

# ONE CHRISTINA CRESCENT

125 S. West Street  
Wilmington, Delaware



## **Electrical Systems Existing Conditions and Building Load Summary Report**

November 2, 2007

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## **Executive Summary**

This report is a survey of the existing electrical system conditions for One Christina Crescent. A brief description of the electrical distribution system is presented, followed by a more detailed review of the various components and details of the system. This report addresses the service entrance, voltage systems, transformers, emergency power systems, over-current devices, switchgear, power factor correction, design issues, lighting loads, mechanical loads, service entrance size, utility company information, and communication systems.

## **I. POWER DISTRIBUTION SYSTEMS**

### **Summary Description of Distribution System**

The electrical power distribution system for One Christina Crescent is a simple radial system. There is a single primary feeder servicing the building with 12KV 3-phase power and one primary transformer which steps the voltage down from 12KV to 480Y/277V 3-phase, 4 wire for utilization. Power is also stepped down from 480Y/277V to 208Y/120V 3-phase, 4 wire for lighting and receptacle loads. The Uninterruptible Power System (UPS) for the building's data center is connected to 480V 3-phase.

### **Service Entrance**

The power utility company's service and responsibility ends at their switchgear and the owner's service and responsibility begins at the point of connection of the primary service feeder to the power company's switchgear. The power company provides the switchgear and the electrical contractor provides the 500 KCMIL, copper 15KV primary service feeder.

### **Voltage Systems**

- 480Y/277V 3-phase, 4 wire
  - o Connected Loads: Mechanical
- 208Y/120V 3-phase, 4 wire
  - o Connected Loads: Lighting and Receptacles
- 480V 3 wire
  - o Connected Loads: Uninterruptible Power System (UPS)

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**Transformers**

**INDIVIDUAL TRANSFORMER SCHEDULE**

| TA<br>G  | PRIMARY<br>VOLTAGE | SECONDARY<br>VOLTAGE | SIZ<br>E  | TYPE        | TEMP.<br>RISE | TAP<br>S | MOUNTING                | REMARKS                  |
|----------|--------------------|----------------------|-----------|-------------|---------------|----------|-------------------------|--------------------------|
| N/<br>A  | 12000V,3PH,3W      | 480Y/277V,3PH,4W     | 375<br>0  | DRY<br>TYPE | N/A           | N/A      | PAD MOUNTED ON<br>FLOOR |                          |
| T-1      | 480V,3PH,3W        | 208Y/120V,3PH,4W     | 45        | DRY<br>TYPE | 80° C         | 6        | FLOOR MOUNTED           | K-4 RATED                |
| T-2      | 480V,3PH,3W        | 208Y/120V,3PH,4W     | 45        | DRY<br>TYPE | 80° C         | 6        | FLOOR MOUNTED           | K-4 RATED                |
| T-3      | 480V,3PH,3W        | 208Y/120V,3PH,4W     | 45        | DRY<br>TYPE | 80° C         | 6        | FLOOR MOUNTED           | K-4 RATED                |
| T-4      | 480V,3PH,3W        | 208Y/120V,3PH,4W     | 45        | DRY<br>TYPE | 80° C         | 6        | FLOOR MOUNTED           | K-4 RATED                |
| T-5      | 480V,3PH,3W        | 208Y/120V,3PH,4W     | 75        | DRY<br>TYPE | 80° C         | 6        | FLOOR MOUNTED           | K-4 RATED                |
| T-6      | 480V,3PH,3W        | 208Y/120V,3PH,4W     | 45        | DRY<br>TYPE | 80° C         | 6        | FLOOR MOUNTED           | K-4 RATED                |
| T-7      | 480V,3PH,3W        | 208Y/120V,3PH,4W     | 45        | DRY<br>TYPE | 80° C         | 6        | FLOOR MOUNTED           | K-4 RATED                |
| T-8      | 480V,3PH,3W        | 208Y/120V,3PH,4W     | 45        | DRY<br>TYPE | 80° C         | 6        | FLOOR MOUNTED           | K-4 RATED                |
| T-9      | 480V,3PH,3W        | 208Y/120V,3PH,4W     | 45        | DRY<br>TYPE | 80° C         | 6        | FLOOR MOUNTED           | K-4 RATED                |
| T-<br>10 | 480V,3PH,3W        | 208Y/120V,3PH,4W     | 45        | DRY<br>TYPE | 80° C         | 6        | PAD MOUNTED ON<br>FLOOR |                          |
| T-<br>11 | 480V,3PH,3W        | 208Y/120V,3PH,4W     | 30        | DRY<br>TYPE | 80° C         | 6        | FLOOR MOUNTED           |                          |
| T-<br>12 | 480V,3PH,3W        | 208Y/120V,3PH,4W     | 30        | DRY<br>TYPE | 80° C         | 6        | FLOOR MOUNTED           |                          |
| T-<br>13 | 480V,3PH,3W        | 208Y/120V,3PH,4W     | 15        | DRY<br>TYPE | 80° C         | 6        | PAD MOUNTED ON<br>FLOOR |                          |
| T-<br>14 | 480V,3PH,3W        | 208Y/120V,3PH,4W     | 30        | DRY<br>TYPE | 80° C         | 6        | FLOOR MOUNTED           |                          |
| N/<br>A  | 480V, 3PH          | 208Y/120V,3PH,4W     | 150       | DRY<br>TYPE | 150° C        | N/A      | FLOOR MOUNTED           |                          |
| N/<br>A  | 480V, 3PH          | 208Y/120V,3PH,4W     | 150       | DRY<br>TYPE | 150° C        | N/A      | FLOOR MOUNTED           |                          |
| N/<br>A  | 480V, 3PH          | 208Y/120V,3PH,4W     | 150       | DRY<br>TYPE | 150° C        | N/A      | FLOOR MOUNTED           |                          |
| N/<br>A  | 480V, 3PH          | 208Y/120V,3PH,4W     | 150       | DRY<br>TYPE | 150° C        | N/A      | FLOOR MOUNTED           |                          |
| N/<br>A  | 480V, 3PH          | 208Y/120V,3PH,4W     | 150       | DRY<br>TYPE | 150° C        | N/A      | FLOOR MOUNTED           |                          |
| N/<br>A  | 480V, 3PH          | 208Y/120V,3PH,4W     | 30        | DRY<br>TYPE | 150° C        | N/A      | FLOOR MOUNTED           |                          |
| N/<br>A  | 480V, 3PH          | 208Y/120V,3PH,4W     | 75        | DRY<br>TYPE | 150° C        | N/A      | FLOOR MOUNTED           |                          |
| N/<br>A  | 480V, 3PH          | 208Y/120V,3PH,4W     | 225       | DRY<br>TYPE | 150° C        | N/A      | FLOOR MOUNTED           |                          |
| N/<br>A  | 480V, 3PH          | 208Y/120V,3PH,4W     | 112.<br>5 | DRY<br>TYPE | 150° C        | N/A      | FLOOR MOUNTED           |                          |
| N/<br>A  | 480V, 3PH          | 208Y/120V,3PH,4W     | 112.<br>5 | DRY<br>TYPE | 150° C        | N/A      | FLOOR MOUNTED           |                          |
| N/<br>A  | 480V, 3PH          | 480V, 3PH            | 225       |             |               |          | FLOOR MOUNTED           | ISOLATION<br>TRANSFORMER |
| N/<br>A  | 480V, 3PH          | 480V, 3PH            | 112.<br>5 |             |               |          | FLOOR MOUNTED           | ISOLATION<br>TRANSFORMER |
| N/<br>A  | 480V, 3PH          | 480V, 3PH            | 112.      |             |               |          | FLOOR MOUNTED           | ISOLATION                |

|   |  |  |   |  |  |  |             |
|---|--|--|---|--|--|--|-------------|
| A |  |  | 5 |  |  |  | TRANSFORMER |
|---|--|--|---|--|--|--|-------------|

### **Emergency Power Systems**

There are (2) natural gas driven emergency generators rated at 500KW/625KVA, 277/480V, 3 PH., 4W. One generator is connected to a combination fire pump controller with automatic transfer switch. Sub-distribution panel SDB is connected to this first generator by means of an 800 amp automatic 4 pole transfer switch. The second generator is connected to panel WS, which serves the IT stations, by way of a 400 amp 4 pole automatic transfer switch. This second generator is also connected the computer room equipment panel CPB through an 800 amp 4 pole automatic transfer switch. A UPS system is installed to provide uninterrupted power to the data center. The system consists of a 225 KVA UPS and (2) 100 KVA UPS. Three Power Distribution Units are connected to the three respective panels that receive power from the UPS systems. One PDU is rated for 225 KVA and the other two are 75 KVA. The UPS system is on the 480Y/277V 3 PH., 4W voltage.

### **Over-current Devices**

Circuit breakers and class “R” fuses are used.

- 1) Service Entrance Switchgear: 600A Fuses 15KV 200E
- 2) Distribution Panel Boards: Circuit breakers; 3 amp fuses for meters in sub-distribution panel “SDR”
- 3) Motor Control Center: Circuit Breakers
- 4) Local Lighting and Appliance Panelboards: Circuit Breakers

### **Locations of Switchgear**

Tables listing all of the major switchgear equipment and panel boards with their respective locations can be found in Appendix A.

### **Power Factor Correction**

It appears that capacitors are used on the individual circuits fed from the motor control center. Please note that it is only assumed that the symbols on these circuits represent capacitors as no tag is provided. Also, no information on capacitors or power factor correction equipment could be found in the buildings specifications.

### **Design Issues**

There is a large data center on the fourth floor which must be on continuously and therefore needs to be on a UPS system. The building is occupied and in use 24/7. Voltage drops may be an issue considering that the building spans a long distance.

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### **Lighting Loads**

A schedule of all luminaires used in One Christina Crescent can be found in Appendix B.

### **Mechanical and other Loads**

Schedules of all major mechanical equipment used in One Christina Crescent can be found in Appendix C.

### **Service Entrance Size**

Complete calculation spreadsheets for the service entrance size during various stages of project development can be found in Appendix D. Below is a summary table from the three calculation methods used for this report. The table lists the actual design equipment sizes for the main breaker and transformer. While the actual design equipment is appropriate for the loads during preliminary calculations, it is undersized according to the actual load calculations performed in this report. This discrepancy may be due to the fact that the drawings used were incomplete from an electrical design standpoint. In this case, portions of the distribution system may have been altered or the main equipment resized at a later point in actual design of the building. Discrepancy could have also occurred because of incomplete load information taken from the drawings.

| <b>Service Entrance Size Summary</b> |                        |                       |
|--------------------------------------|------------------------|-----------------------|
| <b>Phase</b>                         | <b>Total Load (VA)</b> | <b>Total Load (A)</b> |
| Conceptual                           | 2397014                | 2883                  |
| Design Development                   | 4044962                | 4865                  |
| Construction                         | 5344230                | 6428                  |
|                                      |                        |                       |
| <b>Design Equipment</b>              | <b>Transformer</b>     | <b>Switchgear</b>     |
|                                      | 3750000                | 5000                  |

### **Utility Company Information**

Delmarva Power  
P.O. Box 17000  
Wilmington, DE 19886  
[www.delmarva.com](http://www.delmarva.com)

The rate schedule that applies to One Christina Crescent is as follows.



## Rate Changes to Delaware Commercial/Industrial Customer Bills

Effective June 1, 2007, Delmarva Power's supply rates have changed based on a schedule approved by the Delaware Public Service Commission (DEPSC).

For more information, visit [www.delmarva.com](http://www.delmarva.com) and click on the "Choices and Rates" tab.

\* *Phase-In Credit - Customers who have an Electric Delivery Phase-In Summary section on their bill elected to have their rates phased-in over time, without interest. The Phase-In Credit/Charge line item in the Electric Supply Section only applies to those customers. Between June 1, 2007 and December 31, 2007, you may have a credit or no charge at all depending on your tariff and the season. Please note that as of January 1, 2008, you will begin to pay back the amount you deferred and the line item will become a phase-in "charge."*

| Rate Schedule  | Previous Rates         |                      | Rates effective 6/1/07 |                      |
|--|------------------------|----------------------|------------------------|----------------------|
|  | Summer<br>(Jun.-Sept.) | Winter<br>(Oct.-May) | Summer<br>(Jun.-Sept.) | Winter<br>(Oct.-May) |
| <b>Small General Service Secondary Non-Demand - SGS-ND</b> |                        |                      |                        |                      |
| Delivery Charges   |                        |                      |                        |                      |
| Customer Charges   | \$8.36/Month           | \$8.36/Month         | \$8.36/Month           | \$8.36/Month         |
| Distribution Energy kWh                                    | \$0.035310/kWh         | \$0.035310/kWh       | \$0.035310/kWh         | \$0.035310/kWh       |
| Supply Charges   |                        |                      |                        |                      |
| Transmission Energy  | \$0.003140/kWh         | \$0.003140/kWh       | \$1.139000/kW          | \$1.139000/kW        |
| Standard Offer Service Energy kWh                          | \$0.104576/kWh         | \$0.101666/kWh       | \$0.106350/kWh         | \$0.101315/kWh       |
| Phase In Credit Charge kWh*                                | \$(0.002881)/kWh       | \$(0.011251)/kWh     | \$0.000000/kWh         | \$(0.002708)/kWh     |
| <b>General Service Water Heating - GSW</b>                 |                        |                      |                        |                      |
| Delivery Charges   |                        |                      |                        |                      |
| Distribution Energy kWh                                    | \$0.014975/kWh         | \$0.014975/kWh       | \$0.014975/kWh         | \$0.014975/kWh       |
| Supply Charges   |                        |                      |                        |                      |
| Transmission Energy  | \$0.001929/kWh         | \$0.001929/kWh       | \$1.139000/kW          | \$1.139000/kW        |
| Standard Offer Service Energy kWh                          | \$0.085315/kWh         | \$0.100817/kWh       | \$0.087025/kWh         | \$0.100481/kWh       |
| Phase In Credit Charge kWh*                                | \$(0.013791)/kWh       | \$(0.025728)/kWh     | \$(0.002275)/kWh       | \$(0.012519)/kWh     |
| <b>General Service Space Heating - GSH</b>                 |                        |                      |                        |                      |
| Delivery Charges   |                        |                      |                        |                      |
| Distribution Energy kWh                                    | \$0.014975/kWh         | \$0.014975/kWh       | \$0.014975/kWh         | \$0.014975/kWh       |
| Supply Charges   |                        |                      |                        |                      |
| Transmission Energy  | \$0.002574/kWh         | \$0.002574/kWh       | \$1.139000/kW          | \$1.139000/kW        |
| Standard Offer Service Energy kWh                          | \$0.123228/kWh         | \$0.100817/kWh       | \$0.125066/kWh         | \$0.100481/kWh       |
| Phase In Credit Charge kWh                                 | \$(0.021007)/kWh       | \$(0.025200)/kWh     | \$(0.005064)/kWh       | \$(0.011740)/kWh     |
| Minimum Charge   | \$4.99/Month           | \$4.99/Month         | \$4.99/Month           | \$4.99/Month         |
| <b>Medium General Service - Secondary - MGS-S</b>          |                        |                      |                        |                      |
| Delivery Charges   |                        |                      |                        |                      |
| Distribution Demand kW                                     | \$25.42/Month          | \$25.42/Month        | \$25.42/Month          | \$25.42/Month        |
| Distribution Energy kWh                                    | \$3.654078/kW          | \$3.654078/kW        | \$3.654078/kW          | \$3.654078/kW        |
| Supply Charges   |                        |                      |                        |                      |
| Transmission Demand kW                                     | \$0.002905/kWh         | \$0.002905/kWh       | \$0.002905/kWh         | \$0.002905/kWh       |
| Standard Offer Service Demand kW                           | \$0.748676/kW          | \$0.748676/kW        | \$1.139000/kW          | \$1.139000/kW        |
| Standard Offer Service Energy kWh                          | \$18.355448/kW         | \$10.403852/kW       | \$15.028459/kW         | \$9.543857/kW        |
| Off-Peak Service Meter Chrg                                | \$0.059687/kWh         | \$0.066687/kWh       | \$0.050345/kWh         | \$0.062505/kWh       |
| Off-Peak Service Meter Chrg                                | \$8.99/Month           | \$8.99/Month         | \$8.99/Month           | \$8.99/Month         |
| <b>General Service - Secondary - LGS-S</b>                 |                        |                      |                        |                      |
| Delivery Charges   |                        |                      |                        |                      |
| Customer Charge  | \$159.62/Month         | \$159.62/Month       | \$159.62/Month         | \$159.62/Month       |
| Distribution Demand kW                                     | \$2.407000/kW          | \$2.407000/kW        | \$2.407000/kW          | \$2.407000/kW        |
| Distribution On-Peak kWh                                   | \$0.002393/kWh         | \$0.002393/kWh       | \$0.002393/kWh         | \$0.002393/kWh       |
| Distribution Off-Peak kWh                                  | \$0.002393/kWh         | \$0.002393/kWh       | \$0.002393/kWh         | \$0.002393/kWh       |
| Power Factor Charge/Credit                                 | \$0.030000/kW          | \$0.030000/kW        | \$0.030000/kW          | \$0.030000/kW        |
| Supply Charges   |                        |                      |                        |                      |
| Transmission Demand kW                                     | \$0.823472/kW          | \$0.823472/kW        | \$1.139000/kW          | \$1.139000/kW        |
| Standard Offer Service Demand kW                           | \$22.898184/kW         | \$14.554370/kW       | \$18.635390/kW         | \$12.433537/kW       |
| Standard Offer Service On-Peak kWh                         | \$0.087509/kWh         | \$0.093382/kWh       | \$0.056295/kWh         | \$0.064793/kWh       |
| Standard Offer Service Off-Peak kWh                        | \$0.061507/kWh         | \$0.065605/kWh       | \$0.035135/kWh         | \$0.041063/kWh       |

| Rate Schedule                                   | Previous Rates         |  | Rates effective 6/1/07 |                                   |
|---|------------------------|--|------------------------|-----------------------------------|
|   | Summer<br>(Jun.-Sept.) | Winter<br>(Oct.-May)                                   | Summer<br>(Jun.-Sept.) | Winter<br>(Oct.-May) <b>Large</b> |
| <b>General Service - Primary - GS-P</b>         |                        |  |                        |                                   |
| <b>Delivery Charges</b>                         |                        |  |                        |                                   |
| Customer Charge                                 | \$235.42/Month         | \$235.42/Month   | \$235.42/Month         | \$235.42/Month                    |
| Alternate Customer Charge                       | \$92.89/Month          | \$92.89/Month  | \$92.89/Month          | \$92.89/Month                     |
| Distribution Demand kW                          | \$2.624797//kW         | \$2.624797//kW   | \$2.624797//kW         | \$2.624797//kW                    |
| Distribution On-Peak kWh                        | \$0.000273/kWh         | \$0.000273/kWh   | \$0.000273/kWh         | \$0.000273/kWh                    |
| Off-Peak kWh                                    | \$0.000273/kWh         | \$0.000273/kWh   | \$0.000273/kWh         | \$0.000273/kWh                    |
| Power Factor Charge/Credit                      | \$0.030000/kW          | \$0.030000/kW  | \$0.030000/kW          | \$0.030000/kW                     |
| RARM (eligible HPS Customers Only)              |                        |  |                        |                                   |
| Capacity PLC < 600 kW                           |                        | \$150 per month plus \$0.045988 per kW of Capacity PLC |                        |                                   |
| Capacity PLC >= 600 kW                          |                        | \$601.19 per month                                     |                        |                                   |
| <b>Supply Charges</b>                           |                        |  |                        |                                   |
| Transmission Demand kW                          | \$0.835292/kW          | \$0.835292/kW  | \$1.139000/kW          | \$1.139000/kW                     |
| Standard Offer Service                          |                        |  |                        |                                   |
| Demand kW                                       | \$22.148673/kW         | \$13.125055/kW   | \$17.660193/kW         | \$10.988547/kW                    |
| On-Peak kWh                                     | \$0.091929/kWh         | \$0.089905/kWh   | \$0.075051/kWh         | \$0.076963/kWh                    |
| Off-Peak kWh                                    | \$0.073367/kWh         | \$0.071759/kWh   | \$0.060250/kWh         | \$0.061770/kWh                    |
| OR Hourly Priced Service                        | See Rider HPS**        | See Rider HPS**  | See Rider HPS**        | See Rider HPS**                   |
| <b>General Service - Transmission - GS-T</b>    |                        |  |                        |                                   |
| <b>Delivery Charges</b>                         |                        |  |                        |                                   |
| Customer Charge                                 | \$2732.30Month         | \$2732.30Month   | \$2732.30Month         | \$2732.30Month                    |
| Distribution Demand kW                          | \$0.102055kW           | \$0.102055kW   | \$0.102055kW           | \$0.102055kW                      |
| Distribution On-Peak kWh                        | \$0.000273/kWh         | \$0.000273/kWh   | \$0.000273/kWh         | \$0.000273/kWh                    |
| Distribution Off-Peak kWh                       | \$0.000273/kWh         | \$0.000273/kWh   | \$0.000273/kWh         | \$0.000273/kWh                    |
| Power Factor Charge/Credit                      | \$0.030000/kW          | \$0.030000/kW  | \$0.030000/kW          | \$0.030000/kW                     |
| <b>Supply Charges</b>                           |                        |  |                        |                                   |
| Transmission Demand kW                          | Refer to HPS**         | Refer to HPS**   | Refer to HPS**         | Refer to HPS**                    |
| Standard Offer Service Demand kW                | Refer to HPS**         | Refer to HPS**   | Refer to HPS**         | Refer to HPS**                    |
| Standard Offer Service On-Peak kWh              | Refer to HPS**         | Refer to HPS**   | Refer to HPS**         | Refer to HPS**                    |
| Standard Offer Service Off-Peak kWh             | Refer to HPS**         | Refer to HPS**   | Refer to HPS**         | Refer to HPS**                    |
| <b>Outdoor Recreational Lighting - ORL</b>      |                        |  |                        |                                   |
| <b>Delivery Charges</b>                         |                        |  |                        |                                   |
| Customer Charge                                 | \$8.36/Month           | \$8.36/Month   | \$8.36/Month           | \$8.36/Month                      |
| Distribution Energy kWh                         | \$0.024250/kWh         | \$0.024250/kWh   | \$0.024250/kWh         | \$0.024250/kWh                    |
| <b>Supply Charges</b>                           |                        |  |                        |                                   |
| Transmission Energy                             | \$0.000663/kWh         | \$0.000663/kWh   | \$1.139000/kW          | \$1.139000/kW                     |
| Supply Energy kWh                               | \$0.117758/kWh         | \$0.139258/kWh   | \$0.119578/kWh         | \$0.138242/kWh                    |
| Phase In Credit Charge kWh*                     | \$(0.017092)/kWh       | \$(0.032918)/kWh                                       | \$(0.000423)/kWh       | \$(0.013554)/kWh                  |
| <b>Outdoor Lighting-Rate OL</b>                 |                        |  |                        |                                   |
| <b>Delivery Charges</b>                         |                        |  |                        |                                   |
| Distribution Charges: Based on type of lighting |                        |  |                        |                                   |
| Open Bottom Luminaire with bracket              |                        |  |                        |                                   |
| Mercury   |                        |  |                        |                                   |
| 8,600 Lumen (175W)                              | \$4.91                 | \$4.91   | \$4.91                 | \$4.91                            |
| High Pressure Sodium                            |                        |  |                        |                                   |
| 9,500 Lumen (100W)                              | \$5.05                 | \$5.05   | \$5.05                 | \$5.05                            |
| Enclosed Luminaire with bracket                 |                        |  |                        |                                   |
| Mercury   |                        |  |                        |                                   |
| 4,200 Lumen (100W)                              | \$4.48                 | \$4.48   | \$4.48                 | \$4.48                            |
| 8,600 Lumen (175W)                              | \$5.73                 | \$5.73   | \$5.73                 | \$5.73                            |
| High Pressure Sodium                            |                        |  |                        |                                   |
| 5,800 Lumen (70W)                               | \$5.64                 | \$5.64   | \$5.64                 | \$5.64                            |
| 9,500 Lumen (100W)                              | \$5.95                 | \$5.95   | \$5.95                 | \$5.95                            |
| 50,000 Lumen (400W)                             | \$12.05                | \$12.05  | \$12.05                | \$12.05                           |
| <b>Supply Charges</b>                           |                        |  |                        |                                   |
| Night-time OL                                   | \$0.066791/kWh         | \$0.066791/kWh   | \$0.067213/kWh         | \$0.067213/kWh                    |
| Traffic-light OL                                | \$0.066791/kWh         | \$0.066791/kWh   | \$0.067213/kWh         | \$0.067213/kWh                    |
| Phase In Credit Charge kWh*                     | \$(0.012242)/kWh       | \$(0.012242)/kWh                                       | \$(0.001838)/kWh       | \$(0.001838)/kWh                  |

\*\*Hourly Priced Service (HPS) Rider is available in the tariff section of our website at [www.delmarva.com](http://www.delmarva.com).



## **II. COMMUNICATION SYSTEMS**

### **FIRE ALARM**

The intelligent reporting, microprocessor controlled fire detection and signaling system provides manual and automatic alarm initiation, automatic signaling via voice evacuation speakers and ADA/UL1971 strobes, firefighter's one-way paging system and two-way telephone intercommunications, auto-manual smoke pressurization system operations, sprinkler system monitoring, elevator recall and power shutdown operations and fire department notification. The fire alarm control panel is a Notifier model AFP-1010 which contains a microprocessor based Central Processing Unit (CPU). The system also consists of a display interface assembly, lead acid battery secondary power source, addressable monitor module, addressable output module, fault isolator module, manual stations, analog thermal sensors, duct mounted smoke detectors, analog photoelectric sensors, apartment unit smoke detectors, audio/visual signaling appliance (speaker/strobe), audio signaling appliance (speaker), visual signaling appliance, synchronization module, sprinkler bell, firefighters telephone warden station, and remote annunciator panel.

### **TELEPHONE AND DATA COMMUNICATIONS**

A system of conduits, terminal boxes, outlet boxes, junction boxes and other necessary accessories for telephone outlets was installed and left complete and ready for Barclays, who installed their own wire and equipment.

### **RESCUE ASSISTANCE TWO-WAY COMMUNICATION**

The rescue assistance two-way communication system provides audio and visual two-way communications for the handicapped in accordance with "The Americans with Disabilities Act" and complies with design specifications for areas of rescue assistance as published by the Federal Register/Volume 56, No. 144 Section 4.3.11.4. The system consists of a Cornell Model A4208 master station, intercommunications amplifier, and Cornell model 4201 remote stations.

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## Appendix A

### Locations of Switchgear

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## Appendix B

### Lighting Loads

| LUMINAIRE SCHEDULE |             |         |                             |              |         |       |                          |                   |                       |                               |                     |
|--------------------|-------------|---------|-----------------------------|--------------|---------|-------|--------------------------|-------------------|-----------------------|-------------------------------|---------------------|
| FIXTURE            | DESCRIPTION | VOLTAGE | TOTAL<br>FIXTURE<br>WATTAGE | MANUFACTURER | CATALOG | LAMPS | BALLAST/<br>XFMR<br>TYPE | BALLAST<br>FACTOR | CURRENT @<br>STARTING | POWER<br>FACTOR @<br>STARTING | GENERAL<br>LOCATION |



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|   |   |                |                       |   |   |  |  |     |     |     |                |
|---|---|----------------|-----------------------|---|---|--|--|-----|-----|-----|----------------|
| H | LOW VOLTAGE<br>PENDANT<br>FIXTURE<br>MOUNTED ON A<br>FREEJACK<br>SYSTEM |                | TECHLIGHTIN<br>G      | 700FJFIRFHS24 (FIXTURE)   | 1 | 50W<br>HALOGEN BI-<br>PIN                        | ELECTRON<br>IC XFMR                    | N/A | N/A | N/A |                |
| K | CANOPY<br>WHITE LED<br>ENCAPSULATE<br>D LAMPS                           | 120            | BRUCK                 | 13501 (ORION BELT<br><br>D-300WDC (LED DRIVER)<br>70424 (100W XFMR) |   | LED  |  | N/A | N/A | N/A |                |
| L | 10" DIA.<br>RECESSED<br>FLUORESCENT<br>DOWNLIGHT                        | 277            | INFINITY              | PH10-232T-2DIM-CG   | 2 | 32W<br>COMPACT<br>FLUORESCEN<br>T                | ELECTRON<br>IC<br>DIMMING              | N/A | N/A | N/A |                |
| M | 7.5" DIA.<br>INCANDESCEN<br>T DOWNLIGHT                                 | 277            | INFINITY              | R75120-277-CG   | 1 | 120W PAR38                                       | MAGNETIC<br>2 WIRE<br>STEPDOWN<br>XFMR | N/A | N/A | N/A |                |
| N | FLUORESCENT<br>PENDANT  | 120            | DELTALIGHT            | 271-64-21/JETI-LUSTER   | 2 | 54W T5   | ELECTRON<br>IC                         | N/A | N/A | N/A |                |
| T | 6" DIA. METAL<br>HALIDE   | 277            | KIRLIN                | HRR-04050T-43-277   | 1 | 50W METAL<br>HALIDE<br>LOWER<br>WATTAGE<br>PULSE | ELECTRON<br>IC                         | N/A | N/A | N/A |                |
| U | PENDANT<br>FIXTURE  | 120            | DELTALIGHT            | 271-61-21/JETI-S  | 1 | 25W<br>COMPACT<br>FLUORESCEN<br>T                | ELECTRON<br>IC                         | N/A | N/A | N/A |                |
| W | 4' INDUSTRIAL<br>FLUORESCENT<br>STRIP<br>1X4                            | 277            | COLUMBIA              | CSR4232EB8277-CSRWG4-<br>CSHC                                       | 2 | 32W T8   | ELECTRON<br>IC                         | N/A | N/A | N/A | UPS ROOM       |
| X | FLUORESCENT<br>VIRGIN<br>ACRYLIC<br>FIXTURE                             | 277            | LIGHTOLIER            | SPS1GFSVA232277HI   | 2 | 32W T8   | ELECTRON<br>IC                         | N/A | N/A | N/A | DATA<br>CENTER |
| Z | DECORATIVE<br>PENDANT   | 277            | 2 THOUSAND<br>DEGREES | 700TDEMPFS-CF   | 1 | 18W T4   | ELECTRON<br>IC                         | N/A | N/A | N/A |                |
| R | 7.5" DIA.<br>FLUORESCENT<br>SHOWER LIGHT                                | 277            | INFINITY              | PVSL68-113Q277EB  | 1 | 13W TWIN<br>TUBE                                 | ELECTRON<br>IC                         | N/A | N/A | N/A |                |
| S | 9"<br>FLUORESCENT<br>DOWNLIGHT  | MULTI-<br>VOLT | PRESCOLITE            | CFTD970HEB  | 2 | 70W DOUBLE<br>QUAD TUBE                          | ELECTRON<br>IC                         | N/A | N/A | N/A |                |

## Appendix C

### Mechanical Loads

| MECHANICAL<br>EQUIPMENT SCHEDULE |  |  |  |
|----------------------------------|--|--|--|
|                                  |  |  |  |

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| EQUIPMENT<br>TAG | DESCRIPTION               | LOAD     | VOLTAGE<br>& PHASE |
|------------------|---------------------------|----------|--------------------|
| HRU-1            | HEAT RECOVERY UNIT        | 46 HP    | 460V/3-PHASE       |
| HRU-2            | HEAT RECOVERY UNIT        | 46 HP    | 460V/3-PHASE       |
| C-1              | WATER CHILLER             | 257.1 KW | 480V/3-PHASE       |
| C-2              | WATER CHILLER             | 257.1 KW | 480V/3-PHASE       |
| C-3              | WATER CHILLER             | 67.26 KW | 480V/3-PHASE       |
| B-1              | HEATING BOILER            | 74 HP    | 480V/3-PHASE       |
| B-2              | HEATING BOILER            | 74 HP    | 480V/3-PHASE       |
| CT-1             | COOLING TOWER             | 76 HP    | 480V/3-PHASE       |
| CT-2             | COOLING TOWER             | 76 HP    | 480V/3-PHASE       |
| AHU-2-01         | AIR HANDLING UNIT         | 40 HP    | 460V/3-PHASE       |
| AHU-2-02         | AIR HANDLING UNIT         | 40 HP    | 460V/3-PHASE       |
| AHU-3-01         | AIR HANDLING UNIT         | 40 HP    | 460V/3-PHASE       |
| AHU-3-02         | AIR HANDLING UNIT         | 40 HP    | 460V/3-PHASE       |
| AHU-4-01         | AIR HANDLING UNIT         | 50 HP    | 460V/3-PHASE       |
| AHU-4-02         | AIR HANDLING UNIT         | 40 HP    | 460V/3-PHASE       |
| AHU-5-01         | AIR HANDLING UNIT         | 40 HP    | 460V/3-PHASE       |
| AHU-5-02         | AIR HANDLING UNIT         | 25 HP    | 460V/3-PHASE       |
| AHU-6-01         | AIR HANDLING UNIT         | 40 HP    | 460V/3-PHASE       |
| AHU-6-02         | AIR HANDLING UNIT         | 40 HP    | 460V/3-PHASE       |
| EF-1             | EXHAUST FAN               | 2 HP     | 480V/3-PHASE       |
| EF-2             | EXHAUST FAN               | 2 HP     | 480V/3-PHASE       |
| EF-3             | EXHAUST FAN               | 1/6 HP   | 120V/1-PHASE       |
| CAF-1            | COMBUSTION AIR FOR BOILER | 1/3 HP   | 120V/1-PHASE       |
| CAF-2            | COMBUSTION AIR FOR BOILER | 1/3 HP   | 120V/1-PHASE       |
| EF-4             | EXHAUST FAN               | 1.5 HP   | 480V/3-PHASE       |
| EF-5             | EXHAUST FAN               | 1.5 HP   | 480V/3-PHASE       |
| P-1              | COOLING TOWER PUMP        | 40 HP    | 480V/3-PHASE       |
| P-2              | COOLING TOWER PUMP        | 40 HP    | 480V/3-PHASE       |
| P-3              | COOLING TOWER PUMP        | 40 HP    | 480V/3-PHASE       |
| P-4              | CHILLER PUMP              | 30 HP    | 480V/3-PHASE       |
| P-5              | CHILLER PUMP              | 30 HP    | 480V/3-PHASE       |

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|        |  |          |              |
|--------|--|----------|--------------|
| P-6    | CHILLER PUMP   | 30 HP    | 480V/3-PHASE |
| P-7    | SYSTEM CHILLED WATER PUMP                            | 60 HP    | 480V/3-PHASE |
| P-8    | SYSTEM CHILLED WATER PUMP                            | 60 HP    | 480V/3-PHASE |
| P-9    | RETAIL CHILLED WATER PUMP                            | 7.5 HP   | 480V/3-PHASE |
| P-10   | RETAIL CHILLED WATER PUMP                            | 7.5 HP   | 480V/3-PHASE |
| P-11   | HEATING HOT WATER PUMP                               | 7.5 HP   | 480V/3-PHASE |
| P-12   | HEATING HOT WATER PUMP                               | 7.5 HP   | 480V/3-PHASE |
| P-13   | HEATING HOT WATER PUMP                               | 7.5 HP   | 480V/3-PHASE |
| P-14   | SYSTEM HEATING HOT WATER PUMP                        | 25 HP    | 480V/3-PHASE |
| P-15   | SYSTEM HEATING HOT WATER PUMP                        | 25 HP    | 480V/3-PHASE |
| UH-1   | UNIT HEATER  | 1/6 HP   | 120V/1-PHASE |
| UH-2   | UNIT HEATER  | 1/6 HP   | 120V/1-PHASE |
| UH-3   | UNIT HEATER  | 1/6 HP   | 120V/1-PHASE |
| UH-4   | UNIT HEATER  | 1/6 HP   | 120V/1-PHASE |
| UH-5   | UNIT HEATER  | 1/50 HP  | 120V/1-PHASE |
| UH-6   | UNIT HEATER  | 1/6 HP   | 120V/1-PHASE |
| UH-7   | UNIT HEATER  | 1/2 HP   | 120V/1-PHASE |
| UH-8   | UNIT HEATER  | 1/6 HP   | 120V/1-PHASE |
| PF-1   | STAIR & ELEVATOR FAN                                 | 5 HP     | 480V/3-PHASE |
| PF-2   | STAIR & ELEVATOR FAN                                 | 5 HP     | 480V/3-PHASE |
| PF-3   | STAIR & ELEVATOR FAN                                 | 5 HP     | 480V/3-PHASE |
| PF-4   | STAIR & ELEVATOR FAN                                 | 5 HP     | 480V/3-PHASE |
| PF-5   | STAIR & ELEVATOR FAN                                 | 5 HP     | 480V/3-PHASE |
| E      | TOILET ROOMS W/ 1 TOILET CEILING EXHAUST FAN         | 1.4 AMPS | 120V/1-PHASE |
| E-1    | CENTRAL CORE COMMON TOILET ROOMS CEILING EXHAUST FAN | 2.5 AMPS | 120V/1-PHASE |
| FC-111 | FAN COIL   | 5 HP     | 480V/3-PHASE |
| FC-113 | FAN COIL   | 1.5 HP   | 480V/3-PHASE |
| FC-115 | FAN COIL   | 1.5 HP   | 480V/3-PHASE |
| FC-117 | FAN COIL   | 1.5 HP   | 480V/3-PHASE |
| FC-119 | FAN COIL   | 5 HP     | 480V/3-PHASE |
| FC-129 | FAN COIL   | 2 HP     | 480V/3-PHASE |
| FC-131 | FAN COIL   | 3/4 HP   | 480V/3-PHASE |
| FC-133 | FAN COIL   | 1 HP     | 480V/3-PHASE |

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|          |          |        |              |
|----------|----------|--------|--------------|
| FC-135   | FAN COIL | 1.5 HP | 480V/3-PHASE |
| ELEV. #1 | ELEVATOR | 40 HP  | 480V/3-PHASE |
| ELEV. #2 | ELEVATOR | 40 HP  | 480V/3-PHASE |
| ELEV. #3 | ELEVATOR | 40 HP  | 480V/3-PHASE |
| ELEV. #4 | ELEVATOR | 40 HP  | 480V/3-PHASE |
| ELEV. #5 | ELEVATOR | 40 HP  | 480V/3-PHASE |
| ELEV. #6 | ELEVATOR | 40 HP  | 480V/3-PHASE |
| ELEV. #7 | ELEVATOR | 40 HP  | 480V/3-PHASE |

### Appendix D

#### Service Entrance Sizing

| Service Entrance Sizing - Schematic & Conceptual |                              |       |           |           |             |
|--|------------------------------|-------|-----------|-----------|-------------|
| Building Usage Type                              | Demand Power Density (VA/SF) | Floor | Area (SF) | Load (VA) | Load (Amps) |

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|                 |   |                              |        |         |      |
|-----------------|---|------------------------------|--------|---------|------|
| Office Building | 8 | First                        | 27433  | 219464  | 264  |
|                 |   | Second                       | 44243  | 353944  | 426  |
|                 |   | Third                        | 51915  | 415320  | 500  |
|                 |   | Fourth                       | 52192  | 417536  | 502  |
|                 |   | Fifth                        | 53471  | 427768  | 515  |
|                 |   | Sixth                        | 43134  | 345072  | 415  |
|                 |   |                              |        |         |      |
|                 |   | <b>Total</b>                 | 272388 | 2179104 | 2621 |
|                 |   | <b>Total w/ Growth (10%)</b> |        | 2397014 | 2883 |

| <b>Service Entrance Sizing - Design Development</b> |                                     |              |                  |                  |                    |
|---|-------------------------------------|--------------|------------------|------------------|--------------------|
| <b>Load Category</b>                                | <b>Demand Power Density (VA/SF)</b> | <b>Floor</b> | <b>Area (SF)</b> | <b>Load (VA)</b> | <b>Load (Amps)</b> |
| <b>Lighting</b>                                     | 3.5                                 | First        | 27433            | 96016            |                    |
|   |                                     | Second       | 44243            | 154851           |                    |
|   |                                     | Third        | 51915            | 181703           |                    |
|   |                                     | Fourth       | 52192            | 182672           |                    |
|   |                                     | Fifth        | 53471            | 187149           |                    |
|   |                                     | Sixth        | 43134            | 150969           |                    |
|   |                                     | Total        |                  |                  | 953358             |
| <b>Receptacles</b>                                  | 1                                   | First        | 27433            | 27433            |                    |
|   |                                     | Second       | 44243            | 44243            |                    |
|   |                                     | Third        | 51915            | 51915            |                    |
|   |                                     | Fourth       | 52192            | 52192            |                    |
|   |                                     | Fifth        | 53471            | 53471            |                    |
|   |                                     | Sixth        | 43134            | 43134            |                    |
|   |                                     | Total        |                  |                  | 272388             |
|   |                                     |              | 1st 10KVA @ 100% | 10000            |                    |
|   |                                     |              | Remainder @ 50%  | 131194           |                    |
|   |                                     |              | Total            | 141194           | 170                |
| <b>Fans/Pumps</b>                                   | 2                                   | First        | 27433            | 54866            |                    |
|   |                                     | Second       | 44243            | 88486            |                    |
|   |                                     | Third        | 51915            | 103830           |                    |
|   |                                     | Fourth       | 52192            | 104384           |                    |
|   |                                     | Fifth        | 53471            | 106942           |                    |
|   |                                     | Sixth        | 43134            | 86268            |                    |
|   |                                     | Total        |                  |                  | 544776             |



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|                   |   |        |                     |         |      |
|-------------------|---|--------|---------------------|---------|------|
| <b>HVAC/Other</b> | 7 | First  | 27433               | 192031  |      |
|                   |   | Second | 44243               | 309701  |      |
|                   |   | Third  | 51915               | 363405  |      |
|                   |   | Fourth | 52192               | 365344  |      |
|                   |   | Fifth  | 53471               | 374297  |      |
|                   |   | Sixth  | 43134               | 301938  |      |
|                   |   |        |                     |         |      |
|                   |   | Total  |                     | 1906716 | 2293 |
|                   |   |        |                     |         |      |
|                   |   |        | Total               | 3677238 | 4265 |
|                   |   |        | Total w/ 10% Growth | 4044962 | 4865 |

| <b>Service Entrance Sizing - Construction</b> |                            |                         |  |
|---|----------------------------|-------------------------|--|
| <b>Equipment/Panel</b>                        | <b>Connected Load (VA)</b> | <b>Demand Load (VA)</b> | <b>Demand Factor Assumptions</b>             |
| Chiller 1                                     | 498831                     | 399065                  | 0.8  |
| Chiller 2                                     | 498831                     | 399065                  | 0.8  |
| Chiller 3                                     | 103923                     | 83138                   | 0.8  |
| Panel RPA                                     | 66511                      | 64195                   | Assume 78% is lighting and 22% is receptacle |
| Panel RPB                                     | 66511                      | 64195                   | Assume 78% is lighting and 22% is receptacle |
| Panel RPC                                     | 66511                      | 64195                   | Assume 78% is lighting and 22% is receptacle |
| Panel RPD                                     | 66511                      | 64195                   | Assume 78% is lighting and 22% is receptacle |
| Panel RPE                                     | 103923                     | 97492                   | Assume 78% is lighting and 22% is receptacle |
| Panel RPF                                     | 66511                      | 64195                   | Assume 78% is lighting and 22% is receptacle |
| Panel RPG                                     | 66511                      | 64195                   | Assume 78% is lighting and 22% is receptacle |
| Panel RPH                                     | 66511                      | 64195                   | Assume 78% is lighting and 22% is receptacle |
| Panel RPJ                                     | 66511                      | 64195                   | Assume 78% is lighting and 22% is receptacle |
| Panel RPK                                     | 49883                      | 49396                   | Assume 78% is lighting and 22% is receptacle |
| Pump P-1                                      | 29828                      | 23862                   | 0.8  |
| Pump P-2                                      | 29828                      | 23862                   | 0.8  |
| Pump P-3                                      | 29828                      | 23862                   | 0.8  |
| Pump P-4                                      | 22371                      | 17897                   | 0.8  |
| Pump P-5                                      | 22371                      | 17897                   | 0.8  |
| Pump P-6                                      | 22371                      | 17897                   | 0.8  |
| Pump P-9                                      | 5593                       | 4474                    | 0.8  |
| Pump P-10                                     | 5593                       | 4474                    | 0.8  |

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|                   |         |         |  |
|-------------------|---------|---------|--|
| Pump P-11         | 5593    | 4474    | 0.8  |
| Pump P-12         | 5593    | 4474    | 0.8  |
| Pump P-13         | 5593    | 4474    | 0.8  |
| Pump P-14         | 18643   | 14914   | 0.8  |
| Pump P-15         | 18643   | 14914   | 0.8  |
| Pump P-7          | 44742   | 35794   | 0.8  |
| Pump P-8          | 44742   | 35794   | 0.8  |
| CT-1              | 22371   | 17897   | 0.8  |
| CT-2              | 22371   | 17897   | 0.8  |
| PBS-1             | 5593    | 4474    | 0.8  |
| Compactor         | 11186   | 8948    | 0.8  |
| Heating Boiler #1 | 1491    | 1193    | 0.8  |
| Heating Boiler #2 | 1491    | 1193    | 0.8  |
| AHU-2-01          | 29828   | 23862   | 0.8  |
| AHU-2-02          | 29828   | 23862   | 0.8  |
| AHU-3-01          | 29828   | 23862   | 0.8  |
| AHU-3-02          | 29828   | 23862   | 0.8  |
| AHU-4-01          | 29828   | 23862   | 0.8  |
| AHU-4-02          | 29828   | 23862   | 0.8  |
| AHU-5-01          | 29828   | 23862   | 0.8  |
| AHU-5-02          | 29828   | 23862   | 0.8  |
| AHU-6-01          | 29828   | 23862   | 0.8  |
| AHU-6-02          | 29828   | 23862   | 0.8  |
| HRU-1             | 83138   | 66511   | 0.8  |
| HRU-2             | 83138   | 66511   | 0.8  |
| Panel PE          | 83138   | 78993   | Assume 78% is lighting and 22% is receptacle |
| Elevator #1       | 29828   | 25354   | 0.85   |
| Elevator #2       | 29828   | 25354   | 0.85   |
| Elevator #3       | 29828   | 25354   | 0.85   |
| Elevator #4       | 29828   | 25354   | 0.85   |
| Elevator #5       | 29828   | 25354   | 0.85   |
| Elevator #6       | 29828   | 25354   | 0.85   |
| Elevator #7       | 29828   | 25354   | 0.85   |
| PF-1              | 3729    | 2983    | 0.8  |
| PF-2              | 3729    | 2983    | 0.8  |
| PF-3              | 3729    | 2983    | 0.8  |
| PF-4              | 3729    | 2983    | 0.8  |
| PF-5              | 3729    | 2983    | 0.8  |
| Panel EMA         | 83138   | 78993   | Assume 78% is lighting and 22% is receptacle |
| Panel EMB         | 66511   | 64195   | Assume 78% is lighting and 22% is receptacle |
| Panel SDG         | 1662769 | 1484864 | Assume 78% is lighting and 22% is receptacle |
| Panel SDH         | 831384  | 744932  | Assume 78% is lighting and 22% is receptacle |
|                   |         |         |  |

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|  |         |  |
|--|---------|--|
| Total Demand Load                      | 4858391 |  |
| <b>Total Demand Load w/ 10% Growth</b> | 5344230 |  |
| Total Current                          | 5844    |  |
| <b>Total Current w/ 10% Growth</b>     | 6428    |  |

| <b>Service Entrance Size Summary</b> |                        |                       |
|--------------------------------------|------------------------|-----------------------|
| <b>Phase</b>                         | <b>Total Load (VA)</b> | <b>Total Load (A)</b> |
| Conceptual                           | 2397014                | 2883                  |
| Design Development                   | 4044962                | 4865                  |
| Construction                         | 5344230                | 6428                  |
|                                      |                        |                       |
| <b>Actual Equipment</b>              | <b>Transformer</b>     | <b>Switchgear</b>     |
|                                      | 3750000                | 5000                  |