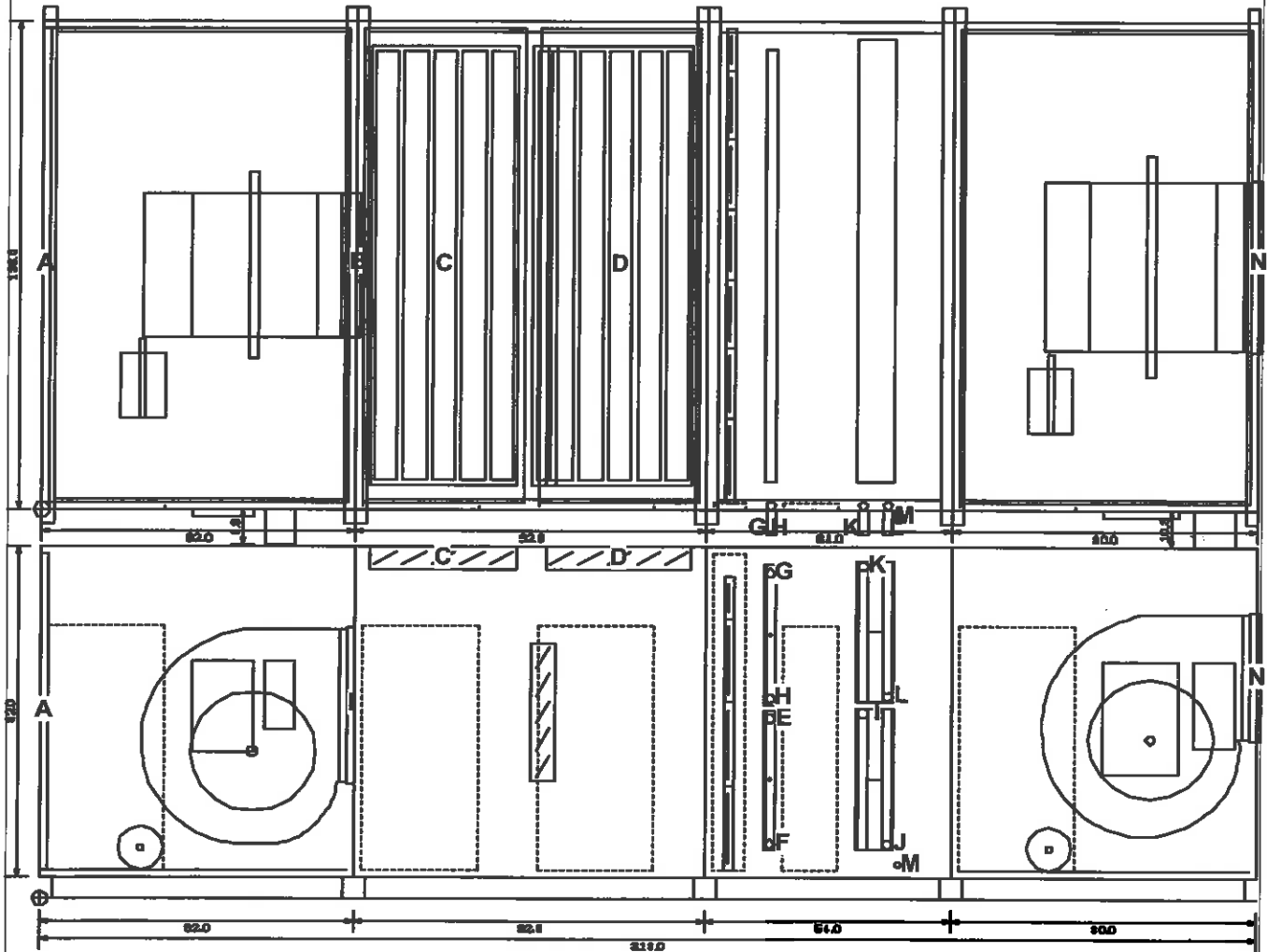


33.00" Airfoil Supply Fan at Standard Conditions			
Air volume	26000	cfm	Fan speed 1006 rpm
Total static	2.78	insWg	Max speed 1579 rpm
Brake horsepower	16.5	bhp	Efficiency 68.9 %
Unit tagging	AHU-80 ton		Date October-28-2011
Job name	Shippensburg Old Main		Time 13:54
 Supply fan performance is certified in accordance with the Central Station Air-Handling Unit Certification Program, which is based on ARI Standard 430.			

# Drawing for AHU-80 ton

Opening	X	Y	Z	W(Width)	H(Height)
A Exhaust inlet	0.00	2.00	8.00	132.00	88.00
B Fan discharge	83.00	47.73	31.90	40.55	43.74
C Damper	84.00	2.00	98.00	132.00	42.00
D Damper	130.00	2.00	98.00	132.00	42.00
E Hot water outlet	190.57	-7.00	50.32	2.50ins. MPS	-
F Hot water inlet	190.57	-7.00	15.40	2.50ins. MPS	-
G Hot water outlet	190.57	-7.00	90.72	2.50ins. MPS	-
H Hot water inlet	190.57	-7.00	55.80	2.50ins. MPS	-
I Cold water outlet	214.66	-7.00	51.69	2.50ins. MPS	-
J Cold water inlet	221.16	-7.00	15.31	2.50ins. MPS	-
K Cold water outlet	214.66	-7.00	92.69	2.50ins. MPS	-
L Cold water inlet	221.16	-7.00	56.31	2.50ins. MPS	-
M Condensate drain conn.	224.00	-3.40	9.73	1.50ins. MPS	-
N Fan discharge	319.00	44.01	44.15	47.99	35.74

Dimensions measured from ⊕



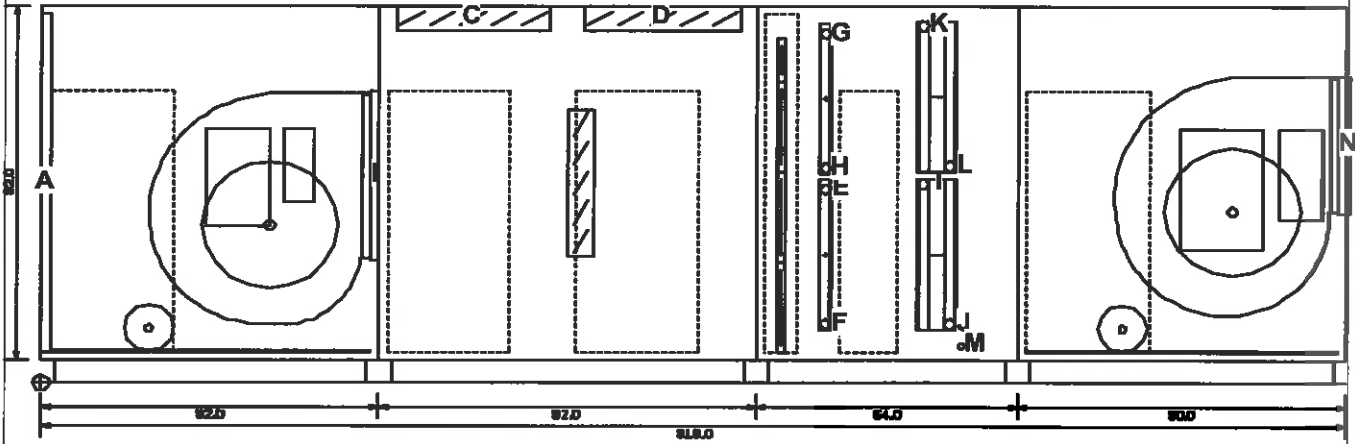
NOTE: Base 6.00ins deep, Cross members extend 4ins on each side of the unit.

VIEW: General Arrangement No Ends  
 DRAWN: October-28-2011 (13:53)  
 JOB NAME: Shippensburg Old Main  
 UNIT TAGGING: AHU-80 ton  
 MODEL: CAH065GDAC



Opening	X	Y	Z	W(Width)	H(Height)
A Exhaust inlet	0.00	2.00	8.00	132.00	88.00
B Fan discharge	83.00	47.73	31.90	40.55	43.74
C Damper	84.00	2.00	98.00	132.00	42.00
D Damper	130.00	2.00	98.00	132.00	42.00
E Hot water outlet	190.57	-7.00	50.32	2.50ins. MPS	-
F Hot water inlet	190.57	-7.00	15.40	2.50ins. MPS	-
G Hot water outlet	190.57	-7.00	90.72	2.50ins. MPS	-
H Hot water inlet	190.57	-7.00	55.80	2.50ins. MPS	-
I Cold water outlet	214.66	-7.00	51.69	2.50ins. MPS	-
J Cold water inlet	221.16	-7.00	15.31	2.50ins. MPS	-
K Cold water outlet	214.66	-7.00	92.69	2.50ins. MPS	-
L Cold water inlet	221.16	-7.00	56.31	2.50ins. MPS	-
M Condensate drain conn.	224.00	-3.40	9.73	1.50ins. MPS	-
N Fan discharge	319.00	44.01	44.15	47.99	35.74

Dimensions measured from ⊕



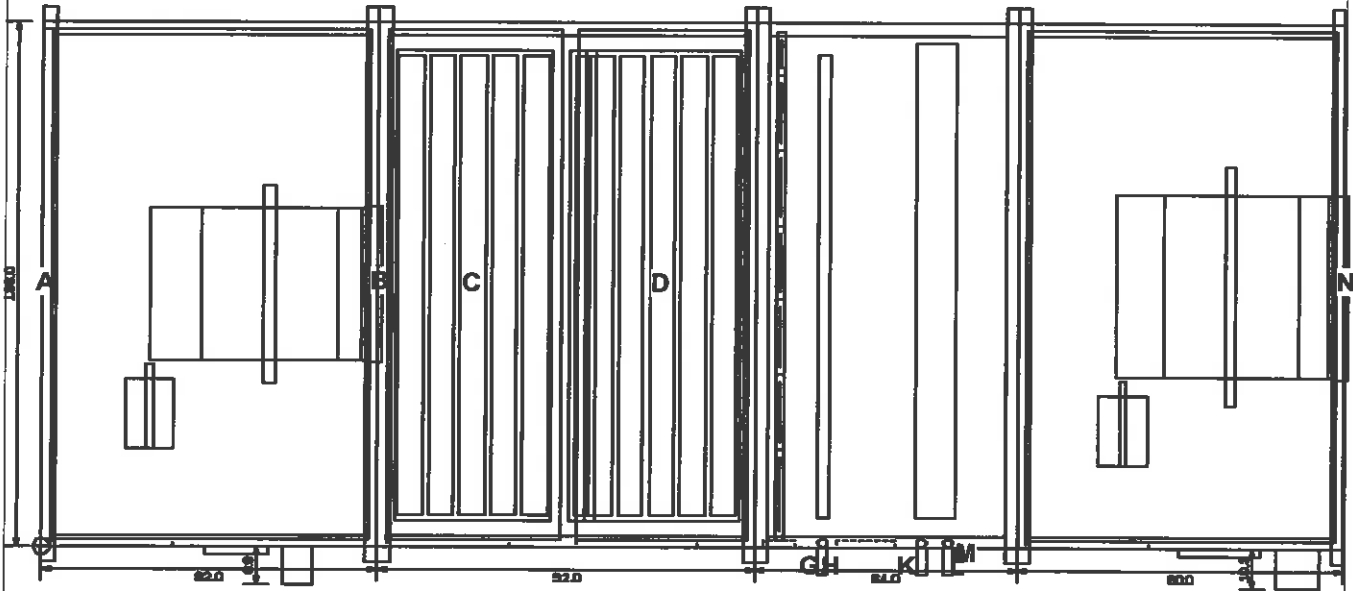
NOTE: Base 6.00ins deep, Cross members extend 4ins on each side of the unit.

VIEW: Right Side  
 DRAWN: October-28-2011 (13:53)  
 JOB NAME: Shippensburg Old Main  
 UNIT TAGGING: AHU-80 ton  
 MODEL: CAH065GDAC



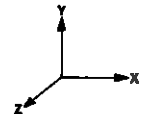
Opening	X	Y	Z	W(Width)	H(Height)
A Exhaust inlet	0.00	2.00	8.00	132.00	88.00
B Fan discharge	83.00	47.73	31.90	40.55	43.74
C Damper	84.00	2.00	98.00	132.00	42.00
D Damper	130.00	2.00	98.00	132.00	42.00
E Hot water outlet	190.57	-7.00	50.32	2.50ins. MPS	-
F Hot water inlet	190.57	-7.00	15.40	2.50ins. MPS	-
G Hot water outlet	190.57	-7.00	90.72	2.50ins. MPS	-
H Hot water inlet	190.57	-7.00	55.80	2.50ins. MPS	-
I Cold water outlet	214.66	-7.00	51.69	2.50ins. MPS	-
J Cold water inlet	221.16	-7.00	15.31	2.50ins. MPS	-
K Cold water outlet	214.66	-7.00	92.69	2.50ins. MPS	-
L Cold water inlet	221.16	-7.00	56.31	2.50ins. MPS	-
M Condensate drain conn.	224.00	-3.40	9.73	1.50ins. MPS	-
N Fan discharge	319.00	44.01	44.15	47.99	35.74

Dimensions measured from ⊕



NOTE: Base 6.00ins deep, Cross members extend 4ins on each side of the unit.

VIEW: Top  
 DRAWN: October-28-2011 (13:53)  
 JOB NAME: Shippensburg Old Main  
 UNIT TAGGING: AHU-80 ton  
 MODEL: CAH065GDAC



# Technical Data Sheet for 100% OA ERU

<b>QUOTE ID</b>	KY8MGV(XX.002)	<b>REP. OFFICE</b>	TriState HVAC-York
<b>JOB NAME</b>	Shippensburg Old Main	<b>SALESPERSON</b>	SW
<b>MODEL NUMBER</b>	CAH008GDAC	<b>ENGINEER</b>	
<b>UNIT TAGGING</b>	100% OA ERU	<b>VERSION</b>	9.43

Unit configuration	Stacked with opposed air flows		
Drive (handing) location	Right		
	<b>SUPPLY</b>	<b>RETURN / EXHAUST</b>	
Air volume	2500	2500	s cfm
Altitude	0	0	ft
Turning loss	0.00	0.00	in WC.
External static	1.50	1.00	in WC.
Total static	3.55	2.53	in WC.
External H x W	34 x 58	34 x 58 (Not including base rails)	ins

<b>CASING DETAILS</b>	
Outer panel	Standard G90 galv steel (unpainted)
Liner	Galvanized steel (Unless noted per section)
Insulation	R-13 Injected Foam (Unless noted per section)
Frame	2 ins
Base	None
Sound baffles	None (Unless noted per section)
Tread Plate floor liner	None (unless noted per section)
Shrink wrapping	No

## Exhaust Air Stream

<b>1 PANEL FILTER(12 ins)</b>				<b>SECTION 4</b>
Type	Throwaway	Clean air press. drop	0.11	ins WC
Efficiency	MERV 7	<b>Mean air press. drop</b>	<b>0.56</b>	<b>ins WC</b>
Face velocity	283 fpm	Dirty air press. drop	1.00	ins WC
Face area	8.8 ft <sup>2</sup>	Access	Side	
Air volume	2500 cfm			

<b>BANK ARRANGEMENT</b>		
No. of Filters	Size H x W x D	Ins
1.0	24 x 24 x 2	Ins
1.0	24 x 20 x 2	
1.0	24 x 12 x 2	

<b>DOOR DATA</b>			
Door location	Drive side	Window size	None
Door width	8 ins	Light	None
Door opening	Outward		

<b>2 ACCESS SECTION(16 ins)</b>			<b>SECTION 4</b>
Drip pan	None	Drip side	-
		Air pressure drop	0.00
			Ins WC

<b>DOOR DATA</b>			
Door location	Drive side	Window size	None
Door width	12 ins	Light	None
Door opening	Outward		

<b>3 ENERGY RECOVERY SECTION (14 ins)</b>			<b>SECTION 3</b>
Heat Wheel Model	ECW 424	Electrical Supply Volt	115/60/1
Media Type	Synthetic fiber - 4 angstrom		Volt

<b>3 ENERGY RECOVERY SECTION (14 ins)</b>	<b>SECTION 3</b>
---	------------------

Wheel Diameter	42.00	ins	Bypass Damp Opening	No Bypass	ins
Supply air CFM	2500	CFM	Supply air PD Sum/Win	1.02 / 0.93	ins WC
Supply air FV Sum/Win	578 / 576	ft/min	Exhaust air CFM	2500	CFM
Return air PD Sum/Win	0.98 / 0.89	ins WC	Motor HP	0.5	
Segmented Wheel	No				

**Summer Conditions**

Outside air DB	90.0	F
Outside air WB	78.0	F
Return air DB	75.0	F
Return air WB	62.0	F
Supply air DB	79.2	F
Supply air WB	67.8	F
Exhaust air DB	86.0	F
Exhaust air WB	74.2	F
Latent effectiveness	72.54	%
Sensible effectiveness	75.83	%
Total effectiveness	73.51	%
Total Energy Recovered	107853	Btu/hr

**Winter Conditions**

Outside air DB	10.0	F
Outside air WB	10.0	F
Return air DB	75.0	F
Return air WB	62.0	F
Supply air DB	56.7	F
Supply air WB	51.0	F
Exhaust air DB	29.2	F
Exhaust air WB	29.2	F
Latent effectiveness	72.54	%
Sensible effectiveness	75.83	%
Total effectiveness	74.49	%
Total Energy Recovered	191172	Btu/hr

<b>4 RETURN/EXHAUST FAN SECTION(40 ins)</b>	<b>SECTION 1</b>
---	------------------

Air volume	2500	cfm	Motor power	2.0	HP
External static pressure	1.00	ins WC	Motor type	ODP	
Total static pressure	2.53	ins WC	Frame size	145 T frame	
Cabinet static pressure	0	ins WC	Electrical supply	460/60/3	
Type	Centrifugal DWDI		Motor efficiency	Premium	
Blade type/Class	Airfoil / 2		Motor speed	1750	rpm
Quantity of Fans	1		Block-off Plate	No	
Fan wheel diameter	13.22	ins	Motor pole	4	
Brake horsepower	1.59	HP	Full load current	2.9	A
Operating/Max speed	2280 / 4335	rpm	Lock rotor current	26.5	A
Orientation	Top horizontal		Motor supplier	Generic	
Air modulation	None		Actual drive service fac.	1.19	
Drip pan	None		Bearing type	Standard - L50 (200K)	
Drip pan side	-		Outlet velocity	1174	ft/m
Wheel guard	None		Inlet screen	None	
Belt guard	None		Outlet screen	None	
Inspection port	None		Motor location	To Side of Fan	
Material type	N/A		Number of blades	N/A	

**DRIVES \***

Fan sheave	AK32H	Motor sheave	AK44H
Number of belts	1	Belt	A32

\* McQuay reserves the right to provide a different but equivalent drive package.

**ANTI-VIBRATION MOUNTS / SPRINGS**

Type	Spring
Seismic restraint	None

**DOOR DATA**

Door location	Drive side	Window size	None
Door width	30	Light	None
Door opening	Outward		

**Supply Air Stream**

<b>1 ACCESS SECTION(16 ins)</b>	<b>SECTION 2</b>
---------------------------------	------------------

Drip pan	None	Drip side	-	
		Air pressure drop	0.00	Ins WC

<b>DOOR DATA</b>
------------------

Door location	Drive side	Window size	None
Door width	12 ins	Light	None
Door opening	Outward		

<b>2 PANEL FILTER(12 ins)</b>	<b>SECTION 2</b>
-------------------------------	------------------

Type	Throwaway	Clean air press. drop	0.11	ins WC
Efficiency	MERV 7	<b>Mean air press. drop</b>	<b>0.56</b>	ins WC
Face velocity	283 fpm	Dirty air press. drop	1.00	ins WC
Face area	8.8 ft <sup>2</sup>	Access	Side	
Air volume	2500 cfm			

<b>BANK ARRANGEMENT</b>
-------------------------

No. of Filters	Size H x W x D	
1.0	24 x 24 x 2	Ins
1.0	24 x 20 x 2	
1.0	24 x 12 x 2	

<b>DOOR DATA</b>
------------------

Door location	Drive side	Window size	None
Door width	8 ins	Light	None
Door opening	Outward		

<b>3 ACCESS SECTION(16 ins)</b>	<b>SECTION 2</b>
---------------------------------	------------------

Drip pan	None	Drip side	-	
		Air pressure drop	0.00	Ins WC

<b>DOOR DATA</b>
------------------

Door location	Drive side	Window size	None
Door width	12 ins	Light	None
Door opening	Outward		

<b>4 ENERGY RECOVERY SECTION (14 ins)</b>	<b>SECTION 3</b>
---	------------------

<b>5 ACCESS SECTION(16 ins)</b>	<b>SECTION 5</b>
---------------------------------	------------------

Drip pan	None	Drip side	-	
		Air pressure drop	0.00	Ins WC

<b>DOOR DATA</b>
------------------

Door location	Drive side	Window size	None
Door width	12 ins	Light	None
Door opening	Outward		



<b>6 CHILLED WATER COIL(30 ins)</b>				<b>SECTION 5</b>	
Coil model	5WH1105B		Number of coils	1	
Total capacity	102862	Btu/h	Number of rows	5	
Sensible capacity	70864	Btu/h	Fins per inch	11	
Air volume	2500	cfm			
Entering db/wb	80.0 / 67.0	F	Entering water	45.0	F
Leaving db/wb	54.1 / 53.6	F	Leaving water	55.3	F
Finned height x length	24 x 45	ins	Water flow rate	20.00	gpm
Face area	7.50	ft2	Water pressure drop	4.90	ftHD
Face velocity	333	ft/m	Water velocity	2.70	ft/s
Coil air pressure drop	0.35	ins WC			
			Fluid volume	5.0	gal
			Fluid weight	48.00	lb
Connection type	Threaded		Fin material	Aluminum (.0075)	
Connection Qty x size	2 x 1.50	ins	Tube material	Copper (.020)	
Connection location	Drive side		Header material	Copper	
Connection material	Carbon steel		Case material	Galv. steel	
Glycol type (%)	- (0 %)		Drain pan	Microbial resistant coated galvanized	
Fouling Factor	0		Drain pan side	Drive side	
			Turbospirals	No	
Coil code	5WH1105B		Electro-fin coat	None	

<b>DOOR DATA</b>				
Door location	Drive side		Window size	None
Door width	14	ins	Light	None
Door opening	Outward			

<b>7 HOT WATER COIL(12 ins)</b>				<b>SECTION 5</b>	
Coil model	5WB1302B		Number of coils	1	
Capacity	137191	Btu/h	Number of rows	2	
			Fins per inch	13	
Air volume	2500	cfm			
Entering db	40.0	F	Entering water	160.0	F
Leaving db	90.2	F	Leaving water	139.9	F
Finned height x length	24 x 42	ins	Water flow rate	13.70	gpm
Face area	7.00	ft2	Water pressure drop	0.40	ftHD
Face velocity	357	ft/m	Water velocity	1.80	ft/s
Coil air pressure drop	0.13	ins WC			
			Fluid volume	2.0	gal
			Fluid weight	18.00	lb
Connection type	Threaded		Fin material	Aluminum (.0075)	
Connection Qty x size	2 x 2.50	ins	Tube material	Copper (.020)	
Connection location	Drive side		Header material	Copper	
Connection material	Carbon steel		Case material	Galvanized track	
Glycol type (%)	- (0 %)		Drip pan	None	
Fouling Factor	0		Drip pan side	-	
			Turbospirals	No	
Coil code	5WB1302B		Electro-fin coat	None	

<b>8 SUPPLY FAN SECTION(40 ins)</b>	<b>SECTION 5</b>
-------------------------------------	------------------

Air volume	2500	cfm	Motor power	3.0	HP
External static pressure	1.50	ins WC	Motor type	ODP	
Total static pressure	3.55	ins WC	Frame size	182 T frame	
Cabinet static pressure	0	ins WC	Electrical supply	460/60/3	
Type	Centrifugal DWDI		Motor efficiency	Premium	
Blade type/Class	Airfoil / 2		Motor speed	1750	rpm
Quantity of Fans	1		Block-off Plate	No	
Fan wheel diameter	13.22	ins	Motor pole	4	
Brake horsepower	2.21	HP	Full load current	4	A
Operating/Max speed	2541 / 4335	rpm	Lock rotor current	32	A
Orientation	Top horizontal		Motor supplier	Generic	
Air modulation	None		Actual drive service fac.	1.19	
Drip pan	None		Bearing type	Standard - L50 (200K)	
Drip pan side	-		Outlet velocity	1174	ft/m
Wheel guard	None		Inlet screen	None	
Belt guard	None		Outlet screen	None	
Inspection port	None		Motor location	To Side of Fan	
Material type	N/A		Number of blades	N/A	

<b>DRIVES *</b>			
-----------------	--	--	--

Fan sheave	AK39H	Motor sheave	AK56H
Number of belts	1	Belt	A32

\* McQuay reserves the right to provide a different but equivalent drive package.

<b>ANTI-VIBRATION MOUNTS / SPRINGS</b>	
--	--

Type	Spring
Seismic restraint	None

<b>DOOR DATA</b>			
------------------	--	--	--

Door location	Drive side	Window size	None
Door width	30 ins	Light	None
Door opening	Outward		

<b>NOTES</b>	
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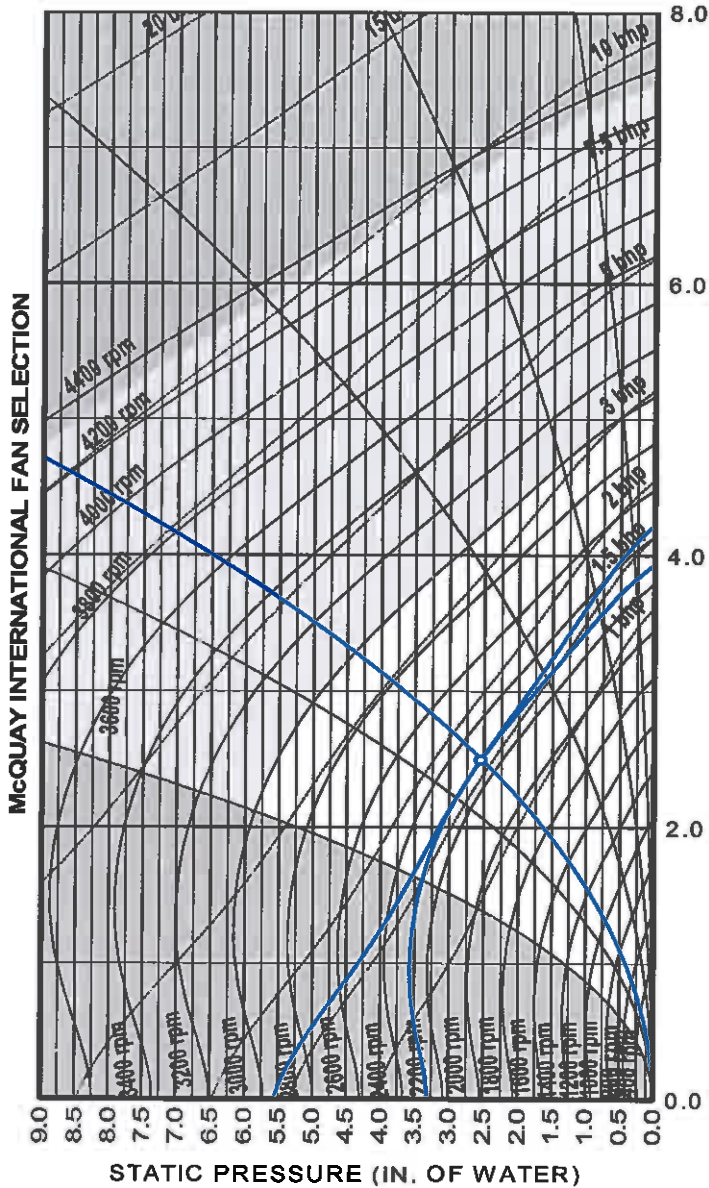
Supply fan performance is certified in accordance with the Central Station Air-Handling Unit Certification Program, which is based on ARI Standard 430.  
 As a standalone component, unit meets or exceeds requirements of ASHRAE 90.1 - 2007. The approving authority is responsible for compliance of multi-component building systems.

<b>SHIPPING SECTION DETAILS</b>			
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	Length (inches)	Weight (lb)	
Section 1	40	508	
Section 2	44	287	
Section 3	16	483	
Section 4	28	203	
Section 5	98	1199	
<b>TOTALS</b>	<b>158.00 (Lower level total)</b>	<b>2680 (Entire unit weight)</b>	

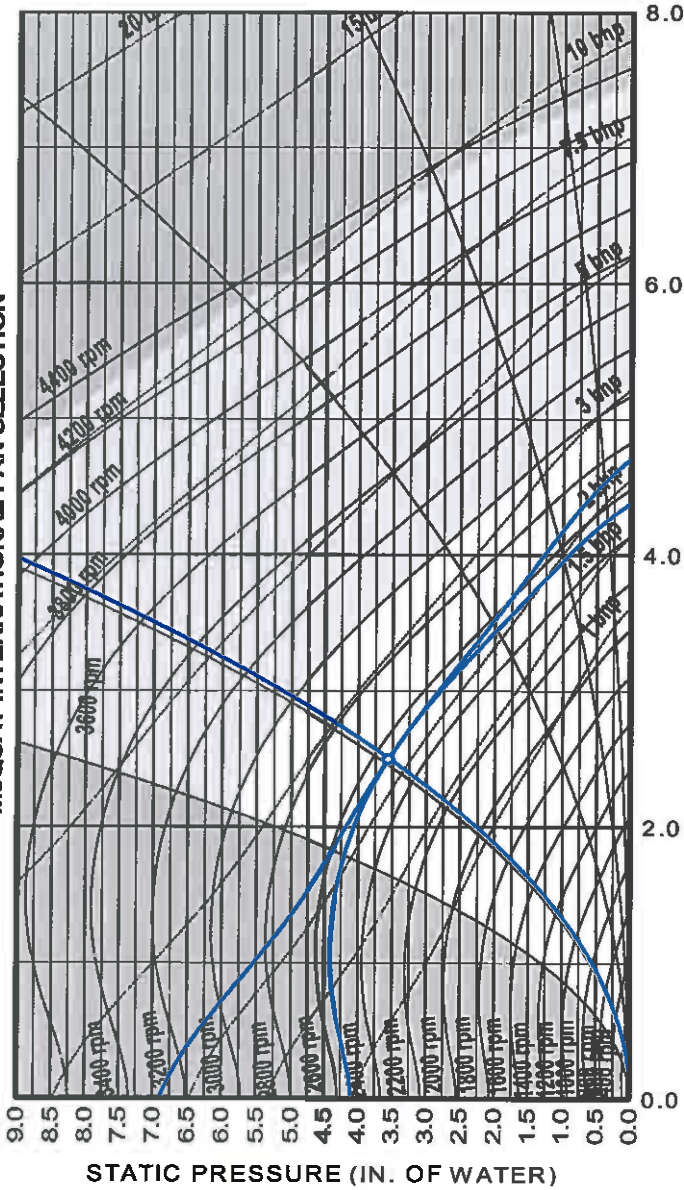
UNIT SOUND	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Radiated	74	76	70	66	57	48	32	23
Unit discharge	81	83	81	82	76	70	66	58
Unit return	76	78	76	77	71	65	61	53


# Fan Curve for 100% OA ERU



13.22" Airfoil Ret/Exh Fan at Standard Conditions					
Air volume	2500	cfm	Fan speed	2280	rpm
Total static	2.53	insWg	Max speed	4335	rpm
Brake horsepower	1.6	bhp	Efficiency	62.6	%
Unit tagging	100% OA ERU		Date	October-28-2011	
Job name	Shippensburg Old Main		Time	14:02	

**McQUAY INTERNATIONAL FAN SELECTION**

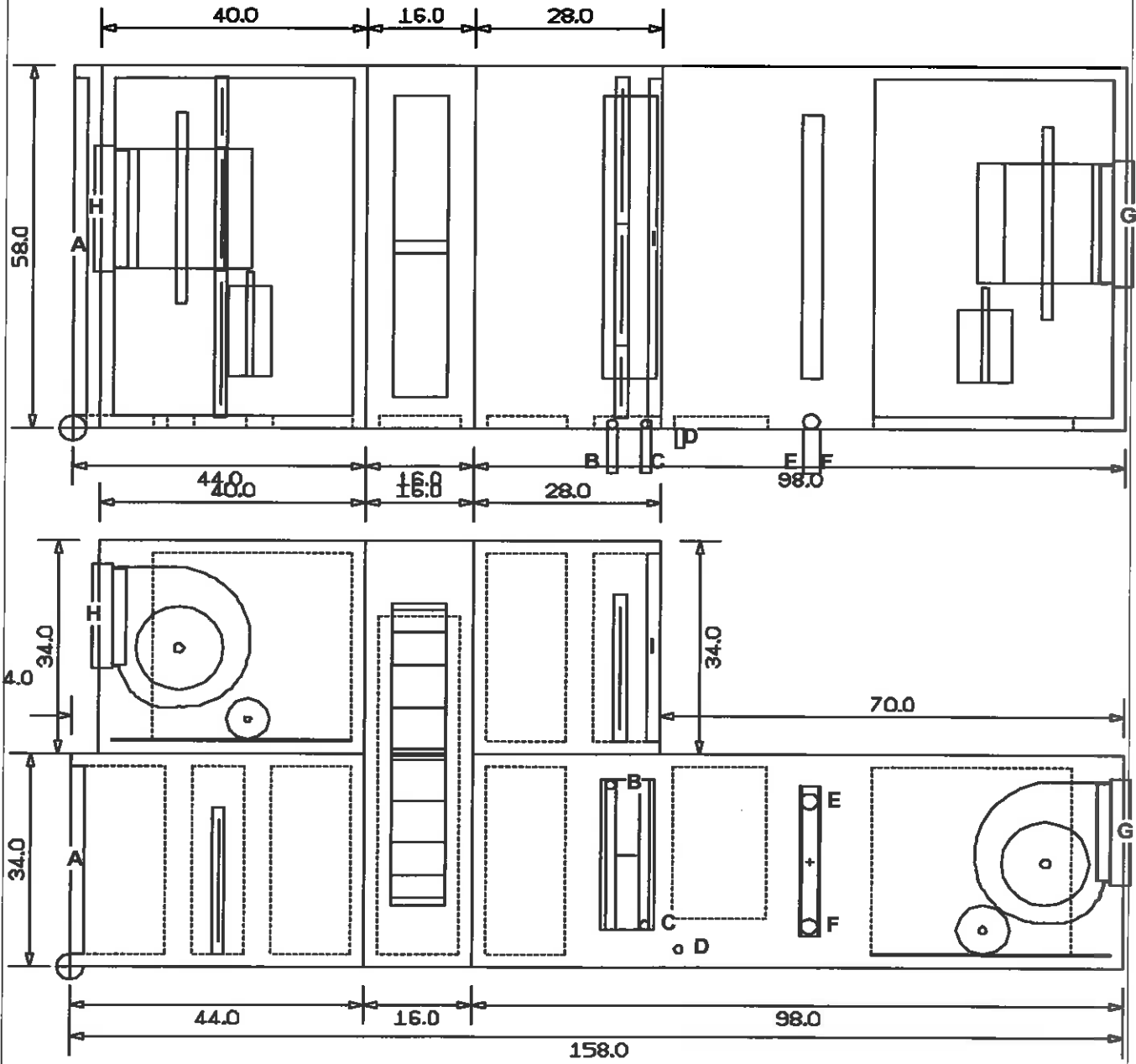


13.22" Airfoil Supply Fan at Standard Conditions					
Air volume	2500	cfm	Fan speed	2541	rpm
Total static	3.55	insWg	Max speed	4335	rpm
Brake horsepower	2.2	bhp	Efficiency	63.4	%
Unit tagging	100% OA ERU		Date	October-28-2011	
Job name	Shippensburg Old Main		Time	14:02	
 Supply fan performance is certified in accordance with the Central Station Air-Handling Unit Certification Program, which is based on ARI Standard 490.					

# Drawing for 100% OA ERU

Opening	X	Y	Z	W(Width)	H(Height)
A Supply inlet	0.00	2.00	2.00	54.00	30.00
B Cold water outlet	80.60	-7.00	29.19	1.50ins. MPS	-
C Cold water inlet	85.85	-7.00	6.81	1.50ins. MPS	-
D Condensate drain conn.	91.00	-2.90	3.00	1.25ins. MPS	-
E Hot water outlet	110.57	-7.00	26.58	2.50ins. MPS	-
F Hot water inlet	110.57	-7.00	6.66	2.50ins. MPS	-
G Fan discharge	159.00	23.03	13.49	19.94	16.68
H Fan discharge	3.00	25.07	47.49	19.94	16.68
I Exhaust inlet	88.00	2.00	36.00	54.00	30.00

Dimensions measured from ⊕

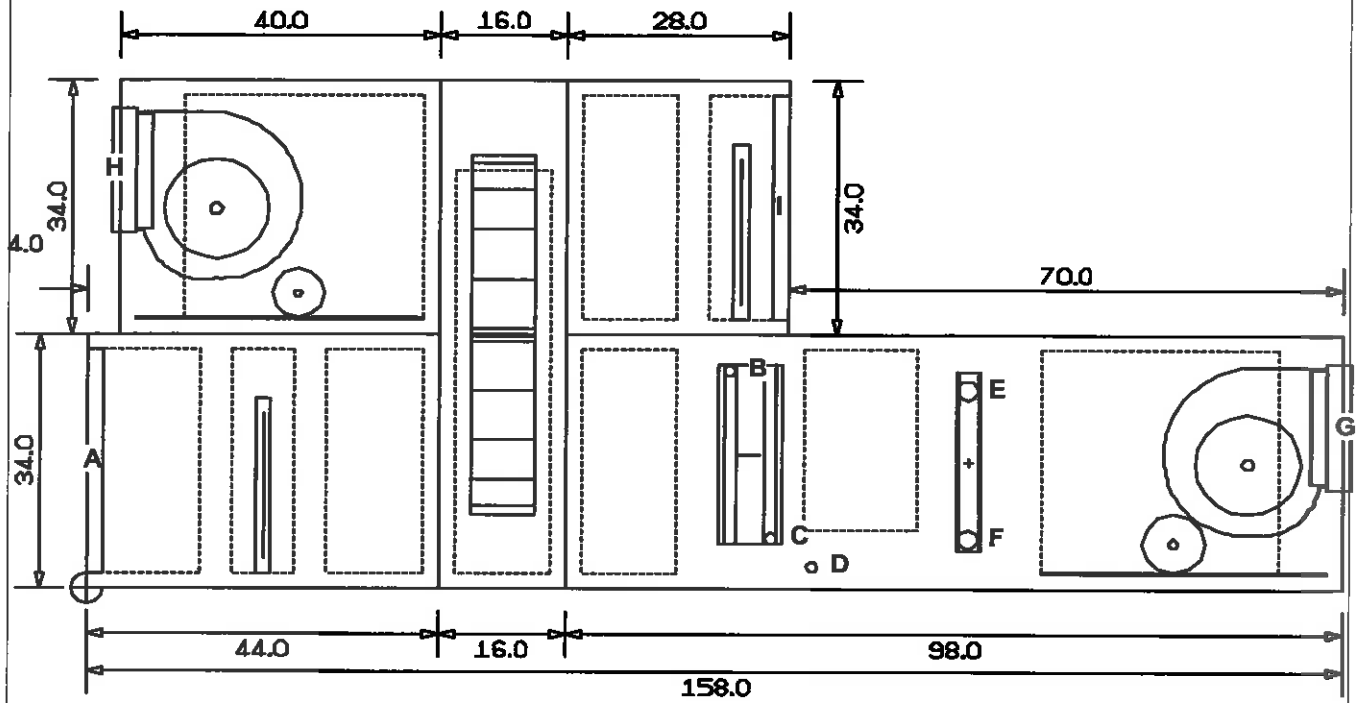


VIEW: General Arrangement No Ends  
 DRAWN: October-28-2011 (14:01)  
 JOB NAME: Shippensburg Old Main  
 UNIT TAGGING: 100% OA ERU  
 MODEL: CAH008GDAC



Opening	X	Y	Z	W(Width)	H(Height)
A Supply inlet	0.00	2.00	2.00	54.00	30.00
B Cold water outlet	80.60	-7.00	29.19	1.50ins. MPS	-
C Cold water inlet	85.85	-7.00	6.81	1.50ins. MPS	-
D Condensate drain conn.	91.00	-2.90	3.00	1.25ins. MPS	-
E Hot water outlet	110.57	-7.00	26.58	2.50ins. MPS	-
F Hot water inlet	110.57	-7.00	6.66	2.50ins. MPS	-
G Fan discharge	159.00	23.03	13.49	19.94	16.68
H Fan discharge	3.00	25.07	47.49	19.94	16.68
I Exhaust inlet	88.00	2.00	36.00	54.00	30.00

Dimensions measured from ⊕

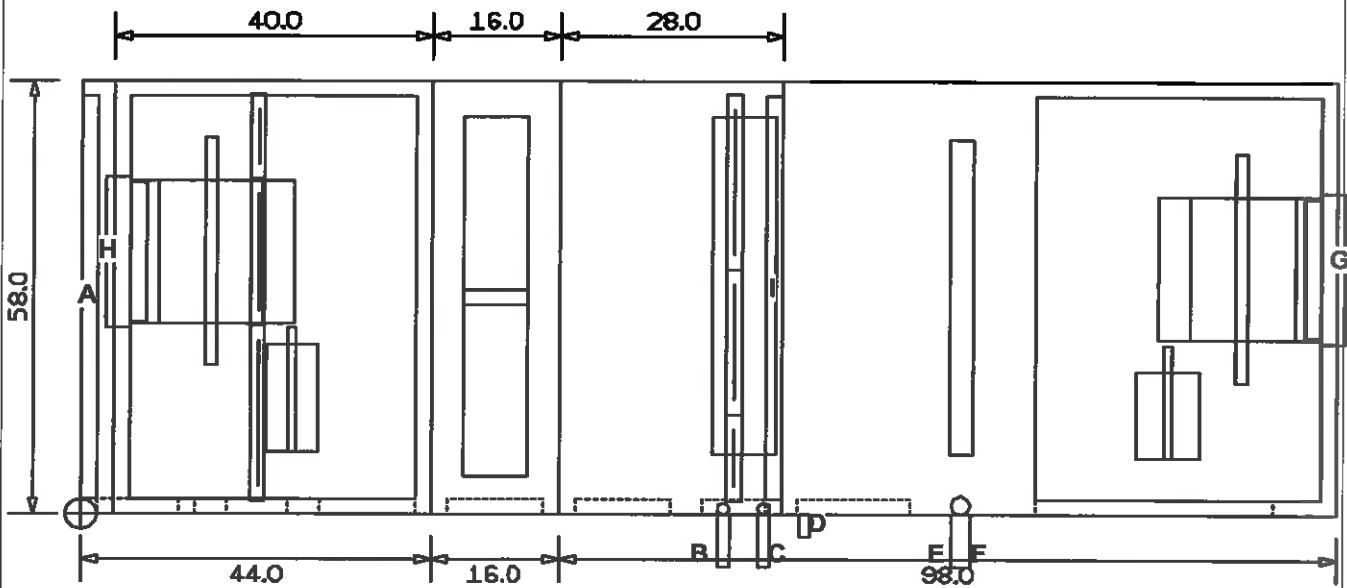


VIEW: General Arrangement No Ends  
 DRAWN: October-28-2011 (14:01)  
 JOB NAME: Shippensburg Old Main  
 UNIT TAGGING: 100% OA ERU  
 MODEL: CAH008GDAC



Opening	X	Y	Z	W(Width)	H(Height)
A Supply inlet	0.00	2.00	2.00	54.00	30.00
B Cold water outlet	80.60	-7.00	29.19	1.50ins. MPS	-
C Cold water inlet	85.85	-7.00	6.81	1.50ins. MPS	-
D Condensate drain conn.	91.00	-2.90	3.00	1.25ins. MPS	-
E Hot water outlet	110.57	-7.00	26.58	2.50ins. MPS	-
F Hot water inlet	110.57	-7.00	6.66	2.50ins. MPS	-
G Fan discharge	159.00	23.03	13.49	19.94	16.68
H Fan discharge	3.00	25.07	47.49	19.94	16.68
I Exhaust inlet	88.00	2.00	36.00	54.00	30.00

Dimensions measured from ⊕



VIEW: General Arrangement No Ends  
 DRAWN: October-28-2011 (14:01)  
 JOB NAME: Shippensburg Old Main  
 UNIT TAGGING: 100% OA ERU  
 MODEL: CAH008GDAC



# Technical Data Sheet for Fan Coil

**Job Name:** Shippensburg Old Main  
**Date:** 12/8/2011  
**Submitted By:** Scott Wolf

## Unit Description:

McQuay Model Number:: FCVC104  
 Unit Size: 04  
 Air Flow: 338 CFM  
 External Static Pressure: 0.00 inH<sub>2</sub>O  
 Unit Configuration: Vertical

## Unit Dimensions & Weights:

Unit Depth: 10.0 in  
 Unit Width: 46.0 in  
 Unit Height: 25.0 in  
 Unit Shipping Weight: 108 lb

## Electric Data:

Voltage: 115/60/1  
 Fan Motor Amps: 0.7 A  
 Unit MCA: 0.9 A  
 Unit MROPD: 1 A

## Filters:

Type: 1" Throwaway  
 Qty./Size: 1/ 27 x 8.75 x 1

## Hot Water Preheat Coil:

Coil:  
     Coil FPI: 12  
     Coil Rows: 1  
     Face Area: 1.0 ft<sup>2</sup>  
     Face Velocity: 355.9 ft/min  
 Performance:  
     Total Capacity: 14206 Btu/hr  
     Entering Air Temperature: 70.0 °F  
     Leaving Air Temperature: 108.4 °F  
     Entering Fluid Temperature: 160.0 °F  
     Leaving Fluid Temperature: 140.1 °F  
     Glycol: Water/ 0%  
     Fluid Flow Rate: 1.4 gpm  
     Fluid Pressure Drop: 5.1 ft H<sub>2</sub>O

## Chilled Water Cooling Coil:

Coil:  
     Coil FPI: 12  
     Coil Rows: 4  
     Face Area: 1.4 ft<sup>2</sup>  
     Face Velocity: 236.4 ft/min  
 Performance:  
     Total Capacity: 13340 Btu/hr  
     Sensible Capacity: 9459 Btu/hr  
     Entering Air Temperature: 80.0 °F/67.0 °F  
     Leaving Air Temperature: 54.4 °F/ 54.2 °F  
     Entering Fluid Temperature: 45.0 °F



Leaving Fluid Temperature: 55.0 °F  
Glycol: Water/ 0%  
Fluid Flow Rate: 2.7 gpm  
Fluid Pressure Drop: 3.0 ft H<sub>2</sub>O

**Supply Fan:**

Fan:

Fan Wheel Size: 6.26 x 6.3  
Fan Quantity: 2

Motor:

Horsepower: 1/25  
Quantity: 1

Unit Data:	
Main Unit Tagging:	Fan Coil
Main Unit Model Number::	VLVFCVY
Valve Package Location:	Primary
Connection Hand:	Left

Valve Package Configuration:	
Coil Control:	
Flow Control:	Floating, 3-Wire, Modulating
Valve Body Type	3-Way
Voltage:	115/60/1
Coil Connection	
Connection Size:	5/8" Connection
Connection Type:	Sweat Connection
Valve Shutoff Control:	
Shut Off Pressure:	High Close Off
Valve Position:	Normally Closed
Valve CV Value	1 CV
Valve Piping Package	
Shut-off Isolation Valve Type:	Ball Valve, Open-Close
Strainer	None
PT Ports	PT Ports
Field Connection Type:	
Connection Type	Sweat
Stainless Steel Hose Length	None
Flow Control	
Flow Control Type:	Auto (Cartridge) Flow
Flow Control Volume	2.50

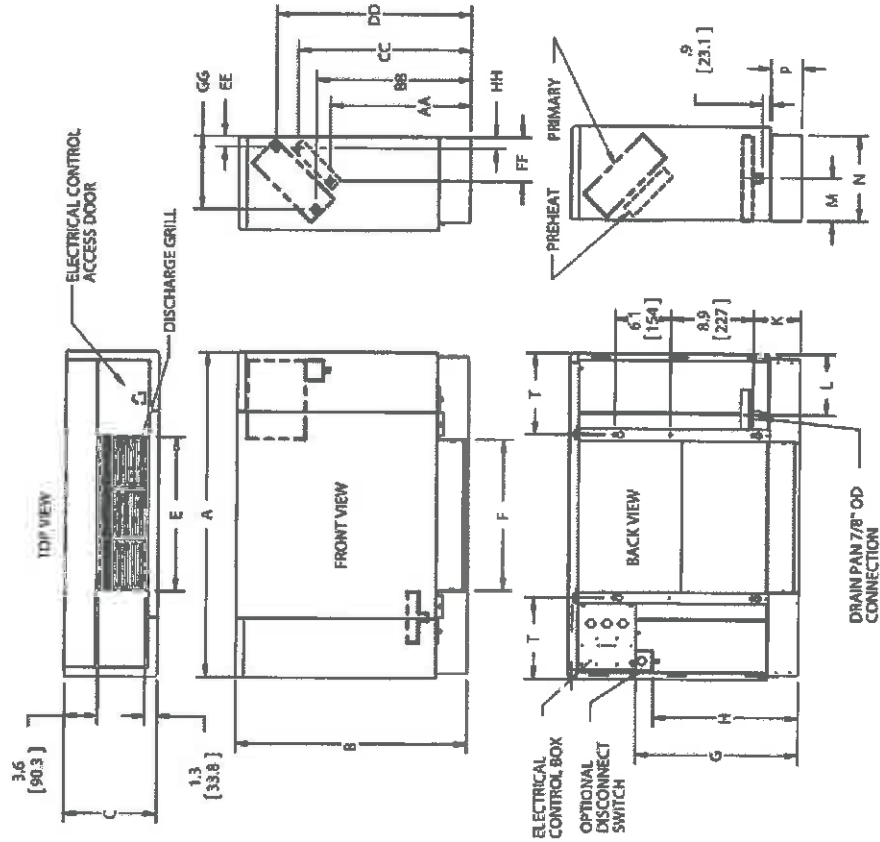
Unit Data:	
Main Unit Tagging:	Fan Coil
Main Unit Model Number::	N/A
Valve Package Location:	Preheat
Connection Hand:	Left

Valve Package Configuration:	
Coil Control:	
Flow Control:	Floating, 3-Wire, Modulating
Valve Body Type	3-Way
Voltage:	115/60/1
Coil Connection	
Connection Size:	5/8" Connection
Connection Type:	Sweat Connection
Valve Shutoff Control:	
Shut Off Pressure:	High Close Off
Valve Position:	Normally Closed
Valve CV Value	1 CV
Valve Piping Package	
Shut-off Isolation Valve Type:	Ball Valve, Open-Close
Strainer	None
PT Ports	PT Ports
Field Connection Type:	
Connection Type	Sweat
Stainless Steel Hose Length	None
Flow Control	
Flow Control Type:	Auto (Cartridge) Flow
Flow Control Volume	1.00

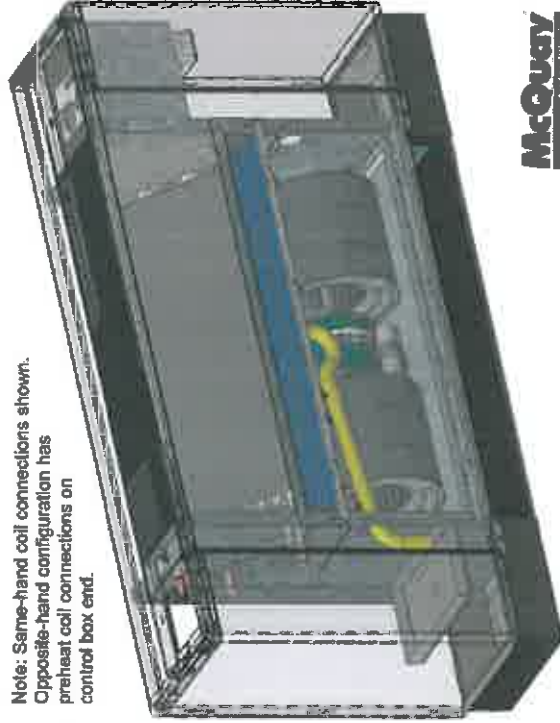
# FanCoil\_Drawing for Fan Coil

<b>Fancoil Certified Drawing</b>		FT_2F_4P_LH
McQuay International certifies that its equipment will conform to this drawing and McQuay's published specifications, subject to its published warranty. Purchaser must determine that the equipment is fit and sufficient for the job specifications. No change to this drawing may be made unless approved in writing by <a href="mailto:McQuay_Americas@McQuay.com">McQuay_Americas@McQuay.com</a>		View: Unit Layout
Unit Tag: Fan Coil		Model: FCVC104
		Date: 10/28/2011

Description	Letter	Dimension in
Width	A	46.0
Dim AA	AA	15.00
Height	B	25.0
Dim BB	BB	16.70
Depth	C	10.0
Dim CC	C	18.70
Dim DD	DD	21.00
Dim E	E	27.30
Dim EE	EE	1.10
Dim F	F	27.20
Dim FF	FF	4.70
Dim G	G	17.80
Dim GG	GG	7.80
Dim H	H	15.70
Dim HH	HH	1.20
Dim K	K	5.00
Dim L	L	4.60
Dim M	M	4.60
Sub. base depth	N	9.30
Dim P	P	3.40
Dim T	T	8.80

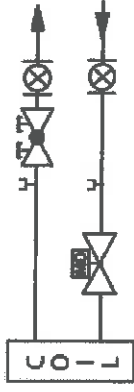


Note: Same-hand coil connections shown. Opposite-hand configuration has preheat coil connections on control box end.



# FanCoil\_Drawing for Fan Coil

## Schematic



Components Key (items not included in package are grayed out)

	<b>Manual Shutoff Ball Valve</b> Water shut-off. Handle rotates 90 degrees.
	<b>2-Way Modulating Valve (3-wire or proportional)</b> Modulates water flow in response to 24V signal.
	<b>PT Port</b> For connecting a pressure or temperature gauge.
	<b>Cartridge-Type, Auto-Fixed Circuit Setter</b> Pressure-compensated, automatic fixed-flow control.

## Valve Package Certified Drawing

McQuay International certifies that its equipment will conform to this drawing and McQuay's published specifications, subject to its published warranty. Purchaser must determine that the equipment is fit and sufficient for the job specifications. No change to this drawing may be made unless approved in writing by [McQuay\\_Sales@McQuay.com](mailto:McQuay_Sales@McQuay.com)

SCHM\_BY\_V2M\_SN\_CA\_PV\_UN

View: Piping/Valve Layout

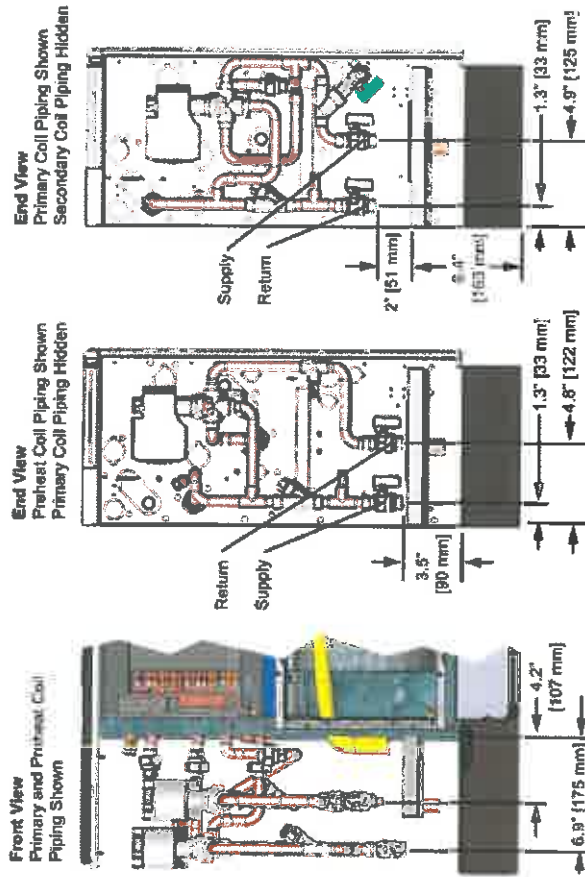
Model: VLVFCVY

Date: 10/28/2011

Unit Tag: Fan Co : VP : VP 001

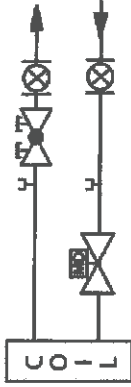
### Connecting Pipe Locations: 4-Pipe, Left Hand with Same-End Preheat Coil

Deluxe package shown, see schematic (right) for list of components selected for this package



# FanCoil\_Drawing for Fan Coil

## Schematic

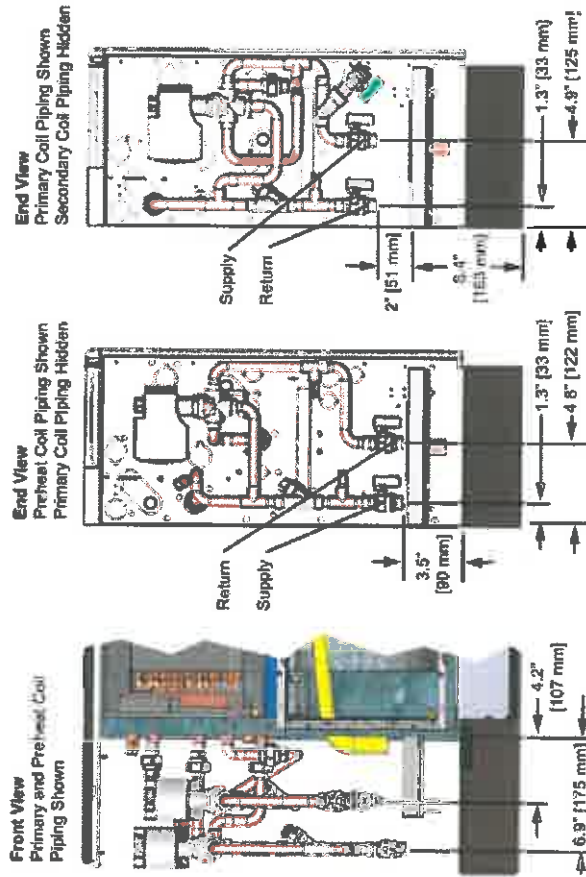


Components Key (items not included in package are grayed out)

	<b>Manual Shutoff Ball Valve</b> Water shut-off. Handle rotates 90 degrees.
	<b>2-Way Modulating Valve (3-wire or proportional)</b> Modulates water flow in response to 24V signal.
	<b>PT Port</b> For connecting a pressure or temperature gauge.
	<b>Cartridge-Type, Auto-Fixed Circuit Setter</b> Pressure-compensated, automatic fixed-flow control.

<b>Valve Package Certified Drawing</b>	
McQuay International certifies that its equipment will conform to this drawing and McQuay's published specifications, subject to its published warranty. Purchaser must determine that the equipment is fit and sufficient for the job specifications. No change to this drawing may be made unless approved in writing by McQuay. <a href="http://www.mcquay.com">www.mcquay.com</a>	
SCHM_BY_V2M_SN_CA_PT_UN	View: Piping/Valve Layout
	Model: VLVFCYY
	Date: 10/28/2011
Unit Tag: Fan Co : VS : VP 001	

Connecting Pipe Locations: 4-Pipe, Left Hand with Same-End Preheat Coil  
Deluxe package shown, see schematic (right) for list of components selected for this package



# **Appendix C-2**

## **Johnson Controls**



# SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
AHU-1	1	Solution Indoor Air Handler 69 x 93	16000

### Unit Sequence

Tier 1

FS <<< CC <<< XA <<< HC <<< AF <<< EE <<< FR

### Basic Unit Options

Insulation Type: (Refer to Each Segment)

Base Rail Height: 6"

Performance: High Performance

### Unit Special Quotes

None

\*Note: Component locations are listed as Segment Hand (Unit Hand) : ex. Left (Right)  
See Submittal Drawing for additional details

### Segments Listed Starting At Air Inlet

Project Name: Shippensburg Old Main

Printed: 10/25/2011 10:58:17

Unit Folder: AHU-1

York Contract No.:  
AHU-1Performance

C-40





# SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
AHU-1	1	Solution Indoor Air Handler 69 x 93	16000

FR - Return Fan Segment																	
Segment Details	Fan Segment Options																
Segment Air Pressure Drop (in. w.g.):	0.08																
Air Flow (CFM):	11400																
Altitude (ft.):	348																
TSP/ESP (in. w.g.):	1.65/ 1.25																
Air Inlet:	Top																
Fan Discharge:	Rear Inverted(Rear)																
<table border="1"> <thead> <tr> <th colspan="2">Fan Segment Options</th> </tr> </thead> <tbody> <tr> <td>1" Spring Isolator</td> <td></td> </tr> <tr> <td>Interior Galvanized Liner</td> <td></td> </tr> <tr> <td>Insulation: R-13 Foam Insulation</td> <td></td> </tr> <tr> <td>Galvanized Floor Liner STD Gauge</td> <td></td> </tr> <tr> <td>Exterior Galvanized Liner</td> <td></td> </tr> <tr> <td>Access Doors on Both Sides 63H x 24W</td> <td></td> </tr> <tr> <td>Standard Door Latch, No Lock, Outward Opening</td> <td></td> </tr> </tbody> </table>		Fan Segment Options		1" Spring Isolator		Interior Galvanized Liner		Insulation: R-13 Foam Insulation		Galvanized Floor Liner STD Gauge		Exterior Galvanized Liner		Access Doors on Both Sides 63H x 24W		Standard Door Latch, No Lock, Outward Opening	
Fan Segment Options																	
1" Spring Isolator																	
Interior Galvanized Liner																	
Insulation: R-13 Foam Insulation																	
Galvanized Floor Liner STD Gauge																	
Exterior Galvanized Liner																	
Access Doors on Both Sides 63H x 24W																	
Standard Door Latch, No Lock, Outward Opening																	
Fan Detail																	
Type:	AF																
Size:	25-25																
Construction:	S																
Bearing Options:	None																
Fan RPM:	974																
BHP:	4.46																
Fan BHP w/ Belt Loss:	4.77																
Outlet Velocity (ft/min):	1550																
Motor Detail																	
Motor Type:	ODP Premium Efficiency																
HP	15.0																
Voltage/Phase/Frequency:	460/3/60 Hz																
Motor RPM:	1800																
Frame Size:	254																
Location:	Left(Left)																
Drive Type:	Belt Drive																
Belt Drive Type:	Fixed																
Drive Options:	Multiple Belt																
Full Load Amps (FLA):	17.7																
Efficiency:	93.0%																



# SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
AHU-1	1	Solution Indoor Air Handler 69 x 93	16000

## Motor Control – Return Fan

### Motor Control Details

Motor Control Type: Variable Frequency Drive  
 Motor HP: 15.0

### Motor Control Electrical Details

Full Load Amps (FLA): 23.0

### Motor Control Options

Non Fused Disconnect  
 Manual Bypass  
 Field Terminated Wiring  
 RFI/EMI EMC Filter  
 Swinging DC Line Choke (equivalent to 5% Input Line Reactor)  
 Modbus RTU, Johnson N2, Siemens FLN, BACnet

### Environmental

Ambient Temperature (°F): 5 to 104  
 Storage Temperature (°F): -40 to 158  
 Humidity: MAX 95% RH non-condensing  
 Altitude: 3,300 ft. without derate (1% derate for each additional 330 ft.)  
 Enclosure: NEMA 1

### Input

Rated Input Voltage: 380/400/415/440/460/480 +10% -15% VAC 3 phase  
 Rated Input Current Amps: 23.00  
 Heat Loss in Watts 100% Load: 337.00  
 Efficiency (%): 98.00

### Output

Output Current Amps: 23.0  
 Overload Current Rating: 110% for 1 minute every 10 minutes

Drives are rated for use below 3,300 ft and 104°F. Use Derating Charts in Air-Mod Engineering Guide Form 100.41-EG1 (704) for use above these limits.

**Copper Conductors Only**



# SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
<b>AHU-1</b>	<b>1</b>	<b>Solution Indoor Air Handler 69 x 93</b>	<b>16000</b>

### EE – Economizer Segment

#### Segment Detail

Supply Air Pressure Drop (in. w.g.)	0.32
Return/Exhaust Air Pressure Drop (in. w.g.)	0.32

	<u>Outside Air (OA)</u>	<u>Mixed Air (MA)</u>	<u>Exhaust Air (EA)</u>	<u>Return Air (RA)</u>
AirFlow (CFM)	16000	16000	16000	16000
Opening (QTY) Size	26.75Hx66.00W	26.75Hx66.00W	26.75Hx66.00W	N/A
Area per Opening (ft <sup>2</sup> )	12.26	12.26	12.26	N/A
Location	Top	Middle-Vertical	Top	None
Damper (QTY) Size	(1)26.75x66	(1)26.75x66	(1)26.75x66	None
Damper Type	Control	Control	Control	None
Configuration	100%	100%	100%	None
Damper Model	CD60	CD60	CD60	None
Damper Material	Galvanized	Galvanized	Galvanized	None
Blade Orientation	Parallel	Parallel	Parallel	None
Min. Allowed CFM	N/A	N/A	N/A	N/A

#### Economizer Segment Options

Interior Galvanized Liner  
 Insulation: R-13 Foam Insulation  
 Galvanized Floor Liner STD Gauge  
 Exterior Galvanized Liner  
 Exhaust Air Doors:  
 Access Doors on Both Sides 63H x 24W  
 Multi-Point Door Latch, No Lock, Outward Opening  
 Outside Air Doors:  
 Access Doors on Both Sides 63H x 24W  
 Standard Door Latch, No Lock, Outward Opening

Dampers Selected are ASHRAE 90.1 Compliant

### AF – Angle Filter Segment

#### Filter Media Detail

(Quantity) Filter Sizes:	(24)20x16
Filter Loading:	Side
Filter Depth:	2"
Filter Media Type:	Pleated 30% (MERV 8)
Filter Area (ft <sup>2</sup> ):	53.3
Filter Air Pressure Drop (in. w.g.):	0.16
Dirty Filter Allowance (in. w.g.):	0.20

#### Filter Segment Options

Interior Galvanized Liner  
 Insulation: R-13 Foam Insulation  
 Galvanized Floor Liner STD Gauge  
 Exterior Galvanized Liner  
 Access Doors on Both Sides 63H x 17W  
 Standard Door Latch, No Lock, Outward Opening



# SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
AHU-1	1	Solution Indoor Air Handler 69 x 93	16000

## HC – Heating Coil Segment

### Coil Segment Details

Coil Space: 7"

### Coil Segment Options

Interior Galvanized Liner  
 Insulation: R-13 Foam Insulation  
 Galvanized Floor Liner STD Gauge  
 Exterior Galvanized Liner  
 Bulkhead Material Galvanized  
 Coil Supports Galvanized

## XA Access Segment

### Access Segment Details

Segment Length: 27"

### Access Segment Options

Interior Galvanized Liner  
 Insulation: R-13 Foam Insulation  
 Galvanized Floor Liner STD Gauge  
 Exterior Galvanized Liner  
 Access Doors on Both Sides 63H x 24W  
 Standard Door Latch, No Lock, Outward Opening  
 22" Additional Core Growth

## CC – Cooling Coil Segment

### Coil Segment Details

Coil Space: 10"

### Coil Segment Options

Interior Galvanized Liner  
 Insulation: R-13 Foam Insulation  
 Galvanized Floor Liner STD Gauge  
 Exterior Galvanized Liner  
 19" IAQ Coil Drain Pan Left (Left)  
 Stainless Steel  
 Bulkhead Material Galvanized  
 Coil Supports Galvanized

### UV Surface Decontamination Detail

None



# SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
AHU-1	1	Solution Indoor Air Handler 69 x 93	16000

## FS - Supply Fan Segment

### Segment Details

Segment Air Pressure Drop (in. w.g.):	0.00
Air Flow (CFM):	16000
Altitude (ft.):	348
TSP/ESP (in. w.g.):	3.29/ 2.00
Air Inlet:	Front(Front)
Fan Discharge:	Rear(Rear)

### Fan Segment Options

1" Spring Isolator  
 Interior Galvanized Liner  
 Insulation: R-13 Foam Insulation  
 Galvanized Floor Liner STD Gauge  
 Exterior Galvanized Liner  
 Access Doors on Both Sides 63H x 24W  
 Standard Door Latch, No Lock, Outward Opening

### Fan Detail

Type:	AF
Size:	25-25
Construction:	S
Bearing Options:	None
Fan RPM:	1340
BHP:	11.94
Fan BHP w/ Belt Loss:	12.59
Outlet Velocity (ft/min):	2176

### Motor Detail

Motor Type:	ODP Premium Efficiency
HP	15.0
Voltage/Phase/Frequency:	460/3/60 Hz
Motor RPM:	1800
Frame Size:	254
Location:	Left(Left)
Drive Type:	Belt Drive
Belt Drive Type:	Fixed
Drive Options:	Multiple Belt
Full Load Amps (FLA):	17.7
Efficiency:	93.0%



# SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
AHU-1	1	Solution Indoor Air Handler 69 x 93	16000

## Motor Control – Supply Fan

Motor Control Details		Motor Control Electrical Details	
Motor Control Type:	Variable Frequency Drive	Full Load Amps (FLA):	23.0
Motor HP:	15.0		

Motor Control Options		Environmental	
Non Fused Disconnect		Ambient Temperature (°F):	5 to 104
Manual Bypass		Storage Temperature (°F):	-40 to 158
RFI/EMI EMC Filter		Humidity:	MAX 95% RH non-condensing
Swinging DC Line Choke (equivalent to 5% Input Line Reactor)		Altitude:	3,300 ft. without derate (1% derate for each additional 330 ft.)
Modbus RTU, Johnson N2, Siemens FLN, BACnet		Enclosure:	NEMA 1

Input	
Rated Input Voltage:	380/400/415/440/460/480 +10% -15% VAC 3 phase
Rated Input Current Amps:	23.00
Heat Loss in Watts 100% Load:	337.00
Efficiency (%):	98.00

Output	
Output Current Amps:	23.0
Overload Current Rating:	110% for 1 minute every 10 minutes

Drives are rated for use below 3,300 ft and 104°F. Use Derating Charts in Air-Mod Engineering Guide Form 100.41-EG1 (704) for use above these limits.

Copper Conductors Only

## Coils & Spacers Listed Starting In Direction Of Air Flow

HC Coil - 01		Coil General/Physical Details		Air Side Performance		Fluid Side Performance	
Location:	0	Rows:	2	Air Flow (CFM):	16000	EWT (°F):	180.0
Tag:	AirCoil	Fins Per Inch:	11	Altitude (ft.):	348	LWT (°F):	160.0
Application:	Heating	Tubes Per Circuit:	2	EAT-DB (°F):	10.0	GPM:	155.2
Coil Type:	Water	Finned Height (in.):	57.50	LAT-DB (°F):	88.4	WPD (ft):	10.1
Face Type:	Full	Finned Length (in.):	81	FV (ft/min):	495	FPS:	5.8
Tube Diameter:	1/2" BDW	Coil Face Area (ft²):	32.3	TMBH:	1509.2	Fluid Type:	Water
Tube Material:	Copper	Coil Conn. Loc.:	Left(Left)	APD (in. w.g.):	0.17	Fluid Weight(lb):	82.6
Tube Wall Thickness:	.016"	Supp Conn Size:	3"			Fluid Volume(ft³):	1.4
		Rtn Conn Size:	3"				
		# of Supply	1				

Project Name: Shippensburg Old Main

Printed: 10/25/2011 10:58:17

York Contract No.:

AHU-1Performance

Unit Folder: AHU-1

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## SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
<b>AHU-1</b>	<b>1</b>	<b>Solution Indoor Air Handler 69 x 93</b>	<b>16000</b>

Fin Type: Corrugated Conn. (per coil):  
 Fin Thickness: .006"  
 Fin Material: Aluminum  
 Casing Material: Galvanized  
 Connection Material: Steel\*  
 Connection Type: MPT  
 Coating: None

\*York suggests using red brass or copper connectors when the coil is to be attached to a copper or brass piping system.

**ARI Messages:**

Coil is certified in accordance with the AHRI Forced-Circulation Air-Cooling and Air-Heating Coils Certification program which is based on AHRI Standard 410. Certified units may be found in the AHRI Directory at [www.ahridirectory.org](http://www.ahridirectory.org).

CC Coil - 01				Air Side Performance		Fluid Side Performance	
Coil General/Physical Details							
Location:	0	Rows:	5	Air Flow (CFM):	16000	EWT (°F):	45.0
Tag:	AirCoil	Fins Per Inch:	10	Altitude (ft.):	348	LWT (°F):	55.0
Application:	Cooling	Tubes Per Circuit:	4	EAT-DB (°F):	80.0	GPM:	115.8
Coil Type:	Water	Finned Height (in.):	57.50	EAT-WB (°F):	67.0	WPD (ft):	7.3
Face Type:	Full	Finned Length (in.):	81	LAT-DB (°F):	56.2	FPS:	3.5
Tube Diameter:	1/2" BDW	Coil Face Area (ft²):	32.3	LAT-WB (°F):	54.9	Fluid Type:	Water
Tube Material:	Copper	Coil Conn. Loc.:	Left(Left)	FV (ft/min):	495	Fluid Weight(lb):	161.9
Tube Wall Thickness:	.016"	Supp Conn Size:	3"	SMBH:	407.3	Fluid Volume(ft³):	2.6
Fin Type:	Corrugated	Rtn Conn Size:	3"	TMBH:	584.1		
Fin Thickness:	.006"	# of Supply	1	APD (in. w.g.):	0.44		
Fin Material:	Aluminum	Conn. (per coil):					
Casing Material:	Stainless						
	Steel						
Connection Material:	Red						
	Brass						
Connection Type:	MPT						
Coating:	None						

**ARI Messages:**

Coil is certified in accordance with the AHRI Forced-Circulation Air-Cooling and Air-Heating Coils Certification program which is based on AHRI Standard 410. Certified units may be found in the AHRI Directory at [www.ahridirectory.org](http://www.ahridirectory.org).



# SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
AHU-1	1	Solution Indoor Air Handler 69 x 93	16000

<b>Electrical Circuit Summary</b>	
<u>Short-Circuit Summary</u>	
5 kA rms Symmetrical	480 V Maximum

Circuit 1	Circuit 1 Electrical Details
<u>Supply Fan Motor Control</u>	Full Load Amps (FLA): 23.0 Minimum Circuit Ampacity (MCA): 28.8 Maximum Fuse Size: 50.00

Circuit 2	Circuit 2 Electrical Details
<u>Return Fan Motor Control</u>	Full Load Amps (FLA): 23.0 Minimum Circuit Ampacity (MCA): 28.8 Maximum Fuse Size: 50.00

### Static Pressure Summary

Segment	Component	Supply (in. w.g.)	Return Fan (in. w.g.)
FR-DWDI Return Fan	Opening Pressure Drop		0.08
	External Static Pressure - User Entered Pressure Drop		1.25
EE Economizer	Opening Pressure Drop		0.29
	Control Galvanized (CD60)		0.03
	Opening Pressure Drop	0.29	
	Control Galvanized (CD60)	0.03	
AF Angle Filter	2" Pleated 30% (MERV 8)	0.16	
	Dirty Filter Allowance	0.20	
HC Heating Coil	Heating 2 rows 11 fins	0.17	
CC Variable Length Cooling Coil	Cooling 5 rows 10 fins	0.44	
FS-DWDI Supply Fan	External Static Pressure - User Entered Pressure Drop	2.00	
<b>Total</b>		<b>3.29</b>	<b>1.65</b>

**Air handling unit parameters vary depending on conditions. Parameters such as airflows, air pressure drops, and coil capacities are shown for design conditions.**

Project Name: Shippensburg Old Main

Printed: 10/25/2011 10:58:17

Unit Folder: AHU-1

York Contract No.:

AHU-1Performance





# SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
AHU-1	1	Solution Indoor Air Handler 69 x 93	16000

### Dimension & Weights Summary

Section	Length* (in.)	Width** (in.)	Height (in.)	Weight (lbs.)
FR-DWDI Return Fan Segment	49	93	69	1983
EE Economizer Segment	65	93	69	819
AF Angle Filter Segment	17	93	69	416
HC Heating Coil Segment	10	93	69	607
XA Variable Length Access Segment	27	93	69	320
CC Variable Length Cooling Coil Segment	20	93	69	1214
FS-DWDI Supply Fan Segment	49	93	69	1983
<b>Overall:</b>	<b>237</b>	<b>93</b>	<b>69</b>	<b>7342</b>

\*The length includes bottom tier segments only.  
 \*\*The width does not include coil connection extensions or door latches that extent beyond the unit casing.  
 The width does not include the depth of any pipe chases.

### Shipping Skid Summary

Shipping Skid	Length* (in.)	Width** (in.)	Height*** (in.)	Weight (lbs.)
(FS-DWDI CC)	70	114	79	3197
(XA HC)	37	102	79	927
(AF EE)	50	99	79	858
(EE)	33	99	79	377
(FR-DWDI)	50	114	79	1983
<b>Ship Loose:</b> None				
*The length includes any mounted rain-hoods, discharge flanges, tie-down brackets, shipping wood-blocks, front dampers, split connectors, electrical/control components, out rigging HW supports, isolation dampers **The width includes any door handles, coil connections, drain connections, lifting lugs, mounted pipe-chases, electrical/control components, tie-down brackets, side dampers ***The height includes any base-rails, shipping wood-blocks, roof peak, discharge flanges, mounted gas-furnace flue pipes				
<b>Shipping Skid Sequence</b>				
Tier 1	(FS < CC) < (XA < HC) < (AF < EE) < (EE) < (FR)			



# SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
AHU-1	1	Solution Indoor Air Handler 69 x 93	16000

## Sound Summary

	Octave Band Sound Power Levels (dB Re. 1 picowatt)								dBA
	63	125	250	500	1000	2000	4000	8000	
Ducted Discharge Rear-1, FS	98	95	96	91	88	80	75	70	
Return Air Top-1, FR	90	83	82	80	74	72	70	67	
Outside Air Top-1, EE	86	84	83	76	73	68	63	58	80
Exhaust Air Top-1, EE	87	85	83	76	73	68	64	58	80

**Sound data tested in accordance with ARI-260 (2000), Standard for Sound Rating of Ducted Air Moving and Conditioning Equipment.**

Notes:

- The overall A-weighted sound power level is only applicable to sound radiation outdoors and casing radiated sound. This metric does not apply to ducted components
- Return air sound powers are estimated using 100% of unit flow. Outside air sound powers are estimated using 15% of unit flow. Exhaust air sound powers are estimated using 15% of unit flow.







# SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
ERV-1	1	Solution Indoor Air Handler 51 x 87	4600

## AF - Angle Filter Segment

Filter Media Detail		Filter Segment Options
(Quantity) Filter Sizes:	(16)20x16	Interior Galvanized Liner
Filter Loading:	Side	Insulation: R-13 Foam Insulation
Filter Depth:	2"	Galvanized Floor Liner STD Gauge
Filter Media Type:	Pleated 30% (MERV 7)	Exterior Galvanized Liner
Filter Area (ft²):	35.6	Access Door on Right Side(Left) 45H x 17W
Filter Air Pressure Drop (in. w.g.):	0.05	Multi-Point Door Latch, No Lock, Outward Opening
Dirty Filter Allowance (in. w.g.):	0.10	

## XA Access Segment

Access Segment Details		Access Segment Options
Segment Length:	23 "	Interior Galvanized Liner
		Insulation: R-13 Foam Insulation
		Galvanized Floor Liner STD Gauge
		Exterior Galvanized Liner
		Access Door on Right Side(Left) 45H x 18W
		Multi-Point Door Latch, No Lock, Outward Opening
		2" Additional Core Growth

## XA Access Segment

Access Segment Details		Access Segment Options
Segment Length:	26 "	Interior Galvanized Liner
		Insulation: R-13 Foam Insulation
		Galvanized Floor Liner STD Gauge
		Exterior Galvanized Liner
		21" Additional Core Growth



# SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
ERV-1	1	Solution Indoor Air Handler 51 x 87	4600

## FE - Exhaust Fan Segment

### Segment Details

Segment Air Pressure Drop (in. w.g.):	0.00
Air Flow (CFM):	4600
Altitude (ft.):	348
TSP/ESP (in. w.g.):	1.97/ 1.25
Air Inlet:	Front(Rear)
Fan Discharge:	Rear(Front)

### Fan Segment Options

1" Spring Isolator  
 Interior Galvanized Liner  
 Insulation: R-13 Foam Insulation  
 Galvanized Floor Liner STD Gauge  
 Exterior Galvanized Liner  
 Access Doors on Both Sides 45H x 18W  
 Multi-Point Door Latch, No Lock, Outward Opening

### Fan Detail

Type:	AF
Size:	18-18
Construction:	S
Bearing Options:	None
Fan RPM:	1351
BHP:	2.01
Fan BHP w/ Belt Loss:	2.15
Outlet Velocity (ft/min):	1460

### Motor Detail

Motor Type:	ODP Premium Efficiency
HP	3.0
Voltage/Phase/Frequency:	460/3/60 Hz
Motor RPM:	1800
Frame Size:	182
Location:	Right(Left)
Drive Type:	Belt Drive
Belt Drive Type:	Fixed
Full Load Amps (FLA):	4.1
Efficiency:	89.5%



# SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
ERV-1	1	Solution Indoor Air Handler 51 x 87	4600

**Motor Control – Exhaust Fan**

Motor Control Details		Motor Control Electrical Details	
Motor Control Type:	EM Starter	Full Load Amps (FLA):	4.1
Motor HP:	3		

**Motor Control Options**  
 Fused Disconnect  
 Field Terminated Wiring  
 Extra Auxiliary Contacts: (1) Normally Open  
 Enclosure Location: Primary Access Side of FE/FR

**The customer must provide a platform or catwalk for accessing the power-disconnect.**

**Copper Conductors Only**

**MB – Mixing Box Segment**

Segment Detail	
Segment Air Pressure Drop (in. w.g.):	0.04

	Outside Air (OA)	Return Air (RA)
AirFlow (CFM)	4600	4600
Opening (QTY) Size	21.00Hx66.00W	N/A
Area per Opening (ft <sup>2</sup> )	9.63	N/A
Location	Front-High(Front)	None
Damper (QTY) Size	(1)21.00x66	None
Damper Type	Control	None
Configuration	100%	None
Damper Model	CD60	None
Damper Material	Galvanized	None
Blade Orientation	Parallel	None
Min. Allowed CFM	N/A	N/A
Damper Linkage	Unlinked	Unlinked

**Mixing Box Segment Options**

Interior Galvanized Liner  
 Insulation: R-13 Foam Insulation  
 Galvanized Floor Liner STD Gauge  
 Exterior Galvanized Liner  
 Access Doors on Both Sides 45H x 18W  
 Standard Door Latch, No Lock, Outward Opening

Dampers Selected are ASHRAE 90.1 Compliant



# SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
ERV-1	1	Solution Indoor Air Handler 51 x 87	4600

## AF - Angle Filter Segment

Filter Media Detail		Filter Segment Options
(Quantity) Filter Sizes:	(16)20x16	Interior Galvanized Liner
Filter Loading:	Side	Insulation: R-13 Foam Insulation
Filter Depth:	2"	Galvanized Floor Liner STD Gauge
Filter Media Type:	Pleated 30% (MERV 7)	Exterior Galvanized Liner
Filter Area (ft <sup>2</sup> ):	35.6	Access Door on Left Side(Left) 45H x 17W
Filter Air Pressure Drop (in. w.g.):	0.05	Standard Door Latch, No Lock, Outward Opening
Dirty Filter Allowance (in. w.g.):	0.10	

## XA Access Segment

Access Segment Details		Access Segment Options
Segment Length:	21 "	Interior Galvanized Liner
		Insulation: R-13 Foam Insulation
		Galvanized Floor Liner STD Gauge
		Exterior Galvanized Liner





# SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
ERV-1	1	Solution Indoor Air Handler 51 x 87	4600

### HW – Heat Wheel Segment

Segment Details	
Supply Air Pressure Drop (in. w.g.):	0.50
Exhaust Air Pressure Drop (in. w.g.):	0.50
Outdoor Air Flow (CFM):	4600
Exhaust Air Flow (CFM):	4600
Segment Length (in.):	28
Heat Wheel Type:	Enthalpy
Heat Wheel Vendor:	AirXchange
Heat Wheel Model Number:	ERC-7490C
Heat Wheel Media:	Composite
Heat Wheel Coating:	
Arrangement:	Vertical

Heat Wheel Segment Options
Interior Galvanized Liner
Insulation: R-13 Foam Insulation
Galvanized Floor Liner STD Gauge
Exterior Galvanized Liner
Inverter Rated Motor

#### Design Conditions

	Dry Bulb, °F	Wet Bulb, °F
Summer, Outdoor:	92.00	74.00
Summer, Indoor:	75.00	63.00
Winter, Outdoor:	9.00	8.00
Winter, Indoor:	72.00	54.00

#### Option Notes

#### Heat Wheel Performance

	Summer	Winter
Net Effectiveness (%)	81.68	83.34
Sensible Effectiveness (%)	84.36	84.61
Latent Effectiveness (%)	79.32	79.57
Supply Air Conditions (db, °F)	77.57	61.56
Supply Air Conditions (wb, °F)	65.20	47.95
Relative Humidity (%)	52.05	34.89
Total Recovered Load (BTU/Hr)	147858	328241

HEAT WHEEL IS ARI – 1060 CERTIFIED

#### Motor Performance

Motor HP	0.250
Volts/Phase/Hertz	230 / 240/ 3/ 60 Hz

Project Name: Shippensburg Old Main  
Printed: 10/25/2011 10:58:34

York Contract No.:  
ERV-1Performance



# SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
ERV-1	1	Solution Indoor Air Handler 51 x 87	4600
RPM	850		
FLA (Full Load Amps)	2.50		
Field Terminated Wiring			
<b>Heat Wheel Segment Dampers</b>			
	<u>Exhaust Air Bypass</u>	<u>Outside Air Bypass</u>	
Opening Size:	N/A	N/A	
Area of Opening:	N/A	N/A	
Damper (QTY)Size:	None	None	
Damper Type:	N/A	N/A	
Damper Configuration:	N/A	N/A	
Damper Model:	N/A	N/A	
Damper Material:	N/A	N/A	
Blade Orientation:	N/A	N/A	

<b>XA Access Segment</b>	
<u>Access Segment Details</u>	<u>Access Segment Options</u>
Segment Length:	31 " Interior Galvanized Liner Insulation: R-13 Foam Insulation Galvanized Floor Liner STD Gauge Exterior Galvanized Liner Access Door on Left Side(Left) 45H x 24W Standard Door Latch, No Lock, Outward Opening 10" Additional Core Growth



# SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
ERV-1	1	Solution Indoor Air Handler 51 x 87	4600

**FS - Supply Fan Segment**

Segment Details

Segment Air Pressure Drop (in. w.g.):	0.00
Air Flow (CFM):	4600
Altitude (ft.):	348
TSP/ESP (in. w.g.):	2.19/ 1.50
Air Inlet:	Front(Front)
Fan Discharge:	Rear(Rear)

Fan Segment Options

- 1" Spring Isolator
- Interior Galvanized Liner
- Insulation: R-13 Foam Insulation
- Galvanized Floor Liner STD Gauge
- Exterior Galvanized Liner
- Access Doors on Both Sides 45H x 18W
- Standard Door Latch, No Lock, Outward Opening

Fan Detail

Type:	AF
Size:	18-18
Construction:	S
Bearing Options:	None
Fan RPM:	1402
BHP:	2.22
Fan BHP w/ Belt Loss:	2.37
Outlet Velocity (ft/min):	1460

Motor Detail

Motor Type:	ODP Premium Efficiency
HP	3.0
Voltage/Phase/Frequency:	460/3/60 Hz
Motor RPM:	1800
Frame Size:	182
Location:	Left(Left)
Drive Type:	Belt Drive
Belt Drive Type:	Fixed
Full Load Amps (FLA):	4.1
Efficiency:	89.5%

Project Name: Shippensburg Old Main

Printed: 10/25/2011 10:58:34

York Contract No.:

ERV-1Performance

Unit Folder: ERV-1

10/25/2011 10:47:30

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# SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
ERV-1	1	Solution Indoor Air Handler 51 x 87	4600

## Motor Control – Supply Fan

### Motor Control Details

Motor Control Type: EM Starter

Motor HP: 3

### Motor Control Electrical Details

Full Load Amps (FLA): 4.1

### Motor Control Options

Fused Disconnect

Extra Auxiliary Contacts: (1) Normally Open

Enclosure Location: Primary Access Side of FS

Copper Conductors Only

## Electrical Circuit Summary

### Short-Circuit Summary

5 kA rms Symmetrical 480 V Maximum

### Circuit 1

Supply Fan Motor Control

### Circuit 1 Electrical Details

Full Load Amps (FLA): 4.1  
 Minimum Circuit Ampacity (MCA): 5.1  
 Maximum Fuse Size: 9.00

### Circuit 2

Exhaust Fan Motor Control

### Circuit 2 Electrical Details

Full Load Amps (FLA): 4.1  
 Minimum Circuit Ampacity (MCA): 5.1  
 Maximum Fuse Size: 9.00

### Circuit 3

Heat Wheel Motor

### Circuit 3 Electrical Details

Full Load Amps (FLA): 2.5  
 Minimum Circuit Ampacity (MCA): 3.1  
 Maximum Fuse Size: 5.00



# SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
ERV-1	1	Solution Indoor Air Handler 51 x 87	4600

### Static Pressure Summary

Segment	Component	Supply (in. w.g.)	Exhaust Fan (in. w.g.)
IP Inlet Plenum	Opening Pressure Drop		0.07
AF Angle Filter	2" Pleated 30% (MERV 7)		0.05
	Dirty Filter Allowance		0.10
HW2 Heat Wheel - Vertical - Top Tier	Energy Wheel Exhaust Pressure Drop		0.50
FE-DWDI Exhaust Fan	External Static Pressure - User Entered Pressure Drop		1.25
MB Mixing Box	Opening Pressure Drop	0.04	
AF Angle Filter	2" Pleated 30% (MERV 7)	0.05	
	Dirty Filter Allowance	0.10	
HW1 Heat Wheel - Vertical - Bottom Tier	Energy Wheel Supply Pressure Drop	0.50	
FS-DWDI Supply Fan	External Static Pressure - User Entered Pressure Drop	1.50	
<b>Total</b>		<b>2.19</b>	<b>1.97</b>

**Air handling unit parameters vary depending on conditions. Parameters such as airflows, air pressure drops, and coil capacities are shown for design conditions.**

### Dimension & Weights Summary

Section	Length* (in.)	Width** (in.)	Height (in.)	Weight (lbs.)
IP Inlet Plenum Segment	-	87	51	460
AF Angle Filter Segment	-	87	51	337
XA Variable Length Access Segment	-	87	51	228
HW2 Heat Wheel - Vertical - Top Tier Segment	-	87	51	622
XA Variable Length Access Segment	-	87	51	258
FE-DWDI Exhaust Fan Segment	-	87	51	995
MB Mixing Box Segment	29	87	51	473
AF Angle Filter Segment	17	87	51	315
XA Variable Length Access Segment	21	87	51	217
HW1 Heat Wheel - Vertical - Bottom Tier Segment	28	87	51	1089
XA Variable Length Access Segment	31	87	51	321
FS-DWDI Supply Fan Segment	41	87	51	1014
<b>Overall:</b>	<b>167</b>	<b>87</b>	<b>102</b>	<b>6329</b>

\*The length includes bottom tier segments only.  
 \*\*The width does not include coil connection extensions or door latches that extent beyond the unit casing.  
 The width does not include the depth of any pipe chases.

Project Name: Shippensburg Old Main

Printed: 10/25/2011 10:58:34

York Contract No.:

ERV-1Performance



# SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
ERV-1	1	Solution Indoor Air Handler 51 x 87	4800

## Shipping Skid Summary

Shipping Skid	Length* (in.)	Width** (in.)	Height*** (in.)	Weight (lbs.)
(HW1 HW2)	28	90	112	1711
(FS-DWDI XA)	74	99	61	1335
(XA AF MB)	67	93	61	1005
(IP AF XA)	72	93	55	1025
(XA FE-DWDI)	68	99	55	1253

**Ship Loose:**  
None

\*The length includes any mounted rain-hoods, discharge flanges, tie-down brackets, shipping wood-blocks, front dampers, split connectors, electrical/control components, out rigging HW supports, isolation dampers

\*\*The width includes any door handles, coil connections, drain connections, lifting lugs, mounted pipe-chases, electrical/control components, tie-down brackets, side dampers

\*\*\*The height includes any base-rails, shipping wood-blocks, roof peak, discharge flanges, mounted gas-furnace flue pipes

## Shipping Skid Sequence

Tier 2	(IP > AF > XA) > (HW > (XA > FE)
Tier 1	(FS < XA) < (HW < (XA < AF < MB)



# SOLUTION AIR HANDLING UNIT PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model	Air Flow (CFM)
ERV-1	1	Solution Indoor Air Handler 51 x 87	4600

## Sound Summary

Octave Band Sound Power Levels (dB Re. 1 picowatt)

63   125   250   500   1000   2000   4000   8000   dB(A)

Contact the Solution Application Group for Heat Wheel Sound Data

***Sound data tested in accordance with ARI-260 (2000), Standard for Sound Rating of Ducted Air Moving and Conditioning Equipment.***

**Notes:**

1. The overall A-weighted sound power level is only applicable to sound radiation outdoors and casing radiated sound. This metric does not apply to ducted components







Project Name: Shippensburg Old Main  
 Location:  
 Consultant/Engineer:  
 Contractor:  
 Sold To:  
 P.O. No: PO

JCI Contract No: Contract #  
 Coil Version: 4.28a  
 Printed Date: 10/25/2011 11:11:17 AM  
 Selection Date: 10/25/2011 11:08:11 AM  
 Last Revision Date: 10/25/2011 11:10:03 AM

**Performance Data Sheet**

Unit Tag FCU-1	Qty 1	Model FW-C12	Air Flow 703 cfm	Total Duty 23,340 Btuh	Sensible Duty 17,410 Btuh
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**Unit Data**

Model Size : 12	Filter : 1" Pleated (MERV 8)	Coil Tube Diameter [in.] 1.2
Type : Vertical Floor - Series C	Filter (Qty) Size : (3) 9.25 X 21.75 X 1	Tube Wall [in.] 0.016
Fans/Motors : 4 / 2	Filter Face Area [ft²] 4.19	Coil Face Area [ft²] 4.03
Capacity : Standard Capacity		Weight* : 251.00 lb

**Output Data**

Altitude [ft]	0
Air Flow Rate [cfm]	703
ESP [in.wg]	0.05
<b>Cooling Data</b>	
EAT DB/WB [°F]	75.0/ 63.0
LAT DB/WB [°F]	82.6/ 61.5
Total Capacity [Btuh]	23,340
Sensible Capacity [Btuh]	17,410
EWT/LWT [°F]	45.0/ 55.0
Fluid Flow [gpm]	4.60
Fluid P.D [ft.wg]	13.98
Fluid Velocity [fps]	4.00
Rows / FPI / Circuits :	3 Rows / 10 FPI / 2 Ckt

<b>Heating Data</b>	
EAT DB [°F]	70.0
LAT DB [°F]	111.1
Sensible Capacity [Btuh]	31,420
EWT/LWT [°F]	180.0/ 180.0
Fluid Flow [gpm]	3.20
Fluid P.D [ft.wg]	15.03
Fluid Velocity [fps]	5.60
Rows / FPI / Circuits :	1 Row / 10 FPI / 1 Ckt

**Options**

- 1" Pleated Spare Filter (MERV 8) (1)
- 16 Gauge Front Panel
- Auxiliary Drip Pan- Plastic, Double Wall
- BC08 24V, Unit S/S & Fan Op. Relay, 3-Spd Fan Relay & Transformer
- Coil Casing- Galvanized Casing
- Leveling Legs
- OC011 Drain Pan Float Switch
- OC012 Toggle Disconnect Switch - 15 ampe
- OC015 Main Fusing (Up to 33 AMPS)
- Paint Options- Pearl White Satin
- Remote Mounted Thermostat
- Return Air Options- Return: Stamped Louver Grille
- Stainless Steel Unit Drain Pan
- Standard Height
- Standard Width
- Supply Air Options- Supply: Stamped Louver Grille
- Tamper Proof Fasteners
- Cooling Coil: Field Provided Piping Package Size - 1/2"
- Cooling Coil: Field Provided by others (2-Position Close-Off)
- Cooling Coil: Left Hand Connection
- Cooling Coil: Manual Air Vent
- Heating Coil: Field Provided Piping Package Size - 1/2"
- Heating Coil: Field Provided by others (2-Position Close-Off)
- Heating Coil: Left Hand Connection
- Heating Coil: Manual Air Vent

**Special Quote (SQ)#**

Electrical Data	
VIP/Hz	: 208/1/60
Fan Power Input	[Watts] 147

**Special Quote (SQ)#**

- \* Unit weight includes unit with wet coil(s) as selected. Does not include accessories.
- o Unit pressure drop and air flow based upon dry coil as required by AHRI-440.
- Total sound power level data based on Vertical Floor Exposed Model with fan air flow at corresponding motor tap with 115/180 volt motor, 4 row coil, 1" throwaway filter, 6.0" external static pressure and standard rated internal pressure losses.
- o Sound data tested in accordance with AHRI-350-2000.
- o Scheduled motor information is for Fan Input Power at High Speed.
- o For 0" altitude the coil selection has been made at Standard Conditions.

**Sound power By Octave Band (dB Re 10<sup>12</sup> Watts)**

Speed	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
High	62	64	65	56	50	44	35

