

Technical Report #2

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Newseum and Freedom Forum Headquarters

Washington, D.C.



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Power Distribution Systems

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Executive Summary

The purpose of Technical Report 2 is to look at and examine the existing electrical system of the Newseum and Freedom Forum Headquarters building. A description of the buildings distribution system is given, as is a description of the service entrance at the B-1 Mezzanine level. The two voltage systems that operate throughout the building were then identified by type and by what loads they go to. The methods used for emergency power and over-current devices in the main switchgear were also researched. Following these descriptions of the electrical systems are tables listing the buildings transformers, switchgear, lighting loads, and mechanical and other loads. Some information regarding the utility company and rates for the Newseum was also gathered. Service is provided to the building by PEPCO.

After all of the previous information was gathered, calculations concerning the Newseums service entrance size were completed. This was done by a total of three methods. The first was load per square foot. This was then followed by a calculation using demand factors from the National Electric Code (NEC). The final calculation was an actual loading calculation. Lighting panelboard loads and mechanical loads were used figure out the total loading of the building. The total load from each step was divided by three in order to account for the three service entrances. These values were then compared to the actual equipment ratings. It was found the main switchboard sizes of 4000 A is higher than that required. However this allows for expansion and additional loading in the future.

Finally, a single line diagram for each service entrance to the Newseum was prepared using the existing riser diagram.

Summary description of distribution system

The power to the Newseum and Freedom Forum Headquarters is supplied by PEPCO in Washinton, D.C. There are three incoming services which are all connected to a totalization meter. The service is at 480Y/277V, 3PH, 4W. Transformers at the service entrance change the power to a 460Y/265V, 3PH, 4W system. Each of the three services then goes to a main switchboard. From here, the power is taken to distribution panels throughout the building. Some of these panels continue to carry the power at 460Y/265V, 3PH, 4W , while some feeders carry power from the main switchboards to transformers which step the voltage down to a 208Y/120V, 3PH, 4W system, and is taken to low voltage distribution panels.

Service Entrance

The service comes into the building at the B-1 Mezzanine level. There are three incoming services that are connected through a totalization meter. Transformers step the voltage down to the buildings main voltage system for each service. It is at this point where responsibility is switched from the utility company to the owner. When power leaves these transformers at 460Y/265V, it is the owners responsibility. After the transformers, it runs through a 4000A switch protected by a 4000A fuse. Each service then connects to a 4000A main switchboard where power is distributed throughout the building.

Voltage Systems

The Newseum and Freedom Forum headquarters has two main voltage systems operating in the building. There is a 460Y/265V, 3 PH, 4 W. This includes loads such as atrium lighting, motor loads, and most of the mechanical equipment. The 208Y/120V, 3 PH, 4 W system is provided for the residential system. However transformers also step down the higher voltage system in the newseum, so that this smaller system can be used along with the larger one. The 208Y/120V system is used in the Newseum for most of the lighting, and some mechanical equipment that uses low horsepower fans and motors.

Transformers

| Tag | Primary Voltage | Secondary Voltage | Size (kVA) | Type | Temp. Rise | Taps | Mounting | Remarks |
|------|------------------|-----------------------|------------|-------------|------------|------|--------------------|---------|
| T-1 | 460V, 3PH, 3W | 208Y/120V, 3PH, 4W | 3 | Dry Type | * | * | Pad mounted | -- |
| T-2 | 460V, 3PH, 3W | 208Y/120V, 3PH, 4W | 6 | Dry Type | * | * | Pad mounted | -- |
| T-3 | 460V, 3PH, 3W | 208Y/120V, 3PH, 4W | 9 | Dry Type | * | * | Pad mounted | -- |
| T-4 | 460V, 3PH, 3W | 208Y/120V, 3PH, 4W | 15 | Dry Type | * | * | Ceiling mounted | -- |
| T-5 | 460V, 3PH, 3W | 208Y/120V, 3PH, 4W | 30 | Dry Type | * | * | Ceiling mounted | -- |
| T-6 | 460V, 3PH, 3W | 208Y/120V, 3PH, 4W | 45 | Dry Type | * | * | Ceiling mounted | -- |
| T-7 | 460V, 3PH, 3W | 208Y/120V, 3PH, 4W | 75 | Dry Type | * | * | Pad mounted | -- |
| T-8 | 460V, 3PH, 3W | 208Y/120V, 3PH, 4W | 112.5 | Dry Type | * | * | Pad mounted | -- |
| T-9 | 460V, 3PH, 3W | 208Y/120V, 3PH, 4W | 150 | Dry Type | * | * | Pad mounted | -- |
| T-10 | 460V, 3PH, 3W | 208Y/120V, 3PH, 4W | 225 | Dry Type | * | * | Pad mounted | -- |
| T-11 | 460V, 3PH, 3W | 208Y/120V, 3PH, 4W | 300 | Dry Type | * | * | Pad mounted | -- |
| T-12 | 460V, 3PH, 3W | 208Y/120V, 3PH, 4W | 500 | Dry Type | * | * | Pad mounted | -- |
| T-13 | 460V, 3PH, 3W | 208Y/120V, 3PH, 4W | 750 | Dry Type | * | * | Pad mounted | -- |

Emergency Power System

Emergency power is supplied by a 2250 kW diesel engine powered generator. This provides emergency power, and back-up power to loads in both the newseum and residential portions on the building. In the future, a separate diesel engine powered generator will provide emergency power to the residential side. Automatic transfer switches start the generator, which then feeds power to a main distribution panel. Life safety components supplied by the emergency power are exit lights, egress lights, corridor and stair lights, fire pumps, smoke exhaust systems, stair pressurization systems, fire alarm systems, security systems, sump and water pumps, fuel oil pumps, and two elevators. The elevators include one car for the Newseum and one for the residential portion. The emergency system also includes a 15 minute battery backup which serves broadcast equipment in Studio's A and B.

Over-current devices

The service entrance switchgear is protected by anywhere from 500A to 2500A fuses. The main switchboards are each protected by fused switches. The buildings panels are also protected by fused switches.

Locations of switchgear

Major equipment

| Tag | Type | Floor level | Room # | Room Name | Drawing |
|----------|--------------------------|-------------|--------|--------------|------------|
| DP-B3-W | Distribution panel | B-3 | B3-06 | Mech. Room | E100-B3.C |
| DP-B3-E | Distribution panel | B-3 | B3-22 | Elec. Room | E100-B3.A |
| T-4 | Transformer | B-3 | B3-06 | Mech. Room | E100-B3.C |
| T-7 | Transformer | B-3 | B3-22 | Elec. Room | E100-B3.A |
| T-4 | Transformer | B-2 | B2-03 | Elec. Closet | E100-B2.A |
| T-4 | Transformer | B-2 | B2-03 | Elec. Closet | E100-B2.A |
| DP-B2-E | Distribution panel | B-2 | B2-18 | Mech. Room | E100-B2.C |
| T-6 | Transformer | B-1 | B1-13 | Elec. Closet | E100-B1.A |
| T-6 | Transformer | B-1 | B1-13 | Elec. Closet | E100-B1.A |
| T-6 | Transformer | B-1 | B1-86 | Elec. Room | E100-B1M.B |
| T-9 | Transformer | B-1 | B1-75 | Elec. Closet | E100-B1.C |
| T-5 | Transformer | B-1 | B1-82 | Servery | E100-B1.B |
| T-8 | Transformer | B-1 | B1-82 | Servery | E100-B1.B |
| T-7 | Transformer | B-1M | B1-27 | Forum tech | E100-B1M.B |
| T-10 | Transformer | B-1M | B1-27 | Forum tech | E100-B1M.B |
| MDB-1 | Switchboard | B-1M | -- | Main elec. | E100-B1M |
| MDB-2 | Switchboard | B-1M | -- | Main elec. | E100-B1M |
| MDB-3 | Switchboard | B-1M | -- | Main elec. | E100-B1M |
| DB-1 | Distribution panel | B-1M | -- | Main elec. | E100-B1M |
| DB-2 | Distribution panel | B-1M | -- | Main elec. | E100-B1M |
| DB-3 | Distribution panel | B-1M | -- | Main elec. | E100-B1M |
| DB-4 | Distribution panel | B-1M | -- | Main elec. | E100-B1M |
| DB-5 | Distribution panel | B-1M | -- | Main elec. | E100-B1M |
| DB-6 | Distribution panel | B-1M | -- | Main elec. | E100-B1M |
| DB-HTG-1 | Distribution panel | B-1M | -- | Main elec. | E100-B1M |
| DB-HTG-2 | Distribution panel | B-1M | -- | Main elec. | E100-B1M |
| DB-HTG-3 | Distribution panel | B-1M | -- | Main elec. | E100-B1M |
| DP-H-1 | Distribution panel | 1 | 1-52 | Fan room | E101.B |
| T-6 | Transformer | 1 | 1-34 | Elec. Closet | E101.B |
| T-6 | Transformer | 1 | 1-52 | Fan room | E101.B |
| T-8 | Transformer | 1 | 1-34 | Elec. Closet | E101.B |
| T-8 | Transformer | 1 | 1-52 | Fan room | E101.B |
| T-8 | Transformer | 1 | 1-52 | Fan room | E101.B |
| T-10 | Transformer | 1 | 1-34 | Elec. Closet | E101.B |
| T-13 | Transformer | 1 | 1-52 | Fan room | E101.B |
| DP-2 | Distribution panel | 2 | 2-08 | Elec. Room | E102.B |
| T-8 | Transformer | 2 | 2-08 | Elec. Room | E102.B |
| T-7 | Transformer | 2 | 2-36 | Elec. Room | E102.B |
| T-6 | Transformer | 2 | 2-36 | Elec. Room | E102.B |
| T-7 | Transformer | 2 | 2-08 | Elec. Room | E102.B |
| T-7 | Transformer | 2 | 2-36 | Elec. Room | E102.B |
| DP-3 | Distribution panel | 3 | 3-11 | Mech. Room | E103.B |
| T-10 | Transformer | 3 | 3-10 | Elec. Room | E103.B |
| T-10 | Transformer | 3 | 3-45 | Elec. Room | E103.B |
| T-10 | Transformer | 3 | 3-11 | Mech. Room | E103.B |
| T-10 | Transformer | 3 | 3-11 | Mech. Room | E103.B |
| ADP-3A | Distribution panel | 3 | 3-11 | Mech. Room | E103.B |
| T-10 | Transformer | 3 | 3-45 | Elec. Room | E103.B |
| DP-H-3 | Distribution panel | 3 | 3-11 | Mech. Room | E103.B |
| PC1-3 | 100kva power conditioner | 3 | 3-45 | Elec. Room | E103.B |

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|---------|-------------------------|------|-------|--------------|---------|
| T-8 | Transformer | 3 | 3-45 | Elec. Room | E103.B |
| T-7 | Transformer | 3M | 3-45 | Elec. Room | E103.B |
| MDP-S-B | Main distribution panel | 4 | 4-16B | Dimmer room | E104.B |
| T-10 | Transformer | 4 | 4-16B | Dimmer room | E104.B |
| T-10 | Transformer | 4 | 4-16B | Dimmer room | E104.B |
| T-10 | Transformer | 4M | 4M-09 | Elec. Room | E104M.B |
| DP-4M-W | Distribution panel | 4M | 4M-10 | Mech. Room | E104M.B |
| DP-4M-E | Distribution panel | 4M | 4M-17 | Elec. Room | E104M.B |
| T-8 | Transformer | 4M | 4M-17 | Elec. Room | E104M.B |
| DP-H-4M | Distribution panel | 4M | 4M-10 | Mech. Room | E104M.B |
| T-7 | Transformer | 5 | 5-10 | Elec. Room | E105.B |
| T-7 | Transformer | 6 | 6-18 | Elec. Room | E106.B |
| DP-H-6 | Distribution panel | 6 | EM | Elec. Room | E106.B |
| DP-6 | Distribution panel | 6 | EM | Elec. Room | E106.B |
| T-7 | Transformer | 7 | 7-10 | Elec. Closet | E107.B |
| DP-ROOF | Distribution panel | Roof | -- | -- | E109.B |
| | | | | | |

Lighting and appliance panel boards

| Tag | Volt system | Floor level | Room # | Room name | Drawing |
|-------------|-------------|-------------|--------|--------------|------------|
| HV-B3-W | 460Y/277V | B-3 | B3-04 | Elec. Closet | E100-B3.A |
| LV-B3-W | 208Y/120V | B-3 | B3-04 | Elec. Closet | E100-B3.A |
| HV-B3-E | 460Y/277V | B-3 | B3-22 | Elec. Room | E100-B3.A |
| LV-B3-E | 208Y/120V | B-3 | B3-22 | Elec. Room | E100-B3.A |
| HV-B2-W | 460Y/277V | B-2 | B2-03 | Elec. Closet | E100-B2.A |
| LV-B2-W | 208Y/120V | B-2 | B2-03 | Elec. Closet | E100-B2.A |
| HV-B2-E | 460Y/277V | B-2 | B2-23 | Elec. Closet | E100-B2.B |
| LV-B2-E | 208Y/120V | B-2 | B2-23 | Elec. Closet | E100-B2.B |
| LV-B1-IG | 208Y/120V | B-1 | B1-13 | Elec. Closet | E100-B1.A |
| HV-B1-W | 460Y/277V | B-1 | B1-13 | Elec. Closet | E100-B1.A |
| LV-B1-W | 208Y/120V | B-1 | B1-13 | Elec. Closet | E100-B1.A |
| LCP-071 | 208Y/120V | B-1 | B1-13 | Elec. Closet | E100-B1.A |
| LV-B1-EXH | 208Y/120V | B-1 | B1-86 | Elec. Room | E100-B1M.B |
| LV-B1-FT | 208Y/120V | B-1 | B1-27 | Forum tech | E100-B1M.B |
| HV-B1-K | 460Y/277V | B-1 | B1-82 | Servery | E100-B1.B |
| LV-B1-KA | 208Y/120V | B-1 | B1-82 | Servery | E100-B1.B |
| LV-B1-KB | 208Y/120V | B-1 | B1-82 | Servery | E100-B1.B |
| LV-B1-KC | 208Y/120V | B-1 | B1-82 | Servery | E100-B1.B |
| LV-B1-KD | 208Y/120V | B-1 | B1-82 | Servery | E100-B1.B |
| HV-B1-E | 460Y/277V | B-1 | B1-86 | Elec. Room | E100-B1M.B |
| LV-B1-E | 208Y/120V | B-1 | B1-86 | Elec. Room | E100-B1M.B |
| LCP-B1R | 208Y/120V | B-1 | B1-13 | Elec. Closet | E100-B1.A |
| HV-B1M | 460Y/277V | B-1M | -- | -- | E100-B1M.B |
| LV-B1M | 208Y/120V | B-1M | -- | -- | E100-B1M.B |
| LV-GLASS | 208Y/120V | B-1M | -- | -- | E100-B1M.B |
| LV-1-IG | 208Y/120V | B-1M | B1-27 | Forum tech | E100-B1M.B |
| LV-1-S | 208Y/120V | 1 | -- | Elec. Closet | E101.C |
| LV-1-R | 208Y/120V | 1 | -- | Elec. Closet | E101.C |
| LV-1-E | 208Y/120V | 1 | 1-53 | Elec. Closet | E101.B |
| LV-1-W | 208Y/120V | 1 | 1-34 | Elec. Closet | E101.B |
| LV-1-F | 208Y/120V | 1 | -- | Elec. Closet | E101.C |
| LV-1-IG | 208Y/120V | 1 | -- | Elec. Closet | E101.C |
| LV-EER-1-IG | 208Y/120V | 1 | B1-27 | Forum tech | E100-B1M.B |
| DIMMERS | 208Y/120V | 1 | -- | Elec. Closet | E101.C |

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|-------------|-----------|----|-------|--------------|---------|
| HV-1-E | 460Y/277V | 1 | 1-53 | Elec. Closet | E101.B |
| HV-1-R | 460Y/277V | 1 | -- | Elec. Closet | E101.C |
| HV-1-W | 460Y/277V | 1 | 1-34 | Elec. Closet | E101.B |
| HV-2-W | 460Y/277V | 2 | 2-08 | Elec. Room | E102.B |
| HV-2-REST | 460Y/277V | 2 | -- | -- | -- |
| HV-2-E | 460Y/277V | 2 | 2-36 | Elec. Room | E102.B |
| LCP-D1 | 208Y/120V | 2 | 2-08 | Elec. Room | E102.B |
| LV-2-W | 208Y/120V | 2 | 2-08 | Elec. Room | E102.B |
| LV-2-ST | 208Y/120V | 2 | 2-08 | Elec. Room | E102.B |
| LV-2W-EXH | 208Y/120V | 2 | 2-08 | Elec. Room | E102.B |
| LV-2E-IG | 208Y/120V | 2 | 2-36 | Elec. Room | E102.B |
| LV-2-REST | 208Y/120V | 2 | -- | -- | -- |
| LV-2-E | 208Y/120V | 2 | 2-36 | Elec. Room | E102.B |
| LV-2E-CAFE | 208Y/120V | 2 | 2-57 | Kitchen | E102.A |
| HV-2M-E | 460Y/277V | 2M | 2M-14 | Elec. Room | E102M.B |
| LV-2M-E | 208Y/120V | 2M | 2M-14 | Elec. Room | E102M.B |
| HV-3-W | 460Y/277V | 3 | 3-10 | Elec. Room | E103.B |
| HV-3-E | 460Y/277V | 3 | 3-45 | Elec. Room | E103.B |
| LV-3-W | 208Y/120V | 3 | 3-10 | Elec. Room | E103.B |
| LCP-3R | 208Y/120V | 3 | 3-45 | Elec. Room | E103.B |
| LV-3W-IG | 208Y/120V | 3 | 3-45 | Elec. Room | E103.B |
| LV-EER-3-IG | 208Y/120V | 3 | 3-45 | Elec. Room | E103.B |
| LV-3E-IG | 208Y/120V | 3 | 3-45 | Elec. Room | E103.B |
| LCP-ADR1 | 208Y/120V | 3 | -- | -- | -- |
| LCP-ADR2 | 208Y/120V | 3 | -- | -- | -- |
| LCP-ALTS | 208Y/120V | 3 | -- | -- | -- |
| LV-3-E | 208Y/120V | 3 | 3-45 | Elec. Room | E103.B |
| LV-MC | 208Y/120V | 3 | 3-11 | Mech. Room | E103.B |
| HV-3M-E | 460Y/277V | 3M | 3-45 | Elec. Room | E103.B |
| LV-3M-E | 208Y/120V | 3M | 3-45 | Elec. Room | E103.B |
| LCP-2R | 208Y/120V | 4 | 4-08A | Elec. Room | E104.B |
| LCP-D3 | 208Y/120V | 4 | 4-08A | Elec. Room | E104.B |
| LV-4-W | 208Y/120V | 4 | 4-08A | Elec. Room | E104.B |
| HV-4-W | 460Y/277V | 4 | 4-08A | Elec. Room | E104.B |
| LV-4E-EXH | 208Y/120V | 4 | 4-18 | Elec. Room | E104.B |
| LCP-BDR1 | 208Y/120V | 4 | 4-08A | Elec. Room | E104.B |
| LCP-4R | 460Y/277V | 4 | 4-08A | Elec. Room | E104.B |
| HV-4-E | 460Y/277V | 4 | 4-18 | Elec. Room | E104.B |
| LV-4-E | 208Y/120V | 4 | 4-18 | Elec. Room | E104.B |
| LCP-D5 | 208Y/120V | 4M | 4M-09 | Elec. Room | E104M.B |
| LCP-5R | 208Y/120V | 4M | 4M-09 | Elec. Room | E104M.B |
| LV-4M-W | 208Y/120V | 4M | 4M-09 | Elec. Room | E104M.B |
| HV-4M-W | 460Y/277V | 4M | 4M-09 | Elec. Room | E104M.B |
| LV-4ME-EXH | 208Y/120V | 4M | 4M-17 | Elec. Room | E104M.B |
| HV-4M-E | 460Y/277V | 4M | 4M-17 | Elec. Room | E104M.B |
| LV-4M-E | 208Y/120V | 4M | 4M-17 | Elec. Room | E104M.B |
| LV-5-IG | 208Y/120V | 5 | 5-10 | Elec. Room | E105.B |
| HV-5-E | 460Y/277V | 5 | 5-10 | Elec. Room | E105.B |
| LV-5-E | 208Y/120V | 5 | 5-10 | Elec. Room | E105.B |
| LV-6-W | 208Y/120V | 6 | 6-18 | Elec. Room | E106.B |
| HV-6-W | 460Y/277V | 6 | 6-18 | Elec. Room | E106.B |
| LV-6-K | 208Y/120V | 6 | 6-26 | Elec. Room | E106.B |
| HV-6W-CR | 460Y/277V | 6 | 6-26 | Elec. Room | E106.B |
| HV-7-W | 460Y/277V | 7 | 7-10 | Elec. Closet | E107.B |
| LV-7-W | 208Y/120V | 7 | 7-10 | Elec. Closet | E107.B |
| LCP-D7 | 208Y/120V | 7 | 7-10 | Elec. Closet | E107.B |

| | | | | | |
|--------|-----------|---|----|--------------|--------|
| HV-8-W | 460Y/277V | 8 | -- | Elec. Closet | E108.B |
| LV-8-W | 208Y/120V | 8 | -- | Elec. Closet | E108.B |
| | | | | | |

Power factor correction

The Newseum building does not have any power factor correction capacitors.

Design issues

At this point, I am not aware of any design issues that were of concern during the design for this power system.

Lighting loads

For a table including the lighting loads, see Appendix A at the end of this report. Because the Newseum had a lighting design firm for the lighting, the MEP engineers lighting schedule only includes tags for the drawings and the wattage that each fixture uses. Detailed information about each fixture and lamp was not readily available.

Mechanical and other loads

For a table describing mechanical and other loading, see Appendix B at the end of this report. Power factors are assumed by the fact that larger motors have higher power factors. Motors with a fraction hp will be 0.8, 10hp or greater will be 0.9, and 1-10 hp will be 0.85. Every other piece of equipment will have an assumed power factor of 0.9.

Service entrance size

For sizing the service entrance, calculations are shown in order to determine the size at various stages of the project design. First, for the conceptual and schematic phases, total volt amps per square foot are used. The Newseum falls into the museum category of the chart. Therefore for the first phase, a value of 10 VA/ square ft. will be used. For the design development phase, the NEC will be used for building load values, demand factors for lighting, and VA's per square foot for mechanical and other loads.

A) Load per Square Foot

460×1.73 (for 3 phase) = 795.8

Divide VA by 795.8 to get amps

| Floor level | Area (sq. ft.) | VA / Sq. Ft. | Load (kVA) | Amps @ 460V |
|--------------|----------------|--------------|-------------|-------------|
| B-3 | 71182 | 10 | 712 | 895 |
| B-2 | 71182 | 10 | 712 | 895 |
| B-1 | 71182 | 10 | 712 | 895 |
| 1 | 45714 | 10 | 457 | 574 |
| 2 | 45714 | 10 | 457 | 574 |
| 3 | 45714 | 10 | 457 | 574 |
| 4 | 45714 | 10 | 457 | 574 |
| 5 | 45714 | 10 | 457 | 574 |
| 6 | 45714 | 10 | 457 | 574 |
| 7 | 23037 | 10 | 230 | 289 |
| 8 | 23037 | 10 | 230 | 289 |
| Total | 533904 | 10 | 5339 | 6708 |

B) Design Development

For lighting VA / sq. ft. I am assuming a value of 2 since museums are not in NEC table 220.12. This value is assumed because it is closest to spaces similar to a museum.

| Category | VA/sq. ft. | Floor level | Area (sq. ft.) | Load (kVA) | Amps @ 460V |
|-------------|------------|-------------|----------------|------------|-------------|
| Receptacles | 1 | B-3 | 71182 | 71.2 | 89.5 |
| | 1 | B-2 | 71182 | 71.2 | 89.5 |
| | 1 | B-1 | 71182 | 71.2 | 89.5 |
| | 1 | 1 | 45714 | 45.7 | 57.4 |
| | 1 | 2 | 45714 | 45.7 | 57.4 |
| | 1 | 3 | 45714 | 45.7 | 57.4 |
| | 1 | 4 | 45714 | 45.7 | 57.4 |
| | 1 | 5 | 45714 | 45.7 | 57.4 |
| | 1 | 6 | 45714 | 45.7 | 57.4 |

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|--------------|---|--------------|---------------|---------------|---------------|
| | 1 | 7 | 23037 | 23.0 | 28.9 |
| | 1 | 8 | 23037 | 23.0 | 28.9 |
| | | Total | 533904 | 533.8 | 670.7 |
| | | | | | |
| Fans / pumps | 2 | B-3 | 71182 | 142.4 | 178.9 |
| | 2 | B-2 | 71182 | 142.4 | 178.9 |
| | 2 | B-1 | 71182 | 142.4 | 178.9 |
| | 2 | 1 | 45714 | 91.4 | 114.8 |
| | 2 | 2 | 45714 | 91.4 | 114.8 |
| | 2 | 3 | 45714 | 91.4 | 114.8 |
| | 2 | 4 | 45714 | 91.4 | 114.8 |
| | 2 | 5 | 45714 | 91.4 | 114.8 |
| | 2 | 6 | 45714 | 91.4 | 114.8 |
| | 2 | 7 | 23037 | 46.0 | 57.8 |
| | 2 | 8 | 23037 | 46.0 | 57.8 |
| | | Total | 533904 | 1067.6 | 1341.1 |
| | | | | | |
| HVAC | 7 | B-3 | 71182 | 498 | 625.8 |
| | 7 | B-2 | 71182 | 498 | 625.8 |
| | 7 | B-1 | 71182 | 498 | 625.8 |
| | 7 | 1 | 45714 | 320 | 402 |
| | 7 | 2 | 45714 | 320 | 402 |
| | 7 | 3 | 45714 | 320 | 402 |
| | 7 | 4 | 45714 | 320 | 402 |
| | 7 | 5 | 45714 | 320 | 402 |
| | 7 | 6 | 45714 | 320 | 402 |
| | 7 | 7 | 23037 | 161.3 | 202.7 |
| | 7 | 8 | 23037 | 161.3 | 202.7 |
| | | Total | 533904 | 3736.6 | 4694.8 |
| | | | | | |
| Lighting | 2 | B-3 | 71182 | 142.4 | 178.9 |
| | 2 | B-2 | 71182 | 142.4 | 178.9 |
| | 2 | B-1 | 71182 | 142.4 | 178.9 |
| | 2 | 1 | 45714 | 91.4 | 114.8 |
| | 2 | 2 | 45714 | 91.4 | 114.8 |
| | 2 | 3 | 45714 | 91.4 | 114.8 |
| | 2 | 4 | 45714 | 91.4 | 114.8 |
| | 2 | 5 | 45714 | 91.4 | 114.8 |
| | 2 | 6 | 45714 | 91.4 | 114.8 |
| | 2 | 7 | 23037 | 46.0 | 57.8 |
| | 2 | 8 | 23037 | 46.0 | 57.8 |
| | | Total | 533904 | 1067.6 | 1341.1 |
| | | | | | |
| | | Total | | | 8047.7 |

C) Construction Documents

| Panel / Load | kW | Voltage | Amps |
|----------------------|-----------|----------------|---------------|
| 1R Lighting panels | 88.0 | 120 | 660 |
| 2R Lighting panels | 30.3 | 277 | 98.4 |
| 3R Lighting panels | 86.0 | 120 | 645 |
| 4R Lighting panels | 28.0 | 120 | 210 |
| 5R Lighting panels | 79.6 | 120 | 597 |
| B1R Lighting panels | 94.8 | 120 | 711 |
| D1 Lighting panels | 27.7 | 120 | 207.75 |
| D3 Lighting panels | 44.7 | 120 | 335.25 |
| D6 Lighting panels | 22.2 | 120 | 166.5 |
| OT-1 Lighting panels | 8.6 | 120 | 64.5 |
| Mechanical | 3443.98 | 460 | 3895 |
| Total | | | 7590.4 |

D) Summary

Keeping in mind that there are 3 service entrances to the Newseum, the totals shall be divided by 3 for sizing.

| | A | B | C | |
|-----------------------|------------|------------|------------|-------------------|
| Calculated | 6708 A | 8047.7 A | 7590.4 A | |
| Suggested Size | 3 @ 2500 A | 3 @ 3000 A | 3 @ 3000 A | |
| | | | | |
| Actual Service | | | | 3 @ 4000 A |

Utility company information

The electric utility company for the Newseum is PEPCO. Their website is www.pepco.com. The building has not yet been completed and is not in operation, so there is no electric utility load data as of now. The utility rate structure for the Newseum falls under PEPCO’s large commercial customers table. It is under subdivision general service primary service, schedule “GS-3A”. This schedule can be seen in appendix C.

Communication Systems

Summary description:

Fire alarm:

There are two separate fire alarm systems. One for the newseum, and one for residential. Alarms with strobes are used to comply with ADA standards. A sprinkler system also runs throughout the building. There are magnetic door holders used in circulation areas to allow for quick evacuation.

Telecommunications:

The main telecommunication room for the newseum is located on basement level B-2, on the east end. (4) – 4” conduits then run to each floor's telecommunication room. The residential portion has a separate main telecommunication room located at the west end of level B-2. (1) – 1” conduit goes to each apartment supplying telephone and cable.

Appendix A: Lighting Loads

| Tag | voltage | wattage | # of fixtures | Total wattage |
|-------|---------|---------|---------------|---------------|
| A-1 | 120 | 2.5 | 96 | 240 |
| AQ-8 | 120 | 90 | 2 | 180 |
| DC-1 | 120 | 38 | 12 | 456 |
| DL-1 | 120 | 55 | 15 | 825 |
| FO-4 | 120 | 75 | 3 | 225 |
| LE-1 | 120 | 3 | 220 | 660 |
| LE-1A | 120 | 2.5 | 68 | 170 |
| LE-4 | 120 | 7 | 4 | 28 |
| LE-5 | 120 | 2.5 | 4 | 10 |
| LE-6 | 120 | 10 | 12 | 120 |
| LE-8 | 120 | 3 | 100 | 300 |
| LE-12 | 120 | 3 | 124 | 372 |
| RF-1 | 120 | 16 | 20 | 240 |
| WM-3 | 120 | 44 | 17 | 748 |
| XDM-2 | 120 | 44 | 12 | 528 |
| XLE-3 | 120 | 7 | 8 | 56 |
| XUQ-1 | 120 | 100 | 12 | 1200 |
| YY-1 | 120 | 75 | 416 | 31200 |
| YY-2 | 120 | 75 | 604 | 45300 |
| YY-7 | 120 | 75 | 69 | 5175 |
| | | | | 88kW |
| AM-2 | 277 | 44 | 130 | 5720 |
| AQ-8 | 120 | 90 | 18 | 1620 |
| DC-1 | 277 | 38 | 173 | 6564 |
| DC-3 | 277 | 48 | 16 | 768 |
| DC-5 | 277 | 48 | 22 | 1056 |
| DM-1 | 277 | 44 | 2 | 88 |
| DM-2 | 277 | 44 | 12 | 528 |
| RF-1 | 277 | 16 | 75 | 1200 |
| RF-6 | 277 | 30 | 96 | 2880 |
| RF-11 | 277 | 40 | 208 | 8320 |
| WC-1 | 277 | 48 | 6 | 288 |
| WF-2 | 277 | 17 | 12 | 204 |
| WM-1 | 277 | 44 | 23 | 1012 |
| | | | | 30.3kW |
| AQ-7 | 120 | 250 | 3 | 750 |
| AQ-8 | 120 | 75 | 8 | 600 |
| AQ-8A | 120 | 75 | 12 | 900 |
| AQ-11 | 120 | 90 | 6 | 540 |
| FO-3A | 120 | 42 | 3 | 126 |
| LE-1 | 120 | 3 | 367 | 1100 |
| LE-1C | 120 | 1.3 | 48 | 62.4 |
| LE-4 | 120 | 7 | 657 | 4599 |

| | | | | |
|-------|-----|-----|-------|---------------|
| LE-5 | 120 | 1.3 | 37 | 48.4 |
| LE-8 | 120 | 3 | 100 | 300 |
| LE-12 | 120 | 3 | 38 | 114 |
| TQ-6 | 120 | 75 | 14 | 1050 |
| UA-1 | 120 | 6 | 3 | 18 |
| WQ-7 | 120 | 75 | 29 | 2175 |
| YY-1 | 120 | 75 | 424 | 31800 |
| YY-2 | 120 | 75 | 416 | 31200 |
| YY-3 | 120 | 75 | 130 | 9750 |
| | | | | 86kW |
| AM-4 | 277 | 175 | 8 | 1400 |
| DC-1 | 277 | 36 | 52 | 1872 |
| DC-3 | 277 | 48 | 4 | 192 |
| DM-2 | 277 | 44 | 4 | 176 |
| LE-1 | 120 | 3 | 83 | 290 |
| RF-1 | 277 | 16 | 15 | 240 |
| UF-1 | 277 | 28 | 52 | 1456 |
| YY-1 | 120 | 75 | 264 | 19800 |
| YY-2 | 120 | 75 | 44 | 3300 |
| | | | | 28kW |
| AQ-2 | 120 | 75 | 4 | 300 |
| LE-1 | 120 | 3 | 362 | 1085 |
| LE-1A | 120 | 2.5 | 200 | 500 |
| LE-2A | 120 | 8 | 32 | 256 |
| LE-3 | 120 | 0.2 | 8 | 1.6 |
| LE-4 | 120 | 7 | 78 | 547.2 |
| LE-11 | 120 | 5 | 25 | 125 |
| YY-1 | 120 | 75 | 10000 | 75000 |
| YY-2 | 120 | 75 | 24 | 1800 |
| | | | | 79.6kW |
| RCC-1 | 120 | 25 | 200 | 5000 |
| YY-1 | 120 | 75 | 1048 | 78600 |
| YY-2 | 120 | 75 | 80 | 6000 |
| YY-6 | 120 | 75 | 64 | 4800 |
| ZA-1 | 120 | 40 | 1 | 40 |
| ZA-3 | 120 | 400 | 1 | 400 |
| | | | | 94.8kW |
| AQ-2 | 120 | 75 | 4 | 300 |
| AQ-3 | 120 | 50 | 8 | 400 |
| AQ-7 | 120 | 250 | 3 | 750 |
| AQ-8 | 120 | 90 | 5 | 450 |
| AQ-8A | 120 | 90 | 18 | 1620 |
| LUQ-3 | 120 | 75 | 7 | 525 |
| TQ-5 | 120 | 75 | 26 | 1950 |
| TQ-6 | 120 | 100 | 15 | 1475 |
| TQ-8 | 120 | 40 | 41 | 1640 |
| TW-2 | 120 | 100 | 6 | 600 |

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| | | | | |
|-------|-----|-----|--------------|----------------|
| UQ-1 | 120 | 500 | 12 | 6000 |
| WQ-2 | 120 | 40 | 50 | 2000 |
| YY-2 | 120 | 75 | 160 | 12000 |
| | | | | 27.7kW |
| AQ-4 | 120 | 50 | 4 | 200 |
| AQ-8A | 120 | 90 | 6 | 540 |
| AQ-11 | 120 | 50 | 3 | 150 |
| DQ-4 | 120 | 75 | 6 | 425 |
| FO-1 | 120 | 75 | 14 | 1050 |
| FO-3A | 120 | 75 | 3 | 225 |
| LE-4 | 120 | 7 | 20 | 144 |
| LE-5 | 120 | 1.3 | 4 | 5.2 |
| TQ-5A | 120 | 75 | 8 | 600 |
| TQ-6 | 120 | 75 | 8 | 625 |
| TQ-6A | 120 | 75 | 2 | 150 |
| TQ-7 | 120 | 500 | 8 | 4000 |
| TQ-10 | 120 | 75 | 1 | 75 |
| WQ-8 | 120 | 75 | 21 | 525 |
| YY-2 | 120 | 75 | 440 | 33000 |
| | | | | 44.7kW |
| AQ-2 | 120 | 75 | 66 | 4950 |
| AQ-8A | 120 | 90 | 6 | 540 |
| DQ-3 | 120 | 250 | 22 | 5500 |
| HQ-1 | 120 | 575 | 9 | 5175 |
| HQ-1A | 120 | 575 | 3 | 1725 |
| HQ-2 | 120 | 575 | 6 | 3150 |
| TQ-5 | 120 | 75 | 8 | 600 |
| | | | | 22.2kW |
| DQ-1 | 120 | 50 | 8 | 400 |
| DQ-6 | 120 | 50 | 136 | 6800 |
| LE-10 | 120 | 3 | 452 | 1356 |
| ST-2 | 120 | 7 | 13 | 91 |
| | | | | 8.6kW |
| | | | | |
| | | | Total | 509.9kW |
| | | | | |

Appendix B: Mechanical Loads

| MECHANICAL EQUIPMENT SCHEDULE | | | | | | | | | |
|--------------------------------------|--|-------|------|---|-----|-----------------|----------------------|----------------------|-----------------|
| EQUIPMENT TAG | DESCRIPTION | LOAD | | | | VOLTAGE & PHASE | ASSUMED POWER FACTOR | EQUIVALENT LOAD (kW) | TOTAL LOAD (kW) |
| | | kW | W | A | hp | | | | |
| B-B3-1 | hot water boiler | 131 | | | | 460V / 3P | 0.9 | 117.9 | |
| B-B3-2 | hot water boiler | 131 | | | | 460V / 3P | 0.9 | 117.9 | |
| | | | | | | | | | 235.80 |
| CH-1 | water chiller | 548.4 | | | | 460V / 3P | 0.9 | 493.6 | |
| CH-2 | water chiller | 548.4 | | | | 460V / 3P | 0.9 | 493.6 | |
| CH-3 | water chiller | 208.7 | | | | 460V / 3P | 0.9 | 187.8 | |
| | | | | | | | | | 1174.95 |
| CT-1 | cooling tower | | | | 25 | 460V / 3P | 0.9 | 16.8 | |
| CT-2 | cooling tower | | | | 25 | 460V / 3P | 0.9 | 16.8 | |
| CT-3 | cooling tower | | | | 25 | 460V / 3P | 0.9 | 16.8 | |
| CT-4 | cooling tower | | | | 25 | 460V / 3P | 0.9 | 16.8 | |
| | | | | | | | | | 67.14 |
| RF-B3-1 | return fan - forum theatre | | | | 5 | 460V / 3P | 0.9 | 3.4 | |
| RF-B3-2 | return fan - forum lobby | | | | 5 | 460V / 3P | 0.85 | 3.2 | |
| RF-B3-3 | return fan - newseum store | | | | 7.5 | 460V / 3P | 0.85 | 4.8 | |
| RF-B3-4 | return fan - mini theatre | | | | 5 | 460V / 3P | 0.85 | 3.2 | |
| RF-B3-5 | return fan - back of house | | | | 3 | 460V / 3P | 0.85 | 1.9 | |
| RF-B3-6 | return fan - core message | | | | 15 | 460V / 3P | 0.9 | 10.1 | |
| RF-B3-7 | return fan - studio B | | | | 15 | 460V / 3P | 0.9 | 10.1 | |
| RF-B3-8 | return fan - café | | | | 5 | 460V / 3P | 0.85 | 3.2 | |
| RF-B2-1 | return fan - main lobby | | | | 20 | 460V / 3P | 0.9 | 13.4 | |
| RF-B2-2 | return fan - main lobby | | | | 20 | 460V / 3P | 0.9 | 13.4 | |
| RF-B2-3 | return fan - temp. exhibit / queing | | | | 7.5 | 460V / 3P | 0.85 | 4.8 | |
| RF-B2-4 | return fan - food court / servery | | | | 10 | 460V / 3P | 0.9 | 6.7 | |
| RF-B2-5 | return fan - berlin wall | | | | 5 | 460V / 3P | 0.85 | 3.2 | |
| RF-B2-6 | return fan - gallery | | | | 5 | 460V / 3P | 0.85 | 3.2 | |
| RF-2-1 | return fan - inter. News/dateline/1st amend. | | | | 15 | 460V / 3P | 0.9 | 10.1 | |
| RF-3-1 | return fan - pultzer/news data/diorama | | | | 7.5 | 460V / 3P | 0.85 | 4.8 | |
| RF-3M-1 | return fan - studio A&B control rooms | | | | 3 | 460V / 3P | 0.85 | 1.9 | |
| RF-3M-2 | return fan - studio A&B control rooms | | | | 3 | 460V / 3P | 0.85 | 1.9 | |
| RF-4M-1 | return fan - news history / corner | | | | 15 | 460V / 3P | 0.9 | 10.1 | |
| RF-6-1 | return fan - reception / meetin room | | | | 3 | 460V / 3P | 0.85 | 1.9 | |
| | | | | | | | | | 114.94 |
| RTAC-9-1,2 | roof top A/C unit | 43 | | | | 460V / 3P | 0.9 | 38.7 | |
| | | | | | | | | | 77.4 |
| FTR -A | fin tube radiator | | 1000 | | | 277V | 0.9 | 0.9 | |
| FTR -B | fin tube radiator | | 1875 | | | 277V | 0.9 | 1.7 | |
| FTR -C | fin tube radiator | | 1500 | | | 277V | 0.9 | 1.4 | |
| FTR -D | fin tube radiator | | 1500 | | | 277V | 0.9 | 1.4 | |
| FTR -E | fin tube radiator | | 750 | | | 277V | 0.9 | 0.7 | |
| FTR -F | fin tube radiator | | 900 | | | 277V | 0.9 | 0.8 | |
| FTR -G | fin tube radiator | | 750 | | | 277V | 0.9 | 0.7 | |
| FTR -H | fin tube radiator | | 752 | | | 277V | 0.9 | 0.7 | |

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| | | | | | | | | |
|-----------|---|--|------|------|-----------|------|------|---------------|
| FTR -I | fin tube radiator | | 6000 | | 277V | 0.9 | 5.4 | |
| FTR -J | fin tube radiator | | 4500 | | 208V | 0.9 | 4.1 | |
| FTR -K | fin tube radiator | | 1000 | | 277V | 0.9 | 0.9 | |
| FTR -L | fin tube radiator | | 1875 | | 277V | 0.9 | 1.7 | |
| | | | | | | | | 20.16 |
| CWP-1 | condeser water pump | | | 75 | 460V / 3P | 0.9 | 50.4 | |
| CWP-2 | condeser water pump | | | 75 | 460V / 3P | 0.9 | 50.4 | |
| CWP-3 | condeser water pump | | | 75 | 460V / 3P | 0.9 | 50.4 | |
| CWP-4 | condeser water pump | | | 30 | 460V / 3P | 0.9 | 20.1 | |
| CWP-5 | condeser water pump | | | 30 | 460V / 3P | 0.9 | 20.1 | |
| CHWP-1 | chilled water pump | | | 50 | 460V / 3P | 0.9 | 33.6 | |
| CHWP-2 | chilled water pump | | | 50 | 460V / 3P | 0.9 | 33.6 | |
| CHWP-3 | chilled water pump | | | 50 | 460V / 3P | 0.9 | 33.6 | |
| CHWP-4 | chilled water pump | | | 25 | 460V / 3P | 0.9 | 16.8 | |
| CHWP-5 | chilled water pump | | | 25 | 460V / 3P | 0.9 | 16.8 | |
| HWP-1 | hot water pump | | | 3.0 | 460V / 3P | 0.9 | 2.0 | |
| HWP-2 | hot water pump | | | 3.0 | 460V / 3P | 0.9 | 2.0 | |
| DTWP-1 | rad. Floor clg. / htg pump | | | 7.5 | 460V / 3P | 0.9 | 5.0 | |
| DTWP-2 | rad. Floor clg. / htg pump | | | 7.5 | 460V / 3P | 0.9 | 5.0 | |
| SCWP-1 | secondary cond. Water pump | | | 30 | 460V / 3P | 0.9 | 20.1 | |
| SCWP-2 | secondary cond. Water pump | | | 30 | 460V / 3P | 0.9 | 20.1 | |
| RCWP-R-6 | res. Cold water pump | | | 30 | 460V / 3P | 0.9 | 20.1 | |
| RCWP-R-7 | res. Cold water pump | | | 30 | 460V / 3P | 0.9 | 20.1 | |
| FOP-B3-1 | fuel oil transfer pump | | | 0.75 | 460V / 3P | 0.8 | 0.4 | |
| FOP-B3-2 | fuel oil transfer pump | | | 0.75 | 460V / 3P | 0.8 | 0.4 | |
| | | | | | | | | 421.19 |
| AHU-B3-1 | air handling unit - forum theater | | | 50 | 460V / 3P | 0.9 | 33.6 | |
| AHU-B3-2 | air handling unit - freedom forum lobby | | | 15 | 460V / 3P | 0.9 | 10.1 | |
| AHU-B3-3 | air handling unit - newseum store | | | 15 | 460V / 3P | 0.9 | 10.1 | |
| AHU-B3-4 | air handling unit - B1 mini theater | | | 10 | 460V / 3P | 0.9 | 6.7 | |
| AHU-B3-5 | air handling unit - back of house | | | 15 | 460V / 3P | 0.9 | 10.1 | |
| AHU-B3-6 | air handling unit - core messages | | | 30 | 460V / 3P | 0.9 | 20.1 | |
| AHU-B3-7 | air handling unit - studio B | | | 30 | 460V / 3P | 0.9 | 20.1 | |
| AHU-B3-8 | air handling unit - café | | | 10 | 460V / 3P | 0.9 | 6.7 | |
| AHU-B3-9 | air handling unit | | | 7.5 | 460V / 3P | 0.85 | 4.8 | |
| AHU-B3-9A | air handling unit | | | 7.5 | 460V / 3P | 0.85 | 4.8 | |
| AHU-B2-1 | air handling unit - main lobby | | | 40 | 460V / 3P | 0.9 | 26.9 | |
| AHU-B2-2 | air handling unit - main lobby | | | 40 | 460V / 3P | 0.9 | 26.9 | |
| AHU-B2-3 | air handling unit | | | 20 | 460V / 3P | 0.9 | 13.4 | |
| AHU-B2-4 | air handling unit - food court | | | 30 | 460V / 3P | 0.9 | 20.1 | |
| AHU-B2-5 | air handling unit - berlin wall | | | 7.5 | 460V / 3P | 0.85 | 4.8 | |
| AHU-B2-6 | air handling unit - gallery | | | 10 | 460V / 3P | 0.9 | 6.7 | |
| AHU-B2-7 | air handling unit | | | 5 | 460V / 3P | 0.85 | 3.2 | |
| AHU-2-1 | air handling unit - international news | | | 40 | 460V / 3P | 0.9 | 26.9 | |
| AHU-4MR-5 | air handling unit - interactive news | | | 40 | 460V / 3P | 0.9 | 26.9 | |
| AHU-3-1 | air handling unit - exhibit / news data | | | 25 | 460V / 3P | 0.9 | 16.8 | |
| AHU-4M-1 | air handling unit - news history | | | 30 | 460V / 3P | 0.9 | 20.1 | |
| AHU-4MR-1 | air handling unit - global immersive | | | 30 | 460V / 3P | 0.9 | 20.1 | |
| AHU-4MR-2 | air handling unit - sports theater | | | 15 | 460V / 3P | 0.9 | 10.1 | |
| AHU-4MR-3 | air handling unit - offices | | | 50 | 460V / 3P | 0.9 | 33.6 | |
| AHU-4MR-4 | air handling unit - 911 gallery | | | 10 | 460V / 3P | 0.9 | 6.7 | |

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| | | | | | | | | |
|-----------|---|--|--|------|-----------|------|------|---------------|
| AHU-6-3 | air handling unit - conf. B | | | 20 | 460V / 3P | 0.9 | 13.4 | |
| AHU-6-2 | air handling unit - conf. A | | | 20 | 460V / 3P | 0.9 | 13.4 | |
| AHU-6-1 | air handling unit - reception / meeting | | | 15 | 460V / 3P | 0.9 | 10.1 | |
| AHU-6R-1 | air handling unit - offices | | | 30 | 460V / 3P | 0.9 | 20.1 | |
| AHU-6R-2 | air handling unit - studio A | | | 50 | 460V / 3P | 0.9 | 33.6 | |
| | | | | | | | | 480.70 |
| CRAC-3M-1 | self contained A/C unit | | | 5 | 460V / 3P | 0.85 | 3.2 | |
| CRAC-3M-2 | self contained A/C unit | | | 5 | 460V / 3P | 0.85 | 3.2 | |
| CRAC-3M-3 | self contained A/C unit | | | 5 | 460V / 3P | 0.85 | 3.2 | |
| CRAC-3M-4 | self contained A/C unit | | | 5 | 460V / 3P | 0.85 | 3.2 | |
| CRAC-3M-5 | self contained A/C unit | | | 7.5 | 460V / 3P | 0.85 | 4.8 | |
| CRAC-3M-6 | self contained A/C unit | | | 7.5 | 460V / 3P | 0.85 | 4.8 | |
| CRAC-3-1 | self contained A/C unit | | | 5 | 460V / 3P | 0.85 | 3.2 | |
| CRAC-2M-1 | self contained A/C unit | | | 5 | 208V / 1P | 0.85 | 3.2 | |
| | | | | | | | | 28.53 |
| SF-6-2 | supply fan - conf. A | | | 1 | 460V / 3P | 0.85 | 0.6 | |
| SF-6-3 | supply fan - conf. B | | | 1 | 460V / 3P | 0.85 | 0.6 | |
| SF-1-1 | supply fan - garage | | | 60 | 460V / 3P | 0.9 | 40.3 | |
| SF-1-2 | supply fan - garage | | | 60 | 460V / 3P | 0.9 | 40.3 | |
| SF-2-1 | supply fan | | | 1.5 | 460V / 3P | 0.85 | 1.0 | |
| SF-3-1 | supply fan | | | 1.5 | 460V / 3P | 0.85 | 1.0 | |
| SF-4M-1 | supply fan | | | 2 | 460V / 3P | 0.85 | 1.3 | |
| SF-6-1 | supply fan | | | 1.5 | 460V / 3P | 0.85 | 1.0 | |
| SF-6R-1 | supply fan - atrium | | | 75 | 460V / 3P | 0.9 | 50.4 | |
| SF-B3-1 | supply fan | | | 3 | 460V / 3P | 0.85 | 1.9 | |
| SF-B3-2 | supply fan - atrium | | | 25 | 460V / 3P | 0.9 | 16.8 | |
| SF-B3-3 | supply fan - atrium | | | 75 | 460V / 3P | 0.9 | 50.4 | |
| SF-B3-4 | supply fan - atrium | | | 75 | 460V / 3P | 0.9 | 50.4 | |
| SF-B3-5 | supply fan - atrium | | | 40 | 460V / 3P | 0.9 | 26.9 | |
| SF-B3-6 | supply fan | | | 1.5 | 460V / 3P | 0.85 | 1.0 | |
| SF-B2-1 | supply fan | | | 5 | 460V / 3P | 0.85 | 3.2 | |
| | | | | | | | | 286.69 |
| EF-6-1 | exhaust fan - atrium | | | 3 | 460V / 3P | 0.85 | 1.9 | |
| EF-6R-1 | exhaust fan - garage | | | 50 | 460V / 3P | 0.9 | 33.6 | |
| EF-6R-2 | exhaust fan - garage | | | 50 | 460V / 3P | 0.9 | 33.6 | |
| EF-6R-3 | exhaust fan | | | 1 | 460V / 3P | 0.85 | 0.6 | |
| EF-4MR-3 | exhaust fan - loading dock | | | 3 | 460V / 3P | 0.85 | 1.9 | |
| EF-4MR-1 | exhaust fan - fuel oil exhaust | | | 1.5 | 460V / 3P | 0.85 | 1.0 | |
| EF-4MR-2 | exhaust fan - sump pit exhaust | | | 0.5 | 460V / 3P | 0.8 | 0.3 | |
| EF-4MR-4 | exhaust fan - electrical exhaust | | | 3 | 460V / 3P | 0.85 | 1.9 | |
| EF-B2-1 | exhaust fan | | | 10 | 460V / 3P | 0.9 | 6.7 | |
| EF-B2-2 | exhaust fan | | | 5 | 460V / 3P | 0.85 | 3.2 | |
| EF-B2-3 | exhaust fan | | | 5 | 460V / 3P | 0.85 | 3.2 | |
| EF-B3-1 | exhaust fan | | | 0.75 | 460V / 3P | 0.8 | 0.4 | |
| EF-9R-1 | exhaust fan | | | 5 | 460V / 3P | 0.85 | 3.2 | |
| EF-9R-2 | exhaust fan | | | 0.75 | 460V / 3P | 0.8 | 0.4 | |
| | | | | | | | | 91.85 |
| TX-9R-1 | exhaust fan - bathroom | | | 3 | 460V / 3P | 0.85 | 1.9 | |
| TX-9R-2 | exhaust fan - bathroom | | | 0.75 | 115V / 1P | 0.8 | 0.4 | |
| TX-4MR-1 | exhaust fan - bathroom | | | 7.5 | 460V / 3P | 0.85 | 4.8 | |
| KX-9R-1 | exhaust fan - kitchen | | | 7.5 | 460V / 3P | 0.85 | 4.8 | |

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| | | | | | | | | |
|----------|------------------------------|--|--|------|-----------|------|------|---------------|
| SX-6-1 | exhaust fan - atrium smoke | | | 50 | 460V / 3P | 0.9 | 33.6 | |
| SX-6-2 | exhaust fan - atrium smoke | | | 50 | 460V / 3P | 0.9 | 33.6 | |
| SX-6-3 | exhaust fan - atrium smoke | | | 50 | 460V / 3P | 0.9 | 33.6 | |
| SX-6-4 | exhaust fan - atrium smoke | | | 50 | 460V / 3P | 0.9 | 33.6 | |
| SX-6-5 | exhaust fan - atrium smoke | | | 50 | 460V / 3P | 0.9 | 33.6 | |
| SX-6-6 | exhaust fan - atrium smoke | | | 50 | 460V / 3P | 0.9 | 33.6 | |
| SX-6-7 | exhaust fan - atrium smoke | | | 50 | 460V / 3P | 0.9 | 33.6 | |
| SX-6-8 | exhaust fan - atrium smoke | | | 50 | 460V / 3P | 0.9 | 33.6 | |
| SP-7R-1 | exhaust fan - stair press. | | | 20 | 460V / 3P | 0.9 | 13.4 | |
| SP-9R-1 | exhaust fan - stair press. | | | 20 | 460V / 3P | 0.9 | 13.4 | |
| SP-9R-2 | exhaust fan - stair press. | | | 20 | 460V / 3P | 0.9 | 13.4 | |
| SP-5-1 | exhaust fan - stair press. | | | 3 | 460V / 3P | 0.85 | 1.9 | |
| SP-B3-1 | exhaust fan - stair press. | | | 3 | 460V / 3P | 0.85 | 1.9 | |
| SP-B2-1 | exhaust fan - stair press. | | | 1.5 | 460V / 3P | 0.85 | 1.0 | |
| TF-B3-1 | exhaust fan | | | 0.25 | 115V / 1P | 0.8 | 0.1 | |
| TF-B3-2 | exhaust fan | | | 0.25 | 115V / 1P | 0.8 | 0.1 | |
| TF-B1-1 | exhaust fan | | | 0.25 | 115V / 1P | 0.8 | 0.1 | |
| TF-B1-2 | exhaust fan | | | 0.25 | 115V / 1P | 0.8 | 0.1 | |
| TF-1-1 | exhaust fan | | | 0.25 | 115V / 1P | 0.8 | 0.1 | |
| TF-B3-2 | exhaust fan | | | 0.5 | 460V / 3P | 0.8 | 0.3 | |
| TF-B3-3 | exhaust fan | | | 0.5 | 460V / 3P | 0.8 | 0.3 | |
| | | | | | | | | 326.80 |
| EF-9RR-1 | exhaust fan - gas meter room | | | 1.5 | 460V / 3P | 0.85 | 1.0 | |
| EF-9RR-2 | exhaust fan | | | 1.5 | 460V / 3P | 0.85 | 1.0 | |
| EF-9RR-3 | exhaust fan | | | 1.5 | 460V / 3P | 0.85 | 1.0 | |
| EF-9RR-5 | exhaust fan | | | 3 | 460V / 3P | 0.85 | 1.9 | |
| EF-9RR-4 | exhaust fan | | | 0.75 | 460V / 3P | 0.8 | 0.4 | |
| TX-9RR-1 | exhaust fan - bathroom | | | 0.75 | 460V / 3P | 0.8 | 0.4 | |
| KX-9RR-1 | exhaust fan - kitchen | | | 20 | 460V / 3P | 0.9 | 13.4 | |
| KX-9-1 | exhaust fan - kitchen | | | 0.75 | 460V / 3P | 0.8 | 0.4 | |
| KX-9-3 | exhaust fan - kitchen | | | 0.75 | 460V / 3P | 0.8 | 0.4 | |
| KX-9-2 | exhaust fan - kitchen | | | 1.5 | 460V / 3P | 0.85 | 1.0 | |
| KX-9-4 | exhaust fan - kitchen | | | 1.5 | 460V / 3P | 0.85 | 1.0 | |
| KX-9-5 | exhaust fan - kitchen | | | 1.5 | 460V / 3P | 0.85 | 1.0 | |
| TX-9-2 | exhaust fan - bathroom | | | 0.5 | 460V / 3P | 0.8 | 0.3 | |
| TX-9-3 | exhaust fan - bathroom | | | 0.5 | 460V / 3P | 0.8 | 0.3 | |
| TX-9-1 | exhaust fan - bathroom | | | 0.5 | 460V / 3P | 0.8 | 0.3 | |
| TX-9-4 | exhaust fan - bathroom | | | 0.5 | 460V / 3P | 0.8 | 0.3 | |
| LX-9-1 | exhaust fan | | | 1 | 460V / 3P | 0.85 | 0.6 | |
| LX-9-2 | exhaust fan | | | 0.75 | 460V / 3P | 0.8 | 0.4 | |
| LX-9-3 | exhaust fan | | | 0.75 | 460V / 3P | 0.8 | 0.4 | |
| LX-9-4 | exhaust fan | | | 1 | 460V / 3P | 0.85 | 0.6 | |
| KX-9-6 | exhaust fan - kitchen | | | 5 | 460V / 3P | 0.85 | 3.2 | |
| KX-9-7 | exhaust fan - kitchen | | | 5 | 460V / 3P | 0.85 | 3.2 | |
| KX-9-8 | exhaust fan - kitchen | | | 1.5 | 460V / 3P | 0.85 | 1.0 | |
| KX-9-9 | exhaust fan - kitchen | | | 1.5 | 460V / 3P | 0.85 | 1.0 | |
| DX-9-1 | exhaust fan - kitchen | | | 0.5 | 460V / 3P | 0.8 | 0.3 | |
| SP-9-1 | exhaust fan - stair press. | | | 10 | 460V / 3P | 0.9 | 6.7 | |
| SP-9-2 | exhaust fan - stair press. | | | 10 | 460V / 3P | 0.9 | 6.7 | |
| TX-9-5 | exhaust fan - bathroom | | | 0.5 | 460V / 3P | 0.8 | 0.3 | |
| KX-9-10 | exhaust fan - kitchen | | | 3 | 460V / 3P | 0.85 | 1.9 | |

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|-----------|-------------------------------|--|------|------|-----------|------|------|--------------|
| KX-9-11 | exhaust fan - kitchen | | | 3 | 460V / 3P | 0.85 | 1.9 | |
| | | | | | | | | 52.26 |
| HV-B2-1 | H & V system | | | 15 | 460V / 3P | 0.9 | 10.1 | |
| HV-B3-1 | H & V system | | | 7.5 | 460V / 3P | 0.85 | 4.8 | |
| HV-6R-1 | H & V system | | | 5 | 460V / 3P | 0.85 | 3.2 | |
| | | | | | | | | 18.00 |
| AC-9-1 | through wall A/C cooling unit | | 15.9 | | 460V / 3P | 0.9 | 14.0 | |
| AC-7-1 | through wall A/C cooling unit | | 14 | | 460V / 3P | 0.9 | 12.4 | |
| AC-B3-2 | water cooled A/C cooling unit | | | 1.2 | 460V / 3P | 0.85 | 0.8 | |
| AC-B3-3 | water cooled A/C cooling unit | | | 1 | 460V / 3P | 0.85 | 0.6 | |
| | | | | | | | | 27.80 |
| HP-1 | water source heat pump | | | 0.5 | 208V / 1P | 0.8 | 0.3 | |
| HP-2 | water source heat pump | | | 0.5 | 208V / 1P | 0.8 | 0.3 | |
| HP-3 | water source heat pump | | | 0.25 | 208V / 1P | 0.8 | 0.1 | |
| HP-4 | water source heat pump | | | 0.25 | 208V / 1P | 0.8 | 0.1 | |
| HP-5 | water source heat pump | | | 0.25 | 208V / 1P | 0.8 | 0.1 | |
| HP-8 | water source heat pump | | | 0.25 | 208V / 1P | 0.8 | 0.1 | |
| HP-11 | water source heat pump | | | 0.25 | 208V / 1P | 0.8 | 0.1 | |
| HP-6 | water source heat pump | | | 0.25 | 208V / 1P | 0.8 | 0.1 | |
| HP-7 | water source heat pump | | | 0.25 | 208V / 1P | 0.8 | 0.1 | |
| HP-9 | water source heat pump | | | 0.1 | 208V / 1P | 0.8 | 0.1 | |
| HP-10 | water source heat pump | | | 0.1 | 208V / 1P | 0.8 | 0.1 | |
| HP-12 | water source heat pump | | | 0.1 | 208V / 1P | 0.8 | 0.1 | |
| HP-13 | water source heat pump | | | 0.1 | 208V / 1P | 0.8 | 0.1 | |
| HP-14 | water source heat pump | | | 0.5 | 208V / 1P | 0.8 | 0.3 | |
| HP-R-1-1 | water source heat pump | | | 0.75 | 208V / 1P | 0.8 | 0.4 | |
| HP-R-2-1 | water source heat pump | | | 0.75 | 208V / 1P | 0.8 | 0.4 | |
| HP-R-2-2 | water source heat pump | | | 0.1 | 208V / 1P | 0.8 | 0.1 | |
| HP-R-2-3 | water source heat pump | | | 0.1 | 208V / 1P | 0.8 | 0.1 | |
| HP-R-2-4 | water source heat pump | | | 0.1 | 208V / 1P | 0.8 | 0.1 | |
| | | | | | | | | 3.25 |
| FCU-B3-1 | fan coil unit | | | 0.17 | 277V / 1P | 0.8 | 0.1 | |
| FCU-B3-2 | fan coil unit | | | 0.17 | 277V / 1P | 0.8 | 0.1 | |
| FCU-B2-1 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-B2-2 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-B2-3 | fan coil unit | | | 0.33 | 277V / 1P | 0.8 | 0.2 | |
| FCU-B2-4 | fan coil unit | | | 0.17 | 277V / 1P | 0.8 | 0.1 | |
| FCU-B2-4A | fan coil unit | | | 0.17 | 277V / 1P | 0.8 | 0.1 | |
| FCU-B2-5 | fan coil unit | | | 0.17 | 277V / 1P | 0.8 | 0.1 | |
| FCU-B2-6 | fan coil unit | | | 0.17 | 277V / 1P | 0.8 | 0.1 | |
| FCU-B2-7 | fan coil unit | | | 0.17 | 277V / 1P | 0.8 | 0.1 | |
| FCU-B2-8 | fan coil unit | | | 0.17 | 277V / 1P | 0.8 | 0.1 | |
| FCU-B1-1 | fan coil unit | | | 2 | 460V / 3P | 0.85 | 1.3 | |
| FCU-B1-2 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-B1-3 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-B1-4 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-B1-5 | fan coil unit | | | 0.33 | 277V / 1P | 0.8 | 0.2 | |
| FCU-B1-6 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-B1-7 | fan coil unit | | | 0.33 | 277V / 1P | 0.8 | 0.2 | |
| FCU-B1-7A | fan coil unit | | | 0.33 | 277V / 1P | 0.8 | 0.2 | |
| FCU-B1-8 | fan coil unit | | | 0.17 | 277V / 1P | 0.8 | 0.1 | |

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|------------|--|--|--|------|-----------|------|-----|-------------|
| FCU-B1-9 | fan coil unit | | | 0.33 | 277V / 1P | 0.8 | 0.2 | |
| FCU-B1M-1 | fan coil unit | | | 0.17 | 277V / 1P | 0.8 | 0.1 | |
| FCU-B1M-2 | fan coil unit | | | 0.17 | 277V / 1P | 0.8 | 0.1 | |
| FCU-B1M-3 | fan coil unit | | | 2 | 460V / 3P | 0.85 | 1.3 | |
| FCU-B1M-3A | fan coil unit | | | 2 | 460V / 3P | 0.85 | 1.3 | |
| FCU-B1M-4 | fan coil unit | | | 0.17 | 277V / 1P | 0.8 | 0.1 | |
| FCU-B1M-5 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-B1M-6 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-B1M-7 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-1-1 | fan coil unit | | | 0.33 | 277V / 1P | 0.8 | 0.2 | |
| FCU-1-1A | fan coil unit | | | 0.33 | 277V / 1P | 0.8 | 0.2 | |
| FCU-1-2 | fan coil unit | | | 0.03 | 277V / 1P | 0.8 | 0.0 | |
| FCU-1-3 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-1-4 | fan coil unit | | | 0.03 | 277V / 1P | 0.8 | 0.0 | |
| FCU-1-5 | fan coil unit | | | 0.33 | 277V / 1P | 0.8 | 0.2 | |
| FCU-1-6 | fan coil unit | | | 0.33 | 277V / 1P | 0.8 | 0.2 | |
| FCU-1-7 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-1-8 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-1-9 | fan coil unit | | | 0.33 | 277V / 1P | 0.8 | 0.2 | |
| FCU-1-9A | fan coil unit | | | 0.33 | 277V / 1P | 0.8 | 0.2 | |
| FCU-2-1 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-2-2 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-B2M-1 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-B2M-2 | fan coil unit | | | 0.33 | 277V / 1P | 0.8 | 0.2 | |
| FCU-3-1 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-3-2 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-3-3 | fan coil unit | | | 0.33 | 277V / 1P | 0.8 | 0.2 | |
| FCU-3-4 | fan coil unit | | | 0.33 | 277V / 1P | 0.8 | 0.2 | |
| FCU-3-5 | fan coil unit | | | 0.06 | 277V / 1P | 0.8 | 0.0 | |
| FCU-3-6 | fan coil unit | | | 0.06 | 277V / 1P | 0.8 | 0.0 | |
| FCU-3M-1 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-3M-2 | fan coil unit | | | 0.33 | 277V / 1P | 0.8 | 0.2 | |
| FCU-4-1 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-4M-1 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-4M-2 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-4M-3 | fan coil unit | | | 0.33 | 277V / 1P | 0.8 | 0.2 | |
| FCU-5-1 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-5-2 | fan coil unit | | | 0.33 | 277V / 1P | 0.8 | 0.2 | |
| FCU-6-1 | fan coil unit | | | 0.17 | 277V / 1P | 0.8 | 0.1 | |
| FCU-6-2 | fan coil unit | | | 0.17 | 277V / 1P | 0.8 | 0.1 | |
| FCU-6-3 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-7-1 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| FCU-8-1 | fan coil unit | | | 0.08 | 277V / 1P | 0.8 | 0.0 | |
| | | | | | | | | 9.94 |
| ECH-1-1 | electric cabinet heater - main lobby | | | 0.5 | 480V / 3P | 0.8 | 0.3 | |
| ECH-1-8 | electric cabinet heater - main lobby | | | 0.5 | 480V / 3P | 0.8 | 0.3 | |
| ECH-1-2 | electric cabinet heater - west lobby | | | 0.5 | 480V / 3P | 0.8 | 0.3 | |
| ECH-1-3 | electric cabinet heater - west lobby | | | 0.5 | 480V / 3P | 0.8 | 0.3 | |
| ECH-1-6 | electric cabinet heater - building entrances | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |
| ECH-1-7 | electric cabinet heater - building entrances | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |
| ECH-1-9 | electric cabinet heater - building entrances | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |

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|----------|--|--|--|------|-----------|-----|-----|-------------|
| ECH-1-10 | electric cabinet heater - building entrances | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |
| ECH-1-11 | electric cabinet heater - building entrances | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |
| ECH-1-12 | electric cabinet heater - building entrances | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |
| ECH-1-4 | electric cabinet heater - building entrances | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |
| ECH-1-5 | electric cabinet heater - building entrances | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |
| EUH-B3-1 | electric unit heater | | | 0.06 | 480V / 3P | 0.8 | 0.0 | |
| EUH-B3-2 | electric unit heater | | | 0.06 | 480V / 3P | 0.8 | 0.0 | |
| EUH-B3-3 | electric unit heater | | | 0.08 | 480V / 3P | 0.8 | 0.0 | |
| EUH-B3-4 | electric unit heater | | | 0.08 | 480V / 3P | 0.8 | 0.0 | |
| EUH-B2-1 | electric unit heater | | | 0.08 | 480V / 3P | 0.8 | 0.0 | |
| EUH-B2-2 | electric unit heater | | | 0.08 | 480V / 3P | 0.8 | 0.0 | |
| EUH-B2-3 | electric unit heater | | | 0.08 | 480V / 3P | 0.8 | 0.0 | |
| EUH-B2-4 | electric unit heater | | | 0.08 | 480V / 3P | 0.8 | 0.0 | |
| EUH-1-1 | electric unit heater - loading dock | | | 0.08 | 480V / 3P | 0.8 | 0.0 | |
| EUH-1-2 | electric unit heater - loading dock | | | 0.08 | 480V / 3P | 0.8 | 0.0 | |
| EUH-1-3 | electric unit heater - loading dock | | | 0.08 | 480V / 3P | 0.8 | 0.0 | |
| EUH-1-4 | electric unit heater - loading dock | | | 0.08 | 480V / 3P | 0.8 | 0.0 | |
| EUH-2-1 | electric unit heater | | | 0.20 | 480V / 3P | 0.8 | 0.1 | |
| EUH-2-2 | electric unit heater | | | 0.20 | 480V / 3P | 0.8 | 0.1 | |
| EUH-3-1 | electric unit heater | | | 0.20 | 480V / 3P | 0.8 | 0.1 | |
| EUH-4M-1 | electric unit heater | | | 0.20 | 480V / 3P | 0.8 | 0.1 | |
| EUH-4M-2 | electric unit heater | | | 0.20 | 480V / 3P | 0.8 | 0.1 | |
| EUH-6-2 | electric unit heater | | | 0.08 | 480V / 3P | 0.8 | 0.0 | |
| EUH-6-3 | electric unit heater | | | 0.08 | 480V / 3P | 0.8 | 0.0 | |
| EUH-6-1 | electric unit heater | | | 0.20 | 480V / 3P | 0.8 | 0.1 | |
| EUH-6-4 | electric unit heater | | | 0.05 | 480V / 3P | 0.8 | 0.0 | |
| EUH-9-1 | electric unit heater | | | 0.05 | 480V / 3P | 0.8 | 0.0 | |
| EUH-9-2 | electric unit heater | | | 0.05 | 480V / 3P | 0.8 | 0.0 | |
| EUH-9R-1 | electric unit heater | | | 0.05 | 480V / 3P | 0.8 | 0.0 | |
| EUH-9R-2 | electric unit heater | | | 0.05 | 480V / 3P | 0.8 | 0.0 | |
| EUH-9R-3 | electric unit heater | | | 0.05 | 480V / 3P | 0.8 | 0.0 | |
| ECH-1-13 | electric cabinet heater | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |
| ECH-1-14 | electric cabinet heater | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |
| ECH-1-15 | electric cabinet heater | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |
| ECH-1-16 | electric cabinet heater | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |
| ECH-2M-1 | electric cabinet heater | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |
| ECH-2M-2 | electric cabinet heater | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |
| ECH-2M-3 | electric cabinet heater | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |
| ECH-2M-4 | electric cabinet heater | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |
| ECH-2M-5 | electric cabinet heater | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |
| ECH-2M-6 | electric cabinet heater | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |
| ECH-3M-1 | electric cabinet heater | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |
| ECH-3M-2 | electric cabinet heater | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |
| ECH-3M-3 | electric cabinet heater | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |
| ECH-3M-4 | electric cabinet heater | | | 0.13 | 480V / 3P | 0.8 | 0.1 | |
| | | | | | | | | 4.40 |
| FPB-A | fan powered box | | | 0.17 | 480V / 3P | 0.8 | 0.1 | |
| FPB-B | fan powered box | | | 0.25 | 480V / 3P | 0.8 | 0.1 | |
| FPB-C | fan powered box | | | 0.33 | 480V / 3P | 0.8 | 0.2 | |
| FPB-D | fan powered box | | | 0.33 | 480V / 3P | 0.8 | 0.2 | |
| FPB-E | fan powered box | | | 0.75 | 480V / 3P | 0.8 | 0.4 | |

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|-------|-----------------|--|--|--|------|-----------|------|-----|----------------|
| FPB-F | fan powered box | | | | 0.75 | 480V / 3P | 0.8 | 0.4 | |
| FPB-G | fan powered box | | | | 1.0 | 480V / 3P | 0.85 | 0.6 | |
| | | | | | | | | | 2.17 |
| | | | | | | | | | |
| | | | | | | | | | 3443.98 |

Appendix C: PEPCO Rate Schedule



A PHI Company

**DISTRICT OF COLUMBIA
GENERAL SERVICE PRIMARY SERVICE
SCHEDULE GS3A
UPDATED AUGUST 22, 2007**

| | Billing Months of <u>June – October</u> (Summer) | Billing Months of <u>November – May</u> (Winter) |
|---|---|---|
| Generation¹ | | |
| First 6,000 kwh | \$ 0.12147 per kwh | \$ 0.11736 per kwh |
| Additional kwh | \$ 0.12147 per kwh | \$ 0.11736 per kwh |
| First 25 kw | No charge | No charge |
| Additional kw | \$ 0.17955 per kw | \$ 0.14956 per kw |
| Procurement Cost Adjustment | www.pepco.com for monthly rate | |
| Transmission² | | |
| All kwh | \$ 0.00349 per kwh | \$ 0.00349 per kwh |
| Distribution³ | | |
| Customer Charge | \$ 6.48 per month | \$ 6.48 per month |
| First 6,000 kwh | \$ 0.04067 per kwh | \$ 0.03371 per kwh |
| Additional kwh | \$ 0.02558 per kwh | \$ 0.01654 per kwh |
| First 25 kw | No charge | No charge |
| Additional kw | \$ 4.69 per kw | \$ 4.09 per kw |
| Delivery Tax⁴ | \$ 0.0077 per kwh | \$ 0.0077 per kwh |
| Public Space Occupancy Surcharge⁵ | \$ 0.00219 per kwh | \$ 0.00219 per kwh |
| Administrative Credit | www.pepco.com for monthly rate | |
| Reliable Energy Trust Fund⁶ | \$ 0.00111 per kwh | \$ 0.00111 per kwh |
| Generation Procurement Credit⁷ | \$ 0.000000 per kwh | \$ 0.000000 per kwh |

¹ Effective June 1, 2007

² Effective February 8, 2005

³ Effective February 8, 2005

⁴ Effective January 1, 2005

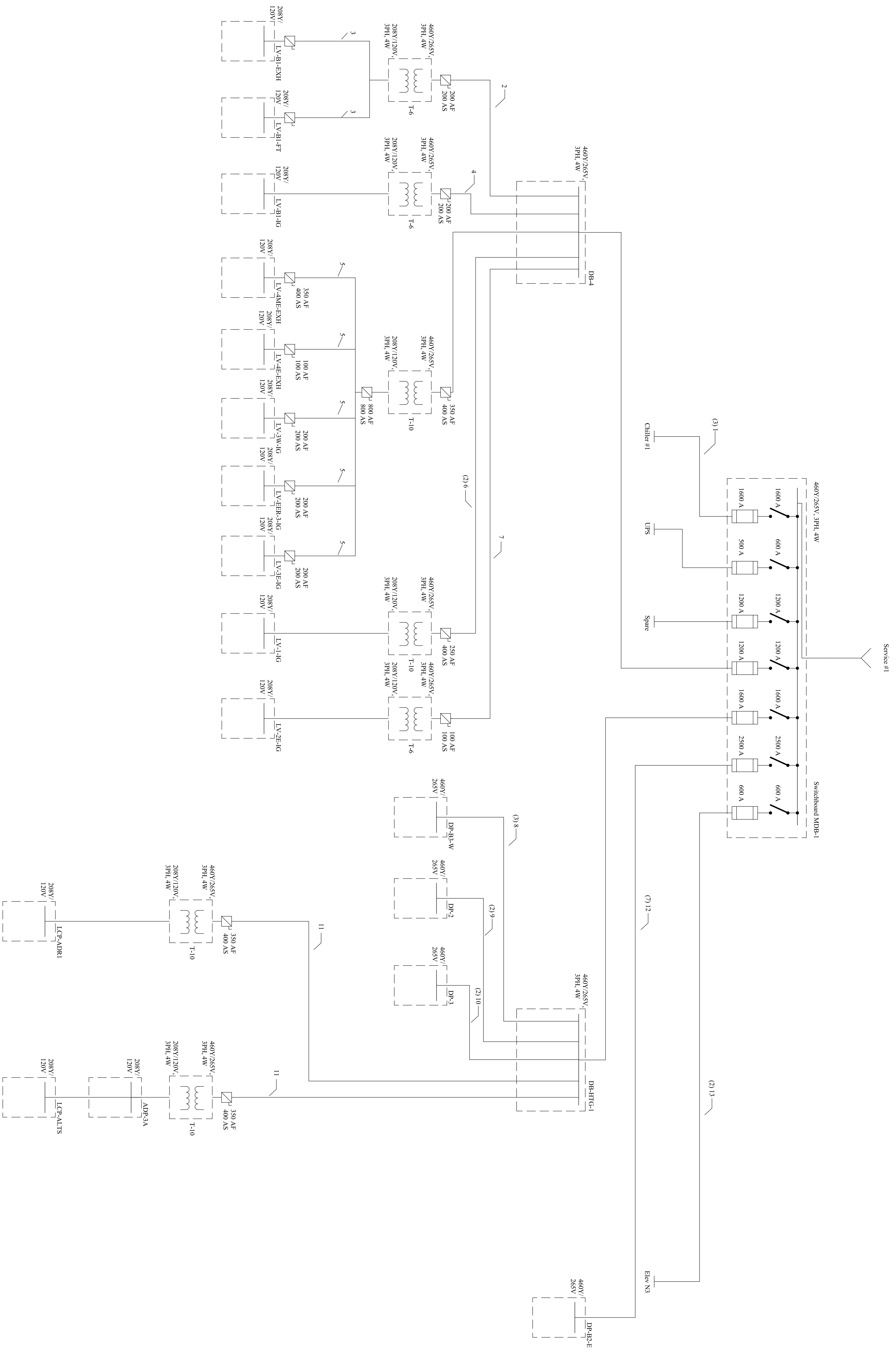
⁵ Effective March 1, 2007

⁶ Effective August 22, 2007

⁷ Effective Billing Month of July, 2007

Appendix D: Feeder Schedule

| Feeder Schedule | | | |
|------------------------|-------------------|--------------------------|----------------|
| Tag | Conductors | Ground Conductors | Conduit |
| 1 | 3 # 400 MCM | 1 # 2/0 | 3 - 3" |
| 2 | 3 # 2 | 1 # 8 | 1 - 0.5" |
| 3 | 3 # 4 | 1 # 10 | 1 - 0.25" |
| 4 | 3 #1 | 1 # 6 | 2 - 0.5" |
| 5 | 4 # 250 MCM | 1 # 4 | 2 - 0.5" |
| 6 | 3 # 350 MCM | 1 # 1 | 2 - 3" |
| 7 | 4 # 500 MCM | 1 # 2 | 1 - 4" |
| 8 | 3 # 300 MCM | 1 # 1/0 | 3 - 3" |
| 9 | 3 # 4/0 | 1 # 2 | 2 - 3" |
| 10 | 3 # 3/0 | 1 # 2 | 2 - 3" |
| 11 | 3 # 500 MCM | 1 # 2 | 1 - 4" |
| 12 | 3 # 500 MCM | 1 # 350 MCM | 7 - 3" |
| 13 | 3 # 250 MCM | 1 # 2 | 2 - 4" |
| 14 | 4 # 500 MCM | 1 # 2 | 1 - 3" |
| 15 | 4 # 300 MCM | 1 # 1/0 | 3 - 3" |
| 16 | 4 # 2 | 1 # 6 | 1 - 0.25" |
| 17 | 4 # 350 MCM | 1 # 1 | 2 - 3" |
| 18 | 4 # 1/0 | 1 # 6 | 1 - 2" |
| 19 | 4 # 2/0 | 1 # 6 | 1 - 3" |
| 20 | 3 # 350 MCM | 1 # 1 | 2 - 4" |
| 21 | 4 # 500 MCM | 1 # 1/0 | 2 - 4" |
| 22 | 4 # 4/0 | 1 # 4 | 1 - 3" |
| 23 | 3 # 4/0 | 1 # 4 | 2 - 0.5" |
| 24 | 4 # 250 MCM | 1 # 4 | 1 - 3" |
| 25 | 4 # 1 | 1 # 6 | 1 - 0.25" |
| 26 | 4 # 3/0 | 1 # 6 | 1 - 3" |
| 27 | 3 # 350 | 1 # 3/0 | 4 - 3" |



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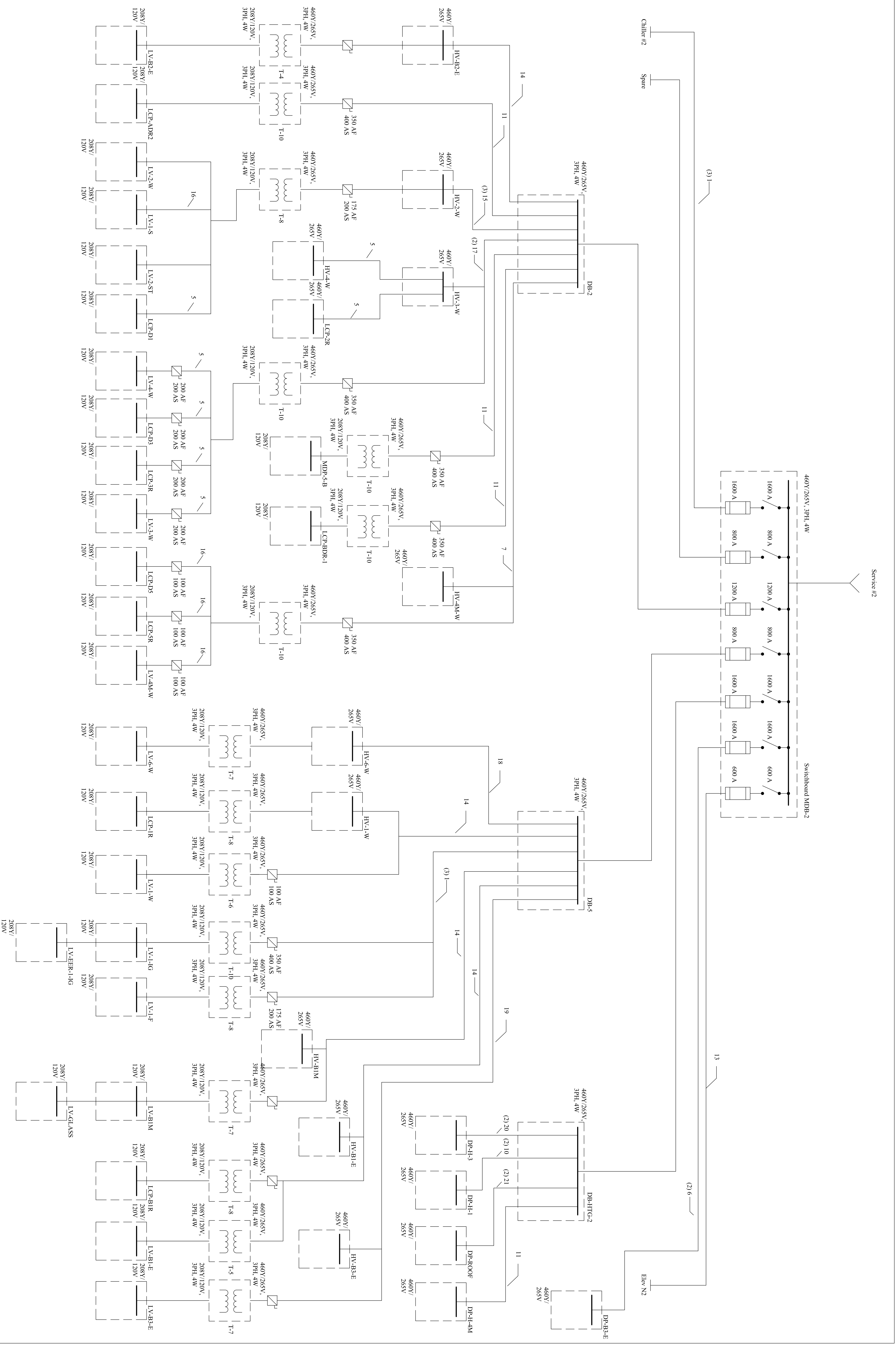
Ryan Wise

AE 481W
 Senior Thesis

Nov. 2, 2007

Consultant:
 Ted Dannerrth, P.E

Single Line Diagram
 Service #1



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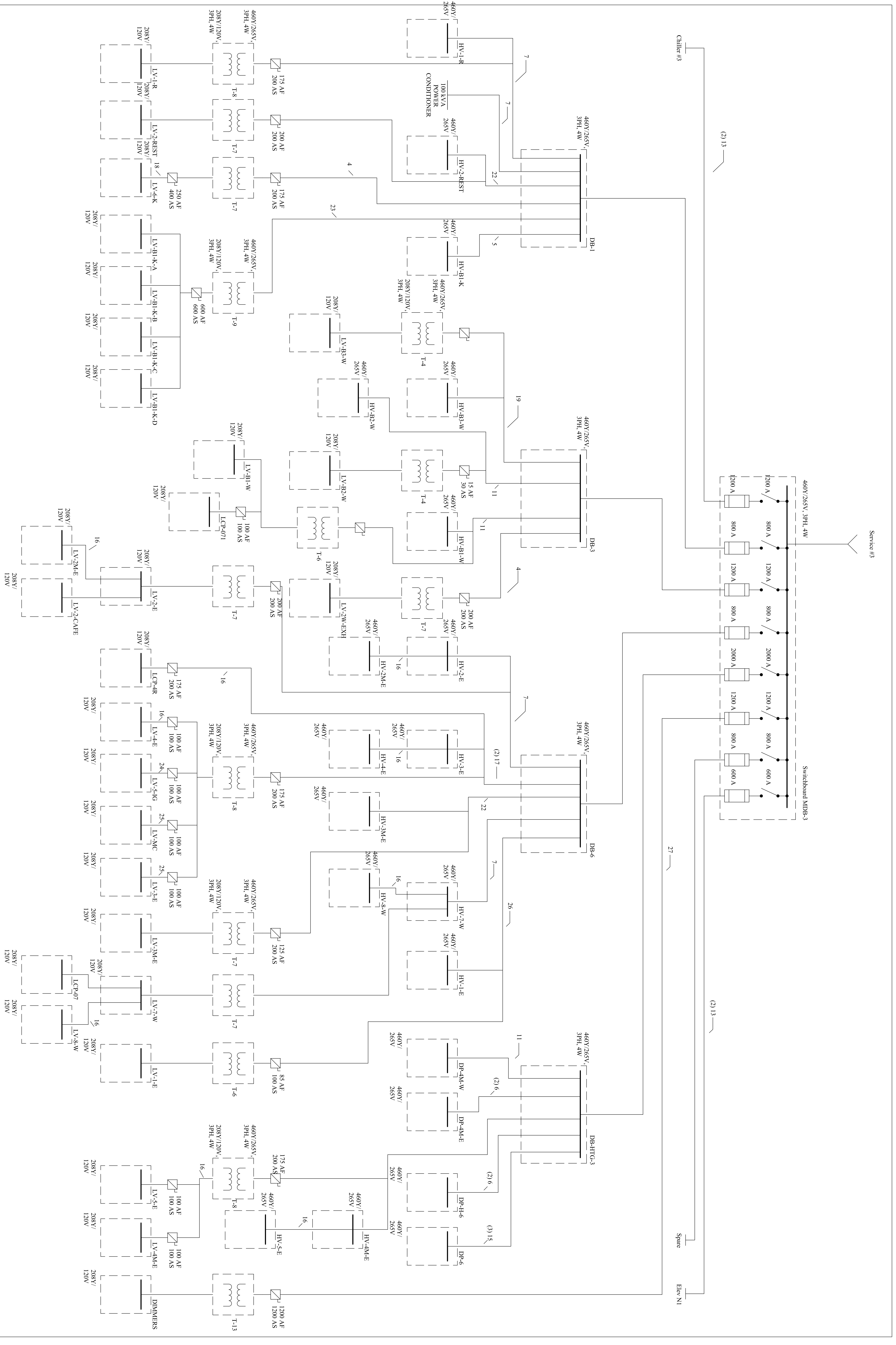
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Single Line Diagram
 Service #2



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Nov. 2, 2007

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Single Line Diagram
 Service #3