NEW YORK LAW SCHOOL

New Community Facility

185 West Broadway

New York, NY

Technical Assignment 2: Existing Electrical Conditions

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Lighting / Electrical

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Executive Summary

This report describes the electrical distribution systems of New York Law School's New Community Facility. Located in downtown Manhattan, this new building seeks to consolidate the functions of various aging New York Law School structures. The building will house a library, auditoriums, dining areas, classrooms, administrative offices, and a large multi-purpose space. Construction is on schedule for the facility to be finished by August, 2008.

Throughout this report, the loads and distribution equipment are examined in order to gain a better understanding of how the electrical network serves other key building systems. The electrical distribution system is analyzed from the utility company's point of entry all the way to individual pieces of equipment.

The findings show that the electrical system is fairly typical for a structure of its size in New York City. The calculations outlined in this report reveal that the distribution system is reasonably sized for the expected loads.

This report can be found online at http://www.engr.psu.edu/ae/thesis/portfolios/2008/adk165

Power Distribution Systems

1. Drawings

The single line drawing and riser diagram (created by the project engineers) can be found in Appendices L and M, respectively.

2. Summary of Distribution System

Two feeders deliver power to NYLS's New Community Facility from the utility company's transformer vault, each supplying a 4000A switchgear. The two switchgears function independently from one another as radial systems, with no tie breaker to provide redundancy in the case that one system fails. The entire building operates on a 208Y/120V 3P 4W system. The facility has an oil-fueled emergency generator and a UPS battery backup system. Two bus ducts serve the above-grade floors, and one bus duct serves the below-grade floors.

3. Service Entrance

The service entrance is located on level B1 (the first level below grade), at the northern corner of the building (the corner of Broadway and Leonard Street). The transformers are located in an underground vault below Leonard Street. Two feeders, each composed of five 4" conduits travel from the transformers to each switchgear. A plan of the building showing the location of the service entrance can be found in Appendix H.

There appears to be two service entrances upon initial inspection of the electrical plans. This would normally be a violation of the NEC, but the design is actually considered one service entrance according to NEC 230.2:

> A building or other structure served shall be supplied by only one service unless permitted in 230.2(A) through (D). For the purpose of 230.40, Exception No. 2 only, underground set of conductors, 1/0 AWG and larger, running to the same location and connected together at their supply end but not connected together at their load end shall be considered to be supplying one service.

The design meets the requirements to be considered one service entrance: the feeders run underground, the conductors are size 600MCM, both enter the building at the same location, and are both served by the same set of transformers. NEC 230.2(E) also requires identification signs to be installed on each service disconnect with information about the other service disconnect:

> (E) Identification. Where a building or structure is supplied by more than one service, or any combination of branch circuits, feeders, and services, a permanent plaque or directory shall be installed at each service disconnect location denoting all other services, feeders, and branch circuits supplying that building or structure and the area served by each. See 225.37.

This requirement ensures that anybody who disconnects one service entrance is aware that another service entrance must be disconnected before the entire building powers down.

The transformers and vault are provided by the utility company, Con Edison. The National Electric Safety Code regulates this equipment. The rest of the equipment in the building, including the conduit connecting the transformer to the switchgears, is the responsibility of the client, New York Law School, and is regulated by the National Electric Code.

4. Voltage Systems

The building operates at 208Y/120V 3P 4W. There are no major transformers within the building to generate other voltage systems.

Equipment operating at 120V includes:

- Lighting and exit signs
- Receptacles and office equipment (such as copiers)
- Security system
- Water fountains
- Data systems
- AV equipment (such as projectors)
- Motorized window shades
- Smaller kitchen equipment (such as refrigerators, coffee machines)
- Some HVAC equipment (such as small fans and heaters)

Equipment operating at 208V includes:

- Some hot water heaters
- MDF data cabinets
- Larger kitchen equipment (such as ovens, fryers)
- Most HVAC equipment (such as large fans and heaters)
- Most Pumps
- Elevators
- Motors

5. Transformers

Since NYLS's New Community Facility operates at a single voltage, no significant transformers are required within the building. At the service entrance, Con Edison operates four 1000KVA transformers in a vault underneath Leonard Street. Two transformers would likely be sufficient for the building's loads, but Con Edison prefers redundant designs in order to circumvent future problems.

6. Emergency Power Systems

A 700KW oil-fueled generator provides emergency power. The generator, located on level 6, outputs power at 208Y/120V 3P 4W. The emergency generator outputs power to three main loads:

- Fire pump
- Fire alarm system
- Emergency distribution panelboard EM-DS
    - Elevators
    - Some HVAC equipment (to expel smoke)
    - Jockey pump (to maintain pressure in sprinkler system)
    - Panelboards serving emergency lighting and exit signs

When any of these building systems loose regular power, an automatic transfer switch trips and the power source changes to the emergency generator. Power may be down temporarily between the time when the utility service is lost and the generator becomes operational.

The building also has a 130KVA UPS battery system located on level B4 (the lowest level below grade). This system provides backup power to the MDF data room for at least 15 minutes in the event of power loss. This allows data to be backed up before the information systems power down. The UPS system also maintains power for the computer network while the emergency generator starts up. Without the UPS system, the delay between normal and emergency power would cause data to be lost from the computers.

7. Over-current Devices

Fused switches primarily protect electrical equipment in NYLS's New Community Facility. The two main switchboards, the emergency switchboard, elevator distribution panels, emergency distribution panels, normal distribution panels, and the motor control center all use fused switches for overcurrent protection. All fused switch devices rated higher than 800A are bolted pressure switches with KRP-C

type fuses, and all devices under 800A use QMR switches with LRPC fuses. Only panelboards use circuit breakers. The vast majority of panelboards have 125A breakers, but the MDF UPS panels use 150A breakers and the kitchen panels use 200A breakers.

8. Main Electrical Equipment

Main Electrical Equipment						
Tag	Equipment Type	Size	Floor	Room	Room Name	Drawings
SS-A	Switchboard	4000A bus	B1	C100	Switch Gear	EP.SC0
SS-B	Switchboard	4000A bus	B1	C100	Switch Gear	EP.SC0
EM-DS	EM distribution switchboard	3000A bus	L6	605	EM Switchgear	EP.6
EPD-A	EM distribution panel	1200A bus	B1	C100	Switch Gear	EP.SC0
EPP-EL-RA	Elevator distribution panel	600A bus	L6	604	EMR	EP.6
EPP-EL-RB	Elevator distribution panel	600A bus	L6	604	EMR	EP.6
DP-A	Distribution panelboard	2000A bus	B1	C100	Switch Gear	EP.SC0
DP-B	Distribution panelboard	2000A bus	B1	C100	Switch Gear	EP.SC0
DP-2	Distribution panelboard	600A bus	L2	211	Elec.	EP.2, E3.1
DP-3	Distribution panelboard	600A bus	L3	306A	Elec.	EP.3, E3.1
DP-4	Distribution panelboard	600A bus	L4	406A	Elec.	EP.4, E3.1
DP-RA	Distribution panelboard	1200A bus	L6	605	EM Switchgear	EP.6
DP-RB	Distribution panelboard	1200A bus	L6	605	EM Switchgear	EP.6
MCC-R-A	Motor control center	225A bus	L6	603	Mech. Bulkhead	EP.6
EUP-GEN	Emergency generator	700KW	L6	605	EM Switchgear	EP.6
UPS-MDF	UPS	130KVA	B4	C405	MDF	EP.SC3, E3.2
ATS-1	Manual transfer switch	-	B1	?	?	EP.SC0
ATS-2	Automatic transfer switch	70A	B1	?	?	EP.SC0
ATS-3	Automatic transfer switch	800A	B1	?	?	EP.SC0
ATS-4	Automatic transfer switch	400A	L6	?	?	EP.6
ATS-5	Automatic transfer switch	600A	L6	?	?	EP.6
ATS-6	Automatic transfer switch	600A	L6	?	?	EP.6
ATS-7	Automatic transfer switch	100A	L6	?	?	EP.6

The schedule of lighting and appliance panelboards is located in Appendix A.

9. Power Factor Correction

No capacitors for power factor correction are located in the building. The inductive loads in the building are not sufficient to justify the use of power factor correction devices.

10. Design Issues

The building's electrical design is fairly typical for a building of its size in New York. Two switchgears and service entrance feeders were used in order to reduce the size of this equipment. Because the system is 208Y/120V rather than 480Y/277V, equipment increases in size rather quickly. The service entrance and main switchgear placement within the building was dictated by the location of Con Edison's existing distribution network.

11. Lighting Loads

Fluorescent lighting dominates NYLS's New Community Facility, but LEDs and incandescent sources also appear throughout the building. Many different fluorescent fixture types are used throughout the building's spaces. These fluorescent sources provide the vast majority of general lighting. Low-voltage halogen sources provide highlights and accents in special spaces, and the LEDs create a dynamic experience at the building's exterior and main entry lobby with color-changing capability. High starting current due to HID ballasts is not an issue, since only one type of 39W metal halide luminaire is used sparingly in the building. Ballast product choices were assumed; the specifications list several acceptable manufacturers. Assumptions were based upon input watts listed in the luminaire schedule. The specifications for the HID and LED ballasts can be found in Appendices J and K, and the full schedule of lighting loads is located in Appendix B.

ASHRAE 90.1 requires a means of automatic shutoff throughout the building. This is accomplished through the use of relay panels controlled by an astronomical time clock, integrated into the building management system. The time clock system operates 365 days a year, with daily and weekly schedules of on/off events. The lights blink as a warning five minutes prior to an "off" event. The lighting can be turned on for two-hour periods during off hours via a manual override switch or through a phone-activated dial-up control.

12. Mechanical and Other Loads

No architectural equipment loads of significant size are listed in the building's electrical documentation. Minor equipment not documented includes water fountains and motorized window shades.

The full schedule of mechanical, plumbing, kitchen, and vertical transportation loads can be found in Appendices C through F. Power factors were estimated, based on the assumption that larger motors tend to have higher power factors.

13. Service Entrance Size

(A) Square Foot Method

Category	Value
Building type	Classroom (8VA/ft^2) / College Lab (15VA/ft^2)
Category estimate	11.5VA per ft^2
Building area	207,192 ft^2
Total KVA estimate	2383 KVA
Total current at 208V	11,455 A
Service entrance size	12,000 A

(B) Square Foot and Actual Loads

Equipment System	Allowance	Total KVA
Receptacles	1VA per ft^2	207 KVA
Fans and pumps	2VA per ft^2	414 KVA
Heating and cooling	7VA per ft^2	1450 KVA
Lighting[1]	2VA per ft^2	414 KVA
Computers[2]	-	10 KVA
Kitchen[3]	-	156 KVA
Elevators[3]	-	176 KVA
Total KVA	2827 KVA	
Total current at 208V	13,591 A	
Service entrance size	15,000 A	

[1] Based on NEC 220.12, average of school (3VA/ft^2) and auditorium (1VA/ft^2)

[2] Computer loads are based on MDF room panel sizes

[3] Kitchen and elevator loads are based on individual calculations in the equipment schedule

(C) Actual Loads

Summary of Service Entrance Size Calculation Using Actual Loads			
Load Category	Demand Factor	Connected Load	Demand Load
Panelboards (including lighting, receptacles, kitchen)	Already calculated by engineers[1]	996 KVA	713 KVA
Largest motor	1.25[2]	71 KVA	89 KVA
All other mechanical equipment	1.00[2]	389 KVA	389 KVA
Elevators	0.77[3]	176 KVA	136 KVA
Additional kitchen equipment	0.65[4]	27 KVA	17.5 KVA
Fire pump	1.25[5]	30 KVA	37 KVA
Fire alarm system	1.00[5]	21 KVA	21 KVA
UPS rectifier input	1.00	104 KVA	104 KVA
Total KVA		1814 KVA	1507 KVA
Total current at 208V		8721 A	7243 A
Total current (with 10% growth)		9593 A	7967 A
Service entrance size			10,000 A

[1] Demand loads for panelboards are listed on the schedules

[2] Demand factor of 1.25 for largest motor, 1.00 for all others

[3] Elevator demand factor based on NEC 620.14 (7 elevators)

[4] Kitchen demand factor based on NEC 220.56

[5] Fire pump and other fire protection equipment demand factors based on NEC 695.6(C)

The table listing the full break-down of calculations used for this method can be found in Appendix G.

(D) Comparison of Estimates and Calculations to Actual Design

Sizing Method	Service Entrance Size
Square foot method	12,000 A
Square foot and actual loads	15,000 A
Actual loads	10,000 A
Actual design	2x4000 A = 8000 A

This summary shows that the calculation of service entrance from actual building loads yielded a result close to the actual design. The actual design is not necessarily the “correct” answer, since numerous design factors may have influenced the service entrance size. The owner’s desire for future expansion or lack thereof, or a goal to reduce costs may have played an important role in the real design. The “square foot and actual loads” estimate may have be high because no demand factors were used in the calculations.

14. Utility Company Information

Con Edison
Cooper Station
P.O. Box 138
New York, NY 10276-0138
1-800-752-6633 (1-800-75-CONED)
www.conedison.com

NYLS's New Community Facility is considered a "large" customer since power requirements exceed 10KW. In Manhattan, there are three possible rate structures under this category:

- Category I: Non time-of-day rate for customers under 1500KW demand
- Category II: Mandatory time-of-day rate for customers over 1500KW demand
- Category III: Voluntary time-of-day rate for customers under 1500KW demand

Based upon load calculations in this report, the facility will most likely fall into category II once the building becomes operational. Because the building receives power at 208V, the service is considered low tension. The table below summarizes the current standard rate structure for this, and the Con Edison document is attached as Appendix I. Con Edison allows customers to shop for energy providers, but at this time it is not known whether or not New York Law School will explore these options.

Con Edison – Manhattan – Large Customer – Rate II – Low Tension – Effective 4/1/07

Demand charge		
Month	Time Period	Cost per KW Demand
June to September	Mon – Fri, 8AM – 6PM	$5.71
	Mon – Fri, 8AM – 10PM	$10.80
	All other hours / days	$10.66
October to May	Mon – Fri, 8AM – 10PM	$7.93
	All other hours / days	$3.45
Energy delivery charge		
All months	All hours / days	Cost per KWH: 0.55 cents

Communication Systems

Fire Alarm System

The fire alarm system is normally powered by its own feeder from SS-B. If power is lost, automatic transfer switch ATS#2 switches the power source to the emergency generator. This system includes sensors, audible and visual alarms, and manual pull boxes located throughout the building. The central control and monitoring station is located at the information/security desk in the main lobby on level 1. The transfer switch is located on level B1.

Information Technology System

This system provides communications both within the building and through the internet. Data jacks are located throughout the building, to provide service for computers, phones, and AV equipment. The central control area is the MDF (main distribution frame) room on level B4, where computer servers are stored. Every floor also has an IDF (intermediate distribution frame) room.

Security System

The security system includes video cameras, door exit alarms, card readers, and intercom stations located throughout the building. Control and monitors are located primarily at the information/security desk in the main lobby on level 1.

Appendix

Appendix A: Lighting and Appliance Panelboards / Load Centers							
Tag	Voltage System	Bus Size	Breaker Size	Floor	Room	Room Name	Drawings
UP-B4-A	208Y/120V 3P 4W	225A	125A	B4	C406B	Elec.	EP.SC3
UP-B4-B	208Y/120V 3P 4W	225A	125A	B4	C406B	Elec.	EP.SC3
UP-B4-C	208Y/120V 3P 4W	225A	125A	B4	C406B	Elec.	EP.SC3
UP-B4-D	208Y/120V 3P 4W	225A	125A	B4	C406B	Elec.	EP.SC3
UP-B3-A	208Y/120V 3P 4W	225A	125A	B3	C317B	Elec.	EP.SC2
UP-B3-B	208Y/120V 3P 4W	225A	125A	B3	C317B	Elec.	EP.SC2
UP-B3-C	208Y/120V 3P 4W	225A	125A	B3	C317B	Elec.	EP.SC2
UP-B3-D	208Y/120V 3P 4W	225A	125A	B3	C317B	Elec.	EP.SC2
UP-B2-A	208Y/120V 3P 4W	225A	125A	B2	C223B	Elec.	EP.SC1
UP-B2-B	208Y/120V 3P 4W	225A	125A	B2	C223B	Elec.	EP.SC1
UP-B2-C	208Y/120V 3P 4W	225A	125A	B2	C223B	Elec.	EP.SC1
UP-B2-D	208Y/120V 3P 4W	225A	125A	B2	C223B	Elec.	EP.SC1
UP-B1-A	208Y/120V 3P 4W	225A	125A	B1	C114B	Elec.	EP.SC0
UP-B1-B	208Y/120V 3P 4W	225A	125A	B1	C114B	Elec.	EP.SC0
UP-B1-C	208Y/120V 3P 4W	225A	125A	B1	C114B	Elec.	EP.SC0
UP-B1-D	208Y/120V 3P 4W	225A	125A	B1	C114B	Elec.	EP.SC0
UP-1-A	208Y/120V 3P 4W	225A	125A	L1	106A	Elec.	EP.1
UP-1-B	208Y/120V 3P 4W	225A	125A	L1	106A	Elec.	EP.1
UP-1-C	208Y/120V 3P 4W	225A	125A	L1	106A	Elec.	EP.1
UP-1-D	208Y/120V 3P 4W	225A	125A	L1	106A	Elec.	EP.1
UP-2-A	208Y/120V 3P 4W	225A	125A	L2	211A	Elec.	EP.2
UP-2-B	208Y/120V 3P 4W	225A	125A	L2	211A	Elec.	EP.2
UP-2-C	208Y/120V 3P 4W	225A	125A	L2	211A	Elec.	EP.2
UP-2-D	208Y/120V 3P 4W	225A	125A	L2	211A	Elec.	EP.2
UP-3-A	208Y/120V 3P 4W	225A	125A	L3	306A	Elec.	EP.3
UP-3-B	208Y/120V 3P 4W	225A	125A	L3	306A	Elec.	EP.3
UP-3-C	208Y/120V 3P 4W	225A	125A	L3	306A	Elec.	EP.3
UP-3-D	208Y/120V 3P 4W	225A	125A	L3	306A	Elec.	EP.3
UP-4-A	208Y/120V 3P 4W	225A	125A	L4	406A	Elec.	EP.4
UP-4-B	208Y/120V 3P 4W	225A	125A	L4	406A	Elec.	EP.4
UP-4-C	208Y/120V 3P 4W	225A	125A	L4	406A	Elec.	EP.4
UP-4-D	208Y/120V 3P 4W	225A	125A	L4	406A	Elec.	EP.4
UP-5-A	208Y/120V 3P 4W	225A	125A	L5	513A	Elec.	EP.5
UP-5-B	208Y/120V 3P 4W	225A	125A	L5	513A	Elec.	EP.5
UP-5-C	208Y/120V 3P 4W	225A	125A	L5	513A	Elec.	EP.5
UP-5-D	208Y/120V 3P 4W	225A	125A	L5	513A	Elec.	EP.5
UP-R	208Y/120V 3P 4W	225A	125A	L6	605	EM Switchgear	EP.6
UP-1-MDF	208Y/120V 3P 4W	225A	150A	B4	C405	MDF	EP.SC3
UP-2-MDF	208Y/120V 3P 4W	225A	150A	B4	C405	MDF	EP.SC3

Appendix A: Lighting and Appliance Panelboards / Load Centers (Continued)							
Tag	Voltage System	Bus Size	Breaker Size	Floor	Room	Room Name	Drawings
UP-3-MDF	208Y/120V 3P 4W	225A	150A	B4	C405	MDF	EP.SC3
UP-KA	208Y/120V 3P 4W	225A	200A	L5	509	Servery	EP.5, EP.5K
UP-KB	208Y/120V 3P 4W	225A	200A	L5	509	Servery	EP.5, EP.5K
EUP-B3	208Y/120V 3P 4W	225A	125A	B3	C317B	Elec.	EP.SC2
EUP-B1	208Y/120V 3P 4W	225A	125A	B1	C114B	Elec.	EP.SC0
EUP-1	208Y/120V 3P 4W	225A	125A	L1	106A	Elec.	EP.1
EUP-2	208Y/120V 3P 4W	225A	125A	L2	211A	Elec.	EP.2
EUP-4	208Y/120V 3P 4W	225A	125A	L4	406A	Elec.	EP.4
EUP-R	208Y/120V 3P 4W	225A	125A	L6	605	EM Switchgear	EP.6

Appendix B: Lighting Loads										
Tag	Lamp Type	Lamps and Wattage	Ballast	Ballast Type	Input Volts	Input Watts	Ballast Factor	Current	Starting Current	PF
A	MR16	(1) 20W	None	-	12V	20W	-	0.17A	-	1.00
A1	PL-T CFL	(1) 32W	Advance ICF-2S26-H1-LD	Electronic PS	120V	36W	0.98	0.31A	-	0.98
A2	MR16	(1) 50W	None	-	12V	50W	-	0.42A	-	1.00
A3	MR16	(1) 50W	None	-	12V	50W	-	0.42A	-	1.00
A4	MR16	(1) 50W	None	-	12V	50W	-	0.42A	-	1.00
CC	Cold Cathode	-	National Cathode LST-200mA	Dimmable	120V	11.7W per ft	-	0.23A per ft	-	0.42
F	PL-L CFL	(2) 40W	Advance RCN-3TTP40-SC	Electronic IS	120V	78W	0.97	0.66	-	0.99
F1	T8	(1) 32W	Advance REL-1P32-SC	Electronic IS	120V	32W	0.92	0.28	-	0.98
F2	PL-T CFL	(1) 32W	Advance ICF-2S26-H1-LD	Electronic PS	120V	36W	0.98	0.31A	-	0.98
F3	T8	(1) per cross section[1]	Advance REL-X-X Series	Electronic IS	120V	Varies[1]	0.92 – 1.06	Varies[1]	-	>0.93
F4	PL-T CFL	(1) 32W	Advance ICF-2S26-H1-LD	Electronic PS	120V	36W	0.98	0.31A	-	0.98
F5	T5	(1) per cross section[1]	Advance ICN-X Series	Electronic PS	120V	Varies[1]	1.00 – 1.07	Varies[1]	-	>0.98
F6	T5	(10) 28W	(5) Lutron ECO-T528-120-2	Electronic Dimmable	120V	330W	1.00	2.75A	<35A	>0.95
F6A	T5	(2) 14W, (8) 28W	(5) Lutron ECO-10 Series	Electronic Dimmable	120V	302W	1.00	2.52A	<35A	>0.95
F6B	T5	(8) 28W	(4) Lutron ECO-T528-120-2	Electronic Dimmable	120V	264W	1.00	2.20A	<28A	>0.95
F6C	T5	(6) 28W	(3) Lutron ECO-T528-120-2	Electronic Dimmable	120V	198W	1.00	1.65A	<21A	>0.95
F7	T5	(1) per cross section[1]	Advance ICN-X Series	Electronic PS	120V	Varies[1]	1.00 – 1.07	Varies[1]	-	>0.98
F8	PL-T CFL	(2) 32W	Advance ICF-2S42-M2-LD	Electronic PS	120V	68W	0.98	0.57A	-	0.98
F9	T5	(1) per cross section[1]	Advance ICN-X Series	Electronic PS	120V	Varies[1]	1.00 – 1.07	Varies[1]	-	>0.98
F10	T5	(2) per cross section[1]	Advance ICN-X Series	Electronic PS	120V	Varies[1]	1.00 – 1.07	Varies[1]	-	>0.98
F10A	T5	(1) per cross section[1]	Advance ICN-X Series	Electronic PS	120V	Varies[1]	1.00 – 1.07	Varies[1]	-	>0.98

Appendix B: Lighting Loads (Continued)										
Tag	Lamp Type	Lamps and Wattage	Ballast	Ballast Type	Input Volts	Input Watts	Ballast Factor	Current	Starting Current	PF
F11	T5	(4) 14W	(2) Advance ICN-2S28	Electronic PS	120V	68W	1.06	0.58A	-	0.98
F12	T8	(1) per cross section[1]	Advance REL-X-X Series	Electronic IS	120V	Varies[1]	0.92 – 1.06	Varies[1]	-	>0.93
F13	T5	(1) per cross section[1]	Advance ICN-X Series	Electronic PS	120V	Varies[1]	1.00 – 1.07	Varies[1]	-	>0.98
F14	T5	(1) per cross section[1]	Advance ICN-X Series	Electronic PS	120V	Varies[1]	1.00 – 1.07	Varies[1]	-	>0.98
F15	T5	(1) per cross section[1]	Lutron ECO-10 Series	Electronic Dimmable	120V	Varies[1]	1.00	Varies[1]	<7A per ballast	>0.95
F16	T5	(4) 21W	(2) Advance ICN-2S28	Electronic PS	120V	96W	1.02	0.80A	-	0.98
F17	T8	(1) 32W	Advance REL-1P32-SC	Electronic IS	120V	32W	0.92	0.28	-	0.98
F17A	T8	(2) 32W	Advance REL-3P32-SC	Electronic IS	120V	65W	1.03	0.54A	-	0.99
F18	T5, MR16	(2) 21W T5, (3) 50W MR16	Lutron E-3-T521-C-120-2	Electronic Dimmable	12V, 120V	152W	1.00	1.26A	<7A	>0.95
F19	T5	(2) per cross section[1]	Lutron ECO-10 Series	Electronic Dimmable	120V	Varies[1]	1.00	Varies[1]	<7A per ballast	>0.95
F19A	T5	(2) per cross section[1]	Lutron Eco-10 Series	Electronic Dimmable	120V	Varies[1]	1.00	Varies[1]	<7A per ballast	>0.95
F20	T5	(2) per cross section[1]	Lutron Eco-10 Series	Electronic Dimmable	120V	Varies[1]	1.00	Varies[1]	<7A per ballast	>0.95
F21	PL-L CFL	(1) 50W	Advance REL-1TTS50	Electronic RS	120V	54W	0.98	0.46A	-	0.98
F22	PL-L CFL	(3) 40W	Advance RCN-3TTP40-SC	Electronic IS	120V	103W	0.86	0.88A	-	0.99
F23	T5	(4) 25W	(2) Advance ICN-2S28	Electronic PS	120V	96W	1.02	0.80A	-	0.98
F24	T8	(6) 32W	(2) Advance REL-3P32-HL-SC	Electronic IS	120V	222W	1.19	1.86A	-	0.98
F25	T5, MR16	(1) 21W T5, (2) 50W MR16	Lutron E-3-T521-C-120-1	Electronic Dimmable	12V, 120V	130W	1.00	1.08A	<7A	>0.95
F25A	T5, MR15	(1) 14W T5, (2) 50W MR16	Lutron E-3-T514-C-120-1	Electronic Dimmable	12V, 120V	120W	1.00	1.00A	<7A	>0.95
F26	T8	(6) 32W	(2) Advance REL-3P32-HL-SC	Electronic IS	120V	222W	1.19	1.86A	-	0.98
F27	PL-T CFL	(2) 32W	Advance ICF-2S42-M2-LD	Electronic PS	120V	68W	0.98	0.57A	-	0.98
F29	PL-L CFL	(2) 50W	Advance REL-2TTS50	Electronic RS	120V	106W	0.98	0.90A	-	0.98

Appendix B: Lighting Loads (Continued)										
Tag	Lamp Type	Lamps and Wattage	Ballast	Ballast Type	Input Volts	Input Watts	Ballast Factor	Current	Starting Current	PF
F29A	PL-L CFL	(2) 40W	Advance RCN-3TTP40-SC	Electronic IS	120V	78W	0.97	0.66A	-	0.99
F32	T5, MR16	(2) 21W T5, (1) 50W MR16	Lutron E-3-T521-C-120-2	Electronic Dimmable	12V, 120V	102W	1.00	0.85A	<7A	>0.95
F33	T5	(1) 28W	Advance ICN-2S28	Electronic PS	120V	33W	1.04	0.28A	-	0.98
F34	PL-T CFL	(1) 42W	Lutron FBD-T418-120-1-S	Electronic Dimmable	120V	43W	>0.95	0.36A	<7A	>0.95
F35	T8	(2) 32W	Advance REL-3P32-SC	Electronic IS	120V	65W	1.03	0.54A	-	0.99
F37	T5	(4) 28W	(2) Lutron ECO-T528-120-2	Electronic Dimmable	120V	132W	1.00	1.10A	<14A	>0.95
F38	T5HO	(4) 54W	(2) Lutron ECO-T554-120-2	Electronic Dimmable	120V	264W	1.00	2.20A	<14A	>0.95
F39	T5	(2) 21W	Advance ICN-2S28	Electronic PS	120V	48W	1.02	0.40A	-	0.98
F40	T5	(2) 21W	Advance ICN-2S28	Electronic PS	120V	48W	1.02	0.40A	-	0.98
FA	PL-T CFL	(1) 42W	Advance ICF-2S26-H1-LD	Electronic PS	120V	46W	0.98	0.38A	-	0.98
FA1	PL-T CFL	(1) 26W	Advance ICF-2S26-H1-LD	Electronic PS	120V	29W	1.10	0.24A	-	0.98
FA2	PL-T CFL	(1) 42W	Lutron FBD-T418-120-1-S	Electronic Dimmable	120V	43W	>0.95	0.36A	<7A	>0.95
FB	PL-T CFL	(1) 32W	Lutron FBD-T432-120-1-S	Electronic Dimmable	120V	37W	>0.95	0.31A	<7A	>0.95
FB1	PL-T CFL	(1) 26W	Advance ICF-2S26-H1-LD	Electronic PS	120V	29W	1.10	0.24A	-	0.98
FB2	PL-T CFL	(1) 32W	Advance ICF-2S26-H1-LD	Electronic PS	120V	36W	0.98	0.31A	-	0.98
FB3	PL-T CFL	(1) 32W	Lutron FBD-T432-120-1-S	Electronic Dimmable	120V	37W	>0.95	0.31A	<7A	>0.95
FC	T8	(1) per cross section[1]	Lutron ECO-10 Series	Electronic Dimmable	120V	Varies[1]	>0.85	Varies[1]	<7A per ballast	>0.95
FC1	T8	(1) per cross section[1]	Advance REL-X-X Series	Electronic IS	120V	Varies[1]	0.92 – 1.06	Varies[1]	-	>0.93
FD	PL-T CFL	(1) 32W	Advance ICF-2S26-H1-LD	Electronic PS	120V	36W	0.98	0.31A	-	0.98
FJ	PL-T CFL	(1) 32W	Advance ICF-2S26-H1-LD	Electronic PS	120V	36W	0.98	0.31A	-	0.98
FJ1	PL-T CFL	(1) 32W	Advance ICF-2S26-H1-LD	Electronic PS	120V	36W	0.98	0.31A	-	0.98

Appendix B: Lighting Loads (Continued)										
Tag	Lamp Type	Lamps and Wattage	Ballast	Ballast Type	Input Volts	Input Watts	Ballast Factor	Current	Starting Current	PF
FK	T8	(2) 32W	Advance REL-3P32-SC	Electronic IS	120V	65W	1.03	0.54A	-	0.99
FS	T8	(2) 32W	Advance REL-3P32-SC	Electronic IS	120V	65W	1.03	0.54A	-	0.99
FS1	T5HO	(1) 54W	Advance ICN4S5490C2LS	Electronic PS	120V	62W	0.99	0.52A	-	0.98
FS2	T5	(1) per cross section[1]	Advance ICN-X Series	Electronic PS	120V	Varies[1]	1.00 – 1.07	Varies[1]	-	>0.98
FT	PL-L CFL	(1) 13W	Integral	-	-	-	-	-	-	-
FT1	T5	(1) per cross section[1]	Advance ICN-X Series	Electronic PS	120V	Varies[1]	1.00 – 1.07	Varies[1]	-	>0.98
FW1	T8	(1) per cross section[1]	Advance REL-X-X Series	Electronic IS	120V	Varies[1]	0.92 – 1.06	Varies[1]	-	>0.93
FW2	T8	(2) per cross section[1]	Advance REL-X-X Series	Electronic IS	120V	Varies[1]	0.92 – 1.06	Varies[1]	-	>0.93
FW3	T5	(1) per cross section[1]	Advance ICN-X Series	Electronic PS	120V	Varies[1]	1.00 – 1.07	Varies[1]	-	>0.98
FW5	T5	(1) per cross section[1]	Lutron Eco-10 Series	Electronic Dimmable	120V	Varies[1]	1.00	Varies[1]	<7A per ballast	>0.95
FW6	T5	(1) per cross section[1]	Advance ICN-X Series	Electronic PS	120V	Varies[1]	1.00 – 1.07	Varies[1]	-	>0.98
FW7	T5	(1) per cross section[1]	Advance ICN-X Series	Electronic PS	120V	Varies[1]	1.00 – 1.07	Varies[1]	-	>0.98
FW8	T5	(1) per cross section[1]	Advance ICN-X Series	Electronic PS	120V	Varies[1]	1.00 – 1.07	Varies[1]	-	>0.98
L1	RGB LED	-	Color Kinetics PDS-500e[2]	-	24V DC	12W per ft	-	-	-	-
L1A	RGB LED	-	Color Kinetics PDS-500e[2]	-	24V DC	30W per ft	-	-	-	-
L2	RGB LED	-	Color Kinetics PDS-500e[2]	-	24V DC	8W per ft	-	-	-	-
L3	RGB LED	-	Color Kinetics PDS-500e[2]	-	24V DC	8W per ft	-	-	-	-
OD	PL-L CFL	(1) 50W	Advance REL-1TTS50	Electronic RS	120V	54W	0.98	0.46A	-	0.98
OD1	PL-T CFL	(1) 42W	Advance ICF-2S26-H1-LD	Electronic PS	120V	46W	0.98	0.38A	-	0.98
S	PL-S CFL	(1) 9W	Advance RMB-1P13-S2-H	Electronic IS	120V	10W	1.05	0.09A	-	0.95
T	MR16	(1) 50W	None	-	12V	50W	-	0.42A	-	1.00
T1	MR15	(1) 50W	None	-	12V	50W	-	0.42A	-	1.00

Appendix B: Lighting Loads (Continued)										
Tag	Lamp Type	Lamps and Wattage	Ballast	Ballast Type	Input Volts	Input Watts	Ballast Factor	Current	Starting Current	PF
T2	MH PAR30	(1) 39W	Advance RMH-39-K	Electronic	120V	45W	1.00	0.40A	-	0.90
EX	LED	-	-	-	-	5W	-	-	-	-
EX1	LED	-	-	-	-	5W	-	-	-	-

[1] Fixture length, lamp size, and lamp quantity depends on architectural conditions.

[2] Color Kinetics PDS-500e units supply data and power to the LED fixtures. Each PDS-500e powers up to 500 watts of LEDs. The PDS-500e receives power at 115V AC, and outputs power to the fixtures at 24V DC. Each unit draws 7A of current, and includes integrated power factor correction.

Appendix C: Mechanical Equipment Loads									
Tag	Description	Manufacturer / Model	Load	Amps[1]	Volts	Ph	PF[2]	KVA	KW
AC-B4-1	Water-cooled packaged A/C	Mammoth VVW-484	20HP	59.4	208V	3P	0.8	12.4	17.1
AC-B3-1	Water-cooled packaged A/C	Mammoth VVW-484	20HP	59.4	208V	3P	0.8	12.4	17.1
AC-B2-1	Water-cooled packaged A/C	Mammoth VVW-484	20HP	59.4	208V	3P	0.8	12.4	17.1
AC-B2-2	Water-cooled packaged A/C	Mammoth VVW-202	5HP	16.7	208V	3P	0.7	3.5	4.2
AC-B1-1	Water-cooled packaged A/C	Mammoth VVW-503	15HP	46.2	208V	3P	0.8	9.6	13.3
AC-B1-2	Water-cooled packaged A/C	Carrier 50VQL240	1.5HP	6.6	208V	3P	0.7	1.4	1.7
AC-B1-3	Water-cooled packaged A/C	Clim. Master GRHO19	0.5HP	2.4	208V	3P	0.5	0.5	0.4
AC-1-1	Water-cooled packaged A/C	Mammoth VVW-383	20HP	59.4	208V	3P	0.8	12.4	17.1
AC-1-2	Water-cooled packaged A/C	Mammoth VVW-202	5HP	16.7	208V	3P	0.7	3.5	4.2
AC-2-1	Water-cooled packaged A/C	Mammoth VVW-242	10HP	30.8	208V	3P	0.75	6.4	8.3
AC-2-2	Water-cooled packaged A/C	Mammoth VVW-463	20HP	59.4	208V	3P	0.8	12.4	17.1
AC-2-3	Water-cooled packaged A/C	Mammoth VVW-282	10HP	30.8	208V	3P	0.75	6.4	8.3
AC-2-4	Water-cooled packaged A/C	Mammoth VVW-202	5HP	16.7	208V	3P	0.7	3.5	4.2
AC-3-1	Water-cooled packaged A/C	Mammoth VVW-282	10HP	30.8	208V	3P	0.75	6.4	8.3
AC-3-2	Water-cooled packaged A/C	Mammoth VVW-282	10HP	30.8	208V	3P	0.75	6.4	8.3
AC-3-3	Water-cooled packaged A/C	Mammoth VVW-202	5HP	16.7	208V	3P	0.7	3.5	4.2
AC-3-4	Water-cooled packaged A/C	Mammoth VVW-202	5HP	16.7	208V	3P	0.7	3.5	4.2
AC-4-1	Water-cooled packaged A/C	Mammoth VVW-282	10HP	30.8	208V	3P	0.75	6.4	8.3
AC-4-2	Water-cooled packaged A/C	Mammoth VVW-282	10HP	30.8	208V	3P	0.75	6.4	8.3
AC-4-3	Water-cooled packaged A/C	Mammoth VVW-202	5HP	16.7	208V	3P	0.7	3.5	4.2
AC-4-4	Water-cooled packaged A/C	Mammoth VVW-202	5HP	16.7	208V	3P	0.7	3.5	4.2
AC-5-1	Water-cooled packaged A/C	Mammoth VVW-766	20HP	59.4	208V	3P	0.8	12.4	17.1
AC-5-2	Water-cooled packaged A/C	Mammoth VVW-202	5HP	16.7	208V	3P	0.7	3.5	4.2
AC-6-1	Water-cooled packaged A/C	Mammoth VVW-1448	60HP	169.0	208V	3P	0.85	35.2	51.8
AC-6-2	Water-cooled packaged A/C	Carrier 50RHS060	0.75HP	3.5	208V	3P	0.6	0.7	0.8
AC-6-3	Water-cooled packaged A/C	Carrier 50VQL160	1.5HP	6.6	208V	3P	0.7	1.4	1.7
AC-6-4	Water-cooled packaged A/C	Carrier 50RHS042	0.5HP	2.4	208V	3P	0.5	0.5	0.4
CRAC-B4-1	Water-cooled packaged A/C	Liebert DH 267W	7.5HP	24.2	208V	3P	0.7	5.0	6.1
CRAC-B4-2	Water-cooled packaged A/C	Liebert DH 267W	7.5HP	24.2	208V	3P	0.7	5.0	6.1
EF-B4-1	Exhaust fan	Penn-Zepyr Z14-TDA	0.5HP	9.8	115V	1P	0.5	1.1	0.6
EF-B4-2	Exhaust fan	Penn-Zepyr Z8H-TDA	132W	4.4	115V	1P	0.5	0.5	0.3
EF-B3-1	Exhaust fan	Penn-Zepyr Z14-TDA	0.5HP	9.8	115V	1P	0.5	1.1	0.6
EF-B3-2	Exhaust fan	Penn-Zepyr Z8H-TDA	132W	4.4	115V	1P	0.5	0.5	0.3
EF-B2-1	Exhaust fan	Penn-Zepyr Z14-TDA	0.5HP	9.8	115V	1P	0.5	1.1	0.6
EF-B2-2	Exhaust fan	Penn-Zepyr Z8H-TDA	132W	4.4	115V	1P	0.5	0.5	0.3
EF-B2-3	Exhaust fan	Penn-Zepyr Z8H-TDA	132W	4.4	115V	1P	0.5	0.5	0.3
RF-B2-1	Return fan	Twin City 182	5HP	16.7	208V	3P	0.7	3.5	2.4
EF-B1-1	Exhaust fan	Penn-Zepyr Z14-TDA	0.5HP	9.8	115V	1P	0.5	1.1	0.6
EF-B1-2	Exhaust fan	Twin City 150	3HP	10.6	208V	3P	0.7	2.2	1.5
EF-1-1	Exhaust fan	Penn-Zepyr Z14-TDA	0.5HP	9.8	115V	1P	0.5	1.1	0.6
EF-1-2	Exhaust fan	Penn-Zepyr Z8H-TDA	132W	4.4	115V	1P	0.5	0.5	0.3
EF-1-3	Exhaust fan	Twin City 150	3HP	10.6	208V	3P	0.7	2.2	2.7
EF-1-4	Exhaust fan	Twin City 122	1.5HP	6.6	208V	3P	0.7	1.4	1.7

Appendix C: Mechanical Equipment Loads (Continued)									
Tag	Description	Manufacturer / Model	Load	Amps[1]	Volts	Ph	PF[2]	KVA	KW
EF-2-1	Exhaust fan	Penn-Zepyr Z14-TDA	0.5HP	9.8	115V	1P	0.5	1.1	0.6
EF-2-2	Exhaust fan	Twin City 330	3HP	10.6	208V	3P	0.7	2.2	2.7
RF-2-1	Return fan	Twin City 200	5HP	16.7	208V	3P	0.7	3.5	4.2
TX-2-1	Toilet exhaust fan	Twin City 330	3HP	10.6	208V	3P	0.7	2.2	2.7
EF-3-1	Exhaust fan	Penn-Zepyr Z14-TDA	0.5HP	9.8	115V	1P	0.5	1.1	0.6
EF-4-1	Exhaust fan	Penn-Zepyr Z14-TDA	0.5HP	9.8	115V	1P	0.5	1.1	0.6
EF-5-1	Exhaust fan	Penn-Zepyr Z14-TDA	0.5HP	9.8	115V	1P	0.5	1.1	0.6
EF-5-2	Exhaust fan	Penn-Zepyr Z8H-TDA	132W	4.4	115V	1P	0.5	0.5	0.3
EF-6-1	Exhaust fan	Twin City 300	5HP	16.7	208V	3P	0.7	3.5	4.2
EF-6-2	Exhaust fan	Twin City 182	1HP	4.6	208V	3P	0.7	1.0	1.2
EF-6-3	Exhaust fan	Twin City 182	1.5HP	6.6	208V	3P	0.7	1.4	1.7
EF-6-4	Exhaust fan	Penn-Zepyr Z8H-TDA	132W	4.4	115V	1P	0.5	0.5	0.3
KX-6-1	Kitchen exhaust fan	Twin City 300	10HP	30.8	208V	3P	0.75	6.4	8.3
RF-6-1	Return fan	Twin City 490	30HP	88.0	208V	3P	0.8	18.3	25.4
SX-6-1	Smoke purge fan	Twin City 365	30HP	88.0	208V	3P	0.8	18.3	25.4
TX-6-1	Toilet exhaust fan	Twin City 300	3HP	10.6	208V	3P	0.7	2.2	2.7
CFS-6-1	Condenser water filtration	PEP HMF-42	5HP	16.7	208V	3P	0.7	3.5	4.2
PCWP-6-1	Primary condenser pump	PACO KP-6015-1/2	40HP	114.0	208V	3P	0.8	23.7	32.9
PCWP-6-2	Primary condenser pump	PACO KP-6015-1/2	40HP	114.0	208V	3P	0.8	23.7	32.9
SCWP-6-1	Secondary condenser pump	PACO KP-5015-9	125HP	343.0	208V	3P	0.9	71.3	111.2
SCWP-6-2	Secondary condenser pump	PACO KP-5015-9	125HP	343.0	208V	3P	0.9	71.3	111.2
ET-6-1	Secondary condenser pump	PACO 1250-1	1.5HP	6.9	208V	3P	0.7	1.4	1.7
HWP-6-1	Hot water reheat pump	PACO LC-30957	7.5HP	24.2	208V	3P	0.7	5.0	6.1
HWP-6-2	Hot water reheat pump	PACO LC-30957	7.5HP	24.2	208V	3P	0.7	5.0	6.1
ET-6-2	Hot water perimeter pump	PACO 1250-1	1.5HP	6.6	208V	3P	0.7	1.4	1.7
ET-6-3	Hot water reheat pump	PACO 1250-1	1.5HP	6.6	208V	3P	0.7	1.4	1.7
PHWP-6-1	Hot water perimeter pump	PACO LC-25957	5HP	16.7	208V	3P	0.7	3.5	4.2
PHWP-6-2	Hot water perimeter pump	PACO LC-25957	5HP	16.7	208V	3P	0.7	3.5	4.2
CP-B1-1	Steam condensate pump	Domestic 92.5CC	0.75HP	3.5	208V	3P	0.6	0.7	0.8
CP-6-1	Steam condensate pump	Domestic 222.5CC	1HP	4.6	208V	3P	0.7	1.0	1.2
CP-6-2	Steam condensate pump	Domestic 152.5CC	1HP	4.6	208V	3P	0.7	1.0	1.2
CP-6-3	Steam condensate pump	Domestic 122.5CC	0.75HP	3.5	208V	3P	0.6	0.7	0.8
CP-6-4	Steam condensate pump	Domestic 122.5CC	0.75HP	3.5	208V	3P	0.6	0.7	0.8
CP-6-5	Steam condensate pump	Domestic 92.5CC	0.75HP	3.5	208V	3P	0.6	0.7	0.8
CP-6-6	Steam condensate pump	Domestic 222.5CC	1HP	4.6	208V	3P	0.7	1.0	1.2
CP-6-7	Steam condensate pump	Domestic 152.5CC	1HP	4.6	208V	3P	0.7	1.0	1.2
CTP-6-1	Cooling tower pump	PACO 1531 1-1/4 AC	1.5HP	6.6	208V	3P	0.7	1.4	1.7
CTP-6-2	Cooling tower pump	PACO 1531 1-1/4 AC	1.5HP	6.6	208V	3P	0.7	1.4	1.7
FOP1	Fuel oil transfer pump	IMO Delaval	5HP	16.7	208V	3P	0.7	3.5	4.2
FOP2	Fuel oil transfer pump	IMO Delaval	5HP	16.7	208V	3P	0.7	3.5	4.2
HV-6-1	Outside air intake system	Trane D66-36”	30HP	88.0	208V	3P	0.8	18.3	25.4
HV-6-2	Outside air intake system	Trane D66-36”	30HP	88.0	208V	3P	0.8	18.3	25.4
HV-6-3	Mech/Elec room ventilation	Trane F21-20”	15HP	46.2	208V	3P	0.8	9.6	13.3

Appendix C: Mechanical Equipment Loads (Continued)									
Tag	Description	Manufacturer / Model	Load	Amps[1]	Volts	Ph	PF[2]	KVA	KW
UH-B4-1	Entrance/unit heater	Trane FFBB1205JAOH	230W	1.1	208V	1P	1.0	0.2	0.2
UH-B1-1	Entrance/unit heater	Trane FFDB1205JFOA	230W	1.1	208V	1P	1.0	0.2	0.2
UH-1-1	Entrance/unit heater	Trane FFHB1205KCOC	230W	1.1	208V	1P	1.0	0.2	0.2
UH-1-2	Entrance/unit heater	Trane FFBB1205JAOH	230W	1.1	208V	1P	1.0	0.2	0.2
UH-1-3	Entrance/unit heater	Trane FFHB1205JCOC	230W	1.1	208V	1P	1.0	0.2	0.2
UH-1-4	Entrance/unit heater	Trane FFEB1205JDOF	230W	1.1	208V	1P	1.0	0.2	0.2
UH-1-5	Entrance/unit heater	Trane 320-S	0.5HP	3.2	115V	1P	1.0	0.4	0.4
UH-1-6	Entrance/unit heater	Trane 320-S	0.5HP	3.2	115V	1P	1.0	0.4	0.4
UH-2-1	Entrance/unit heater	International Environ.	2HP	13.0	115V	1P	1.0	1.5	1.5
UH-2-2	Entrance/unit heater	International Environ.	2HP	13.0	115V	1P	1.0	1.5	1.5
UH-2-3	Entrance/unit heater	International Environ.	2HP	13.0	115V	1P	1.0	1.5	1.5
UH-2-4	Entrance/unit heater	International Environ.	2HP	13.0	115V	1P	1.0	1.5	1.5
UH-5-1	Entrance/unit heater	Trane FFBB1205JAOH	230W	1.1	208V	1P	1.0	0.2	0.2
UH-5-2	Entrance/unit heater	Trane FFBB1205JAOH	230W	1.1	208V	1P	1.0	0.2	0.2
UH-5-3	Entrance/unit heater	Trane FFEB1205JAOH	230W	1.1	208V	1P	1.0	0.2	0.2
UH-5-4	Entrance/unit heater	Trane FFEB1205JAOH	230W	1.1	208V	1P	1.0	0.2	0.2
UH-5-5	Entrance/unit heater	Trane FFBB1205JAOH	230W	1.1	208V	1P	1.0	0.2	0.2
UH-6-1	Entrance/unit heater	Trane 320-S	0.5HP	3.2	115V	1P	1.0	0.4	0.4
UH-6-2	Entrance/unit heater	Trane 320-S	0.5HP	3.2	115V	1P	1.0	0.4	0.4
UH-6-3	Entrance/unit heater	Trane 320-S	0.5HP	3.2	115V	1P	1.0	0.4	0.4
UH-6-4	Entrance/unit heater	Trane 320-S	0.5HP	3.2	115V	1P	1.0	0.4	0.4
UH-6-5	Entrance/unit heater	Trane 320-S	0.5HP	3.2	115V	1P	1.0	0.4	0.4
UH-6-6	Entrance/unit heater	Trane 320-S	0.5HP	3.2	115V	1P	1.0	0.4	0.4
UH-6-7	Entrance/unit heater	Trane 320-S	0.5HP	3.2	115V	1P	1.0	0.4	0.4
UH-6-8	Entrance/unit heater	Trane 320-S	0.5HP	3.2	115V	1P	1.0	0.4	0.4
CT-6-1	Cooling tower	Marley 148-81-A	75HP	211.0	208V	3P	0.85	43.9	64.6
CT-6-2	Cooling tower	Marley 148-81-A	75HP	211.0	208V	3P	0.85	43.9	64.6
Totals								659	905

[1] Full load current taken from NEC tables 430.248 (1PH) and 430.250 (3PH)

[2] Power factor is assumed

Appendix D: Plumbing Equipment Loads									
Description	Manufacturer / Model	Load	Qty	Amps[1]	Volts	Phases	PF	KVA[2]	KW[2]
Booster pump	Peerless 55TE73 GEF	7.5HP	3	24.2	208V	3P	0.7	15	18.3
Duplex sump pump	Flygt 4”CP3127 484 IMP	10HP	2	30.8	208V	3P	0.75	12.8	16.6
Duplex ejector pump	Flygt 4”CP3127 484 IMP	10HP	1	30.8	208V	3P	0.75	6.4	8.3
Elevator pit sump pump	Weil	1.5HP	2	6.6	208V	3P	0.7	2.8	3.4
Hot water pump	Bell & Gosset PR series	1/8HP	4	?	?	?	?	?	?
Totals								37	47

[1] Each; full load current taken from NEC tables 430.248 (1PH) and 430.250 (3PH)

[2] Total

Appendix E: Kitchen Equipment Loads								
Tag	Description	Qty	Load (Each)	Volts	Phases	PF	KVA	KW
01.06	Ventilator	1	20A	120V	1P	0.75	2.40	1.80
01.07	Kettle with base	1	10A	115V	1P	0.75	1.15	0.86
01.08	Combination oven/steamer	2	12A	120V	1P	1.0	2.88	2.88
01.09	Convection oven (double)	1	9A	115V	1P	1.0	1.04	1.04
01.10	Range	1	6A	115V	1P	1.0	0.69	0.69
01.11	Cook / hold	1	7.2A	208V	1P	1.0	1.50	1.50
01.15	Fire extinguishing system	1	20A	120V	1P	0.75	2.40	1.80
01.17	Mixer (20 quart)	1	0.5HP	208V	1P	0.5	0.50	0.70
01.20	Food processor	1	0.5HP	120V	1P	0.5	1.10	0.60
01.21	Refrigerator	1	5.5A	115V	1P	0.75	0.63	0.47
01.23	Microwave oven	1	20A	208V	1P	0.75	4.16	3.12
01.30	Desk with receptacles	1	15A	120V	1P	0.75	1.80	1.35
01.31	Computers	4	20A	120V	1P	0.75	9.60	7.20
01.41	Walk-in	1	5A	120V	1P	0.75	0.60	0.45
01.42	Walk-in freezer	1	5A	120V	1P	0.75	0.60	0.45
01.43	Evaporator coil	1	5A	208V	1P	0.75	1.04	0.78
01.45	Evaporator coil	1	5A	208V	1P	0.75	0.60	0.45
01.50	Self-serve refrigerated case	1	13A	120V	1P	0.75	1.56	1.17
01.52	Sneeze guard with heat lamp	1	20A	120V	1P	0.75	2.40	1.80
01.53	Hot or cold pan unit	1	16.7A	208V	1P	0.75	3.47	2.61
01.54	Heated drop-in display	2	6.7A	120V	1P	1.0	1.61	1.61
01.56	Heated cabinet	1	0.9KW	120V	1P	1.0	0.90	0.90
01.57	Griddle stand refrigerator	1	9.1A	120V	1P	0.75	1.09	0.82
01.60	Dump station	1	6.9A	120V	1P	0.75	0.83	0.62
01.61	Fryer	2	0.5A	120V	1P	1.0	0.12	0.12
01.63	Ventilator	1	15A	120V	1P	0.75	1.80	1.35
01.66	Freezer	1	7.9A	120V	1P	0.75	0.95	0.71
01.68	Sneeze guard with heat lamp	2	20A	120V	1P	1.0	4.80	4.80
01.70	Refrigerator	1	10A	120V	1P	0.75	1.20	0.90
01.71	Fire extinguishing system	1	20A	120V	1P	0.75	2.40	1.80
01.76	Ventilator	1	10A	120V	1P	0.75	1.20	0.90
01.77	Induction cook-top	3	14A	208V	1P	0.75	8.74	6.55
01.78	Hot/cold pan unit	2	16.7A	208V	1P	0.75	6.95	5.21
01.81	Slicer	1	0.5HP	120V	1P	0.5	1.10	0.60
01.82	Toaster, conveyer	1	16A	208V	1P	0.75	3.33	2.50
01.84	Food warmer (built-in)	2	3.8A	120V	1P	1.0	0.91	0.91
01.87	Hot food well	1	8.3A	120V	1P	1.0	1.00	1.00
01.88	Cold pan unit, refrigerator	1	4.5A	120V	1P	0.75	0.54	0.41
01.89	Refrigerator (under counter)	1	9.1A	120V	1P	0.75	1.09	0.82
01.91	Coffee brewing system	1	29.6A	208V	1P	0.75	6.16	4.62
01.92	Iced tea brewer	1	15A	120V	1P	0.75	1.80	1.35
01.93	Self-serve case (refrigerated)	1	18A	120V	1P	0.75	2.16	1.62
01.95	POS	2	20A	120V	1P	0.75	4.80	3.60

Appendix E: Kitchen Equipment Loads (Continued)								
Tag	Description	Qty	Load (Each)	Volts	Phases	PF	KVA	KW
01.100	Compressor rack	1	60A	208V	3P	0.75	12.48	16.21
03.01	POS	2	15A	120V	1P	0.75	3.60	2.70
03.02	Bakery display case	1	9.5A	115V	1P	1.0	1.09	1.09
03.05	Iced tea brewer	1	18A	120V	1P	0.75	2.16	1.62
03.06	Coffee brewer	2	23.4A/5KW	120V	1P	0.7	2.81	5.00
03.08	Back bar refrigerator	1	8.8A	115V	1P	0.75	1.01	0.76
03.09	Espresso machine	1	20A	120V	1P	0.75	2.40	1.80
03.10	Blender	2	13A	120V	1P	0.75	3.12	2.34
C003	Hot holding cabinet	4	17.5A	120V	1P	1.0	8.40	8.40
C007	Mobile refrigerator cart	2	7A	120V	1P	0.75	1.68	1.26
C014	Refrigerator (reach-in)	1	6.7A	120V	1P	0.75	0.80	0.60
D007	Warewasher	1	100.4A	208V	3P	0.75	20.88	27.13
Totals							156KVA	144KW

Appendix F: Vertical Transportation Loads								
Tag	Description	Load	Amps[1]	Volts	Phases	PF[2]	KVA	KW
P-1	Passenger elevator	45HP	128.5	208V	3P	0.8	26.7	37
P-2	Passenger elevator	45HP	128.5	208V	3P	0.8	26.7	37
P-3	Passenger elevator	45HP	128.5	208V	3P	0.8	26.7	37
P-4	Passenger elevator	45HP	128.5	208V	3P	0.8	26.7	37
P-5	Passenger elevator	35HP	101	208V	3P	0.8	21	29.1
P-6	Passenger elevator	35HP	101	208V	3P	0.8	21	29.1
S-7	Service elevator	45HP	128.5	208V	3P	0.8	26.7	37
Totals							176KVA	243KW

[1] Full load current interpolated from NEC tables 430.248 (1PH) and 430.250 (3PH)

[2] Power factor is assumed

Appendix G: Calculation of Actual Loads for Service Entrance				
Tag	Equipment Type	Demand Factor	Connected Load (KVA)	Demand Load (KVA)
-	Elevators (all 7)	0.77	176.0	135.5
-	MDF UPS rectifier input	1.00	104.0	104.0
-	Fire pump	1.25	29.7	37.1
-	Fire alarm system	1.00	21.0[1]	21.0
-	Booster pump	1.00	15.0[1]	15.0
-	Booster pump	1.00	15.0[1]	15.0
-	Booster pump	1.00	15.0[1]	15.0
HWP-6-1	Hot water reheat pump	1.00	5.0	5.0
HWP-6-2	Hot water reheat pump	1.00	5.0	5.0
ET-6-2	Hot water perimeter pump	1.00	1.4	1.4
ET-6-3	Hot water reheat pump	1.00	1.4	1.4
CP-6-1	Steam condensate pump	1.00	1.0	1.0
CP-6-3	Steam condensate pump	1.00	0.7	0.7
CP-6-4	Steam condensate pump	1.00	0.7	0.7
CP-6-6	Steam condensate pump	1.00	0.7	0.7
CP-6-7	Steam condensate pump	1.00	0.7	0.7
CTP-6-1	Cooling tower pump	1.00	0.7	0.7
CTP-6-2	Cooling tower pump	1.00	0.7	0.7
-	Hot water circulation pump	1.00	3.5[1]	3.5
-	Hot water circulation pump	1.00	3.5[1]	3.5
AC-B2-1	Water-cooled packaged A/C	1.00	12.4	12.4
AC-B2-2	Water-cooled packaged A/C	1.00	3.5	3.5
AC-2-1	Water-cooled packaged A/C	1.00	6.4	6.4
AC-2-3	Water-cooled packaged A/C	1.00	6.4	6.4
AC-2-4	Water-cooled packaged A/C	1.00	3.5	3.5
-	Dishwasher (level 2)	0.65	21.0[1]	13.7
-	Dishwasher (level 2)	0.65	6.0[1]	3.9
AC-3-2	Water-cooled packaged A/C	1.00	6.4	6.4
AC-3-3	Water-cooled packaged A/C	1.00	3.5	3.5
AC-3-4	Water-cooled packaged A/C	1.00	3.5	3.5
AC-4-2	Water-cooled packaged A/C	1.00	6.4	6.4
AC-4-3	Water-cooled packaged A/C	1.00	3.5	3.5
AC-4-4	Water-cooled packaged A/C	1.00	3.5	3.5
KX-6-1	Kitchen exhaust fan	1.00	6.4	6.4
CT-6-2	Cooling tower	1.25	43.9	54.9
PCWP-6-2	Primary condenser pump	1.00	23.7	23.7
SCWP-6-2	Secondary condenser pump	1.00	71.3	71.3
HV-6-1	Outside air intake system	1.00	18.3	18.3
AC-6-1	Water-cooled packaged A/C	1.00	35.2	35.2
RF-6-1	Return fan	1.00	18.3	18.3
CT-6-1	Cooling tower	1.00	43.9	43.9
PCWP-6-1	Primary condenser pump	1.00	23.7	23.7
SCWP-6-1	Secondary condenser pump	1.25	71.3	89.1

Appendix G: Calculation of Actual Loads for Service Entrance (Continued)				
Tag	Equipment Type	Demand Factor	Connected Load (KVA)	Demand Load (KVA)
HV-6-3	Outside air intake system	1.00	9.6	9.6
HV-6-2	Outside air intake system	1.00	18.3	18.3
CFS-6-1	Condenser water filtration	1.00	3.5	3.5
-	Jockey pump	1.00	4.0	4.0
CRAC-B4-1	Water-cooled packaged A/C	1.00	5.0	5.0
CRAC-B4-2	Water-cooled packaged A/C	1.00	5.0	5.0
SX-6-1	Smoke-purge fan	1.00	18.3	18.3
AC-6-2	Water-cooled packaged A/C	1.00	0.7	0.7
AC-6-3	Water-cooled packaged A/C	1.00	1.4	1.4
AC-6-4	Water-cooled packaged A/C	1.00	0.5	0.5
UP-B4-A	Panelboard	-	20.82	13.11
UP-B4-B	Panelboard	-	16.02	10.34
UP-B4-C	Panelboard	-	24.34	24.34
UP-B4-D	Panelboard	-	0	0
UP-B3-A	Panelboard	-	23.70	15.49
UP-B3-B	Panelboard	-	24.09	16.54
UP-B3-C	Panelboard	-	18.91	18.91
UP-B3-D	Panelboard	-	0	0
UP-B2-A	Panelboard	-	40.38	27.69
UP-B2-B	Panelboard	-	31.06	20.32
UP-B2-C	Panelboard	-	20.55	20.55
UP-B2-D	Panelboard	-	0	0
UP-B1-A	Panelboard	-	24.92	16.33
UP-B1-B	Panelboard	-	32.66	21.25
UP-B1-C	Panelboard	-	18.32	15.52
UP-B1-D	Panelboard	-	3.00	3.00
UP-1-A	Panelboard	-	32.74	21.21
UP-1-B	Panelboard	-	32.54	21.16
UP-1-C	Panelboard	-	18.96	18.96
UP-1-D	Panelboard	-	10.00	6.50
UP-2-A	Panelboard	-	36.04	23.72
UP-2-B	Panelboard	-	30.70	20.05
UP-2-C	Panelboard	-	31.99	28.33
UP-2-D	Panelboard	-	0	0
UP-3-A	Panelboard	-	32.42	21.11
UP-3-B	Panelboard	-	36.00	22.12
UP-3-C	Panelboard	-	34.04	22.15
UP-3-D	Panelboard	-	22.35	21.48
UP-4-A	Panelboard	-	31.11	20.31
UP-4-B	Panelboard	-	34.00	22.12
UP-4-C	Panelboard	-	35.64	22.92
UP-4-D	Panelboard	-	21.33	21.33
UP-5-A	Panelboard	-	32.22	20.99

Appendix G: Calculation of Actual Loads for Service Entrance (Continued)				
Tag	Equipment Type	Demand Factor	Connected Load (KVA)	Demand Load (KVA)
UP-5-B	Panelboard	-	33.09	21.68
UP-5-C	Panelboard	-	26.49	26.19
UP-5-D	Panelboard	-	3.16	2.00
UP-R	Panelboard	-	21.16	13.88
UP-1-MDF	Panelboard	-	25.00	16.25
UP-2-MDF	Panelboard	-	25.00	16.25
UP-3-MDF	Panelboard	-	0	0
UP-KA	Panelboard	-	48.08	31.47
UP-KB	Panelboard	-	43.31	27.87
Total KVA			1905 KVA	1609 KVA
Total current at 208V			9159 A	7736 A
Total current at 208V (including 10% growth)			10,075 A	8509 A
Service entrance size				10,000 A

[1] Load based on size of overcurrent protection device

Appendix H: Feeder Schedule												
Tag	From	To	No. of Sets	Conduit	Phase Conductors			Neutral Conductor		Overcurrent Protection	Switch	Disconnect Switch
				Size	No.	Size	Type	Size	Type			
#1	CON ED	SS-A	10	4”	3	600MCM	CU THHN	600MCM	CU THHN	?	?	-
#2	CON ED	SS-B	10	4”	3	600MCM	CU THHN	600MCM	CU THHN	?	?	-
#3	EM GEN	EM-DS	10	3”	3	500MCM	CU THHN	500MCM	CU THHN	?	?	-
#4	EM GEN	Fire Pump (ATS#1)										
#5	EM GEN	Fire Alarm (ATS#2)										
#6	CON ED	Steam Panel										
SS-A#1	SS-A	Fire Pump (ATS#1)	1	3”	3	500MCM	CU THHN	-	-	800A	800A	-
SS-A#2	SS-A	Bus Duct	4	3”	3	500MCM	CU THHN	500MCM	CU THHN	3000A	3000A	-
SS-A#4	SS-A	DP-A	1	3”	3	500MCM	CU THHN	500MCM	CU THHN	2000A	2000A	-
SS-B#1	SS-B	Fire Alarm (ATS#2)	1	0.5”	3	#3	CU THHN	#3	CU THHN	100A	100A	-
SS-B#2	SS-B	Bus Duct	10	3”	3	500MCM	CU THHN	500MCM	CU THHN	3000A	3000A	-
SS-B#3	SS-B	Bus Duct	7	3”	3	500MCM	CU THHN	-	-	2500A	2500A	-
SS-B#4	SS-B	DP-B	1	3”	3	500MCM	CU THHN	500MCM	CU THHN	2000A	2000A	-
EM-DS#1	EM-DS	EDP-A (ATS#3)	6	3”	3	500MCM	CU THHN	500MCM	CU THHN	1200A	1200A	-
EM-DS#2	EM-DS	EUP-R (ATS#4)	1	4”	3	600MCM	CU THHN	600MCM	CU THHN	400A	400A	-
EM-DS#4	EM-DS	ELP-EL-RA (ATS#5)	2	2.5”	3	350MCM	CU THHN	350MCM	CU THHN	600A	600A	-
EM-DS#5	EM-DS	ELP-EL-RB (ATS#6)	2	2.5”	3	350MCM	CU THHN	350MCM	CU THHN	600A	600A	-
EDP-A#1	EDP-A	EUP-1	2	3”	3	500MCM	CU THHN	500MCM	CU THHN	400A	225A	-
EDP-A#2	EDP-A	EUP-2	1	3”	3	500MCM	CU THHN	500MCM	CU THHN	400A	225A	-
EDP-A#3	EDP-A	EUP-B1 & B3	2	3”	3	500MCM	CU THHN	500MCM	CU THHN	600A	500A	-
EDP-A#4	EDP-A	Jockey Pump	1	4”	3	#12	CU THHN	-	-	30A	20A	-
EDP-A#5	EDP-A	CRAC-B4-1	1	2”	3	#4/0	CU THHN	-	-	200A	200A	250V-200A-3P
EDP-A#6	EDP-A	CRAC-B4-2	1	2”	3	#4/0	CU THHN	-	-	200A	200A	250V-200A-3P
EDP-A#7	EDP-A	SX-6-1	1	1.5”	3	#2/0	CU THHN	-	-	100A	100A	250V-100A-3P
EDP-A#8	EDP-A	EUP-4	2	3”	3	500MCM	CU THHN	500MCM	CU THHN	400A	225A	-
EDP-A#9	EDP-A	AC-6-2	1	0.75”	3	#10	CU THHN	-	-	30A	30A	250V-30A-3P
EDP-A#10	EDP-A	AC-6-3	1	0.75”	3	#8	CU THHN	-	-	60A	40A	250V-60A-3P
EDP-A#11	EDP-A	AC-6-4	1	0.75”	3	#10	CU THHN	-	-	30A	30A	250V-30A-3P
EPP-EL-RA#1	EPP-EL-RA	Elevator P-1	1	2”	3	#4/0	CU THHN	-	-	400A	225A	250V-400A-3P
EPP-EL-RA#2	EPP-EL-RA	Elevator P-2	1	2”	3	#4/0	CU THHN	-	-	400A	225A	250V-400A-3P
EPP-EL-RA#3	EPP-EL-RA	Elevator P-3	1	2”	3	#4/0	CU THHN	-	-	400A	225A	250V-400A-3P
EPP-EL-RA#4	EPP-EL-RA	Elevator P-4	1	2”	3	#4/0	CU THHN	-	-	400A	225A	250V-400A-3P
EPP-EL-RA#5	EPP-EL-RA	EUP-EL-R (ATS#7)	1	1.25”	3	#3	CU THHN	#3	CU THHN	100A	100A	-
EPP-EL-RB#1	EPP-EL-RB	Elevator P-5	1	2”	3	#3/0	CU THHN	-	-	200A	200A	250V-200A-3P

Appendix H: Feeder Schedule (Continued)												
Tag	From	To	No. of Sets	Conduit	Phase Conductors			Neutral Conductor		Overcurrent Protection	Switch	Disconnect Switch
				Size	No.	Size	Type	Size	Type			
EPP-EL-RB#2	EPP-EL-RB	Elevator P-6	1	2”	3	#3/0	CU THHN	-	-	200A	200A	250V-200A-3P
EPP-EL-RB#3	EPP-EL-RB	Elevator S-7	1	2”	3	#4/0	CU THHN	-	-	400A	225A	250V-400A-3P
EPP-EL-RB#4	EPP-EL-RB	EUP-EL-R (ATS#7)	1	1.25”	3	#3	CU THHN	#3	CU THHN	100A	100A	-
DP-A#1	DP-A	DP-RA	5	3”	3	500MCM	CU THHN	500MCM	CU THHN	1200A	1200A	-
DP-A#2	DP-A	EPP-EL-RA (ATS#5)	3	3”	3	500MCM	CU THHN	500MCM	CU THHN	600A	600A	-
DP-A#3	DP-A	EDP-A (ATS#3)	2	3”	3	500MCM	CU THHN	500MCM	CU THHN	800A	800A	-
DP-A#4	DP-A	Booster Pump	1	4”	3	#8	CU THHN	-	-	60A	40A	250V-60A-3P
DP-A#5	DP-A	Booster Pump	1	4”	3	#8	CU THHN	-	-	60A	40A	250V-60A-3P
DP-A#6	DP-A	MDF UPS Rectifier	2	3”	3	250MCM	CU THHN	-	-	600A	500A	-
DP-B#1	DP-B	DP-RB	5	3”	3	500MCM	CU THHN	500MCM	CU THHN	1200A	1200A	-
DP-B#2	DP-B	EPP-EL-RB (ATS#6)	3	3”	3	500MCM	CU THHN	500MCM	CU THHN	600A	600A	-
DP-B#3	DP-B	Booster Pump	1	4”	3	#8	CU THHN	-	-	60A	40A	250V-60A-3P
DP-B#4	DP-B	HW Circ. Pump	1	4”	3	#12	CU THHN	-	-	30A	20A	-
DP-B#5	DP-B	HW Circ. Pump	1	4”	3	#12	CU THHN	-	-	30A	20A	-
DP-B#6	DP-B	AC-B2-1	1	2”	3	250MCM	CU THHN	-	-	400A	250A	250V-400A-3P
DP-B#7	DP-B	AC-B2-2	1	1”	3	#2	CU THHN	-	-	100A	100A	250V-100A-3P
DP-2#1	DP-2	AC-2-1	1	1.5”	3	#2/0	CU THHN	-	-	200A	150A	250V-200A-3P
DP-2#2	DP-2	AC-2-3	1	1.5”	3	#2/0	CU THHN	-	-	200A	150A	250V-200A-3P
DP-2#3	DP-2	AC-2-4	1	1.5”	3	#2/0	CU THHN	-	-	200A	150A	250V-200A-3P
DP-2#4	DP-2	LVL2 Dishwasher	1	1.25”	3	#3	CU THHN	-	-	100A	100A	250V-100A-3P
DP-2#5	DP-2	LVL2 Dishwasher	1	0.75”	3	#10	CU THHN	-	-	30A	30A	250V-30A-3P
DP-3#1	DP-3	AC-3-2	1	1.5”	3	#2/0	CU THHN	-	-	200A	150A	250V-200A-3P
DP-3#2	DP-3	AC-3-3	1	1.25”	3	#3	CU THHN	-	-	100A	100A	250V-100A-3P
DP-3#3	DP-3	AC-3-4	1	1.5”	3	#2/0	CU THHN	-	-	200A	150A	250V-200A-3P
DP-4#1	DP-4	AC-4-2	1	1.5”	3	#2/0	CU THHN	-	-	200A	150A	250V-200A-3P
DP-4#2	DP-4	AC-4-3	1	1.25”	3	#3	CU THHN	-	-	100A	100A	250V-100A-3P
DP-4#3	DP-4	AC-4-4	1	1.5”	3	#2/0	CU THHN	-	-	200A	150A	250V-200A-3P
DP-RA#1	DP-RA	EUP-R	1	2”	3	#4/0	CU THHN	#4/0	CU THHN	200A	200A	-
DP-RA#2	DP-RA	MCC-R-A	1	2”	3	#4/0	CU THHN	-	-	200A	200A	-
DP-RA#3	DP-RA	KX-6-1	1	0.75”	3	#8	CU THHN	-	-	60A	40A	250V-60A-3P
DP-RA#5	DP-RA	CT-6-2	1	2”	3	250MCM	CU THHN	-	-	400A	250A	250V-400A-3P
DP-RA#6	DP-RA	PCWP-6-2	1	1.5”	3	#2/0	CU THHN	-	-	200A	150A	250V-200A-3P
DP-RA#7	DP-RA	SCWP-6-2	2	2.5”	3	#4/0	CU THHN	-	-	400A	400A	250V-400A-3P
DP-RA#8	DP-RA	HV-6-1	1	1.25”	3	#3	CU THHN	-	-	100A	100A	250V-100A-3P

Appendix H: Feeder Schedule (Continued)												
Tag	From	To	No. of Sets	Conduit	Phase Conductors			Neutral Conductor		Overcurrent Protection	Switch	Disconnect Switch
				Size	No.	Size	Type	Size	Type			
DP-RA#10	DP-RA	AC-6-1	2	3”	3	350MCM	CU THHN	-	-	600A	600A	250V-600A-3P
DP-RB#1	DP-RB	UP-R	1	1.25”	3	#1	CU THHN	#1	CU THHN	200A	125A	-
DP-RB#2	DP-RB	RF-6-1	1	1.25”	3	#3	CU THHN	-	-	100A	100A	250V-100A-3P
DP-RB#4	DP-RB	CT-6-1	1	2”	3	250MCM	CU THHN	-	-	400A	250A	250V-400A-3P
DP-RB#5	DP-RB	PCWP-6-1	1	1.5”	3	#2/0	CU THHN	-	-	200A	150A	250V-200A-3P
DP-RB#6	DP-RB	SCWP-6-1	2	2.5”	3	#4/0	CU THHN	-	-	400A	400A	250V-400A-3P
DP-RB#7	DP-RB	HV-6-3	1	0.75”	3	#6	CU THHN	-	-	60A	60A	250V-60A-3P
DP-RB#9	DP-RB	HV-6-2	1	1.25”	3	#3	CU THHN	-	-	100A	100A	250V-100A-3P
DP-RB#12	DP-RB	CFS-6-1	1	0.75”	3	#10	CU THHN	-	-	30A	30A	250V-30A-3P
#7	BUS SS-A#2	UP-B1A/B/C/D	2	2.5”	3	250MCM	CU THHN	250MCM	CU THHN	500A	600A	-
#8	BUS SS-A#2	UP-B2A/B/C/D	2	2.5”	3	250MCM	CU THHN	250MCM	CU THHN	500A	600A	-
#9	BUS SS-A#2	UP-B3A/B/C/D	2	2.5”	3	250MCM	CU THHN	250MCM	CU THHN	500A	600A	-
#10	BUS SS-A#2	UP-B4A/B/C/D	2	2.5”	3	250MCM	CU THHN	250MCM	CU THHN	500A	600A	-
#11	EUP-B1	EUP-B3	2	3”	3	500MCM	CU THHN	450MCM	CU THHN	125A	-	-
#12	BUS SS-B#3	DP-2	2	2.5”	3	350MCM	CU THHN	350MCM	CU THHN	600A	600A	-
#13	BUS SS-B#3	DP-3	2	2.5”	3	350MCM	CU THHN	350MCM	CU THHN	600A	600A	-
#14	BUS SS-B#3	DP-4	2	2.5”	3	350MCM	CU THHN	350MCM	CU THHN	600A	600A	-
#15	BUS SS-B#2	UP-1A/B/C/D	2	2.5”	3	250MCM	CU THHN	250MCM	CU THHN	500A	600A	-
#16	BUS SS-B#2	UP-2A/B/C/D	2	2.5”	3	250MCM	CU THHN	250MCM	CU THHN	500A	600A	-
#17	BUS SS-B#2	UP-3A/B/C/D	2	2.5”	3	250MCM	CU THHN	250MCM	CU THHN	500A	600A	-
#18	BUS SS-B#2	UP-4A/B/C/D	2	2.5”	3	250MCM	CU THHN	250MCM	CU THHN	500A	600A	-
#19	BUS SS-B#2	UP-5A/B/C/D	2	2.5”	3	250MCM	CU THHN	250MCM	CU THHN	500A	600A	-
#20	BUS SS-B#2	UP-KA/B	2	1.5”	3	#3	CU THHN	#3	CU THHN	400A	400A	-
#21	BUS SS-A#2	AC-B1-1	1	2.5”	3	250MCM	CU THHN	-	-	250A	400A	-
#22	BUS SS-A#2	AC-B2-2	1	1.25”	3	#3	CU THHN	-	-	100A	100A	-
#23	BUS SS-A#2	AC-B3-1	1	2.5”	3	250MCM	CU THHN	-	-	250A	400A	-
#24	BUS SS-A#2	AC-B4-1	1	2.5”	3	250MCM	CU THHN	-	-	250A	400A	-
#25	BUS SS-B#3	AC-1-1	1	2.5”	3	250MCM	CU THHN	-	-	250A	400A	-
#26	BUS SS-B#3	AC-1-2	1	1.25”	3	#3	CU THHN	-	-	100A	100A	-
#27	BUS SS-B#3	AC-2-2	1	2.5”	3	250MCM	CU THHN	-	-	250A	400A	-
#28	BUS SS-B#3	AC-3-1	1	1.5”	3	#1/0	CU THHN	-	-	150A	200A	-
#29	BUS SS-B#3	AC-4-1	1	1.5”	3	#1/0	CU THHN	-	-	150A	200A	-
#30	BUS SS-B#3	AC-5-1	2	2”	3	#3/0	CU THHN	-	-	400A	400A	-
#31	BUS SS-B#3	AC-5-2	1	1.25”	3	#3	CU THHN	-	-	100A	100A	-

SERVICE CLASSIFICATION NO. 9 - Continued
GENERAL - LARGE

Rate II - General - Large - Time-of-Day

Low Tension Service

Demand Charge (per kilowatt of maximum demand for each time period)

Month	Time Period	Delivery Service
June, July, August, September	Mon.-Fri., 8 AM - 6 PM	$5.71
	Mon.-Fri., 8 AM - 10 PM	$10.80
	All hours - all days	$10.66
All other months	Mon. - Fri., 8 AM - 10 PM	$7.93
	All hours - all days	$3.45

Energy Delivery Charge (cents per kilowatthour)

Month	Time Period	Delivery Service
June, July, August, September	Mon. - Fri., 8 AM - 10 PM	0.55
	All other days/hours	0.55
All other months	Mon. - Fri., 8 AM - 10 PM	0.55
	All other days/hours	0.55

High Tension Service

Demand Charge (per kilowatt of maximum demand for each time period)

Month	Time Period	Delivery Service
June, July, August, September	Mon.-Fri., 8 AM - 6 PM	$ 5.71
	Mon.-Fri., 8 AM - 10 PM	$ 10.80
All other months	Mon. - Fri., 8 AM - 10 PM	$ 7.93

Energy Delivery Charge (cents per kilowatthour)

Month	Time Period	Delivery Service
June, July, August, September	Mon. - Fri., 8 AM - 10 PM	0.55
	All other days/hours	0.55
All other months	Mon. - Fri., 8 AM - 10 PM	0.55
	All other days/hours	0.55

The demand charge for each time period will be determined by multiplying the maximum demand for the respective time period by the rate applicable to the demand for that time period. The total demand charge will be the sum of the charges for each of the time periods.

(Service Classification No. 9 - Continued on Leaf No. 274-A)

Appendix J: HID Ballast Specifications

This document is available under the “Technical Report 2” page at:
http://www.engr.psu.edu/ae/thesis/portfolios/2008/adk165

PDS-500e

Color Kinetics® PDS-500e intelligent power/data supply is specifically designed for Color Kinetics class 1 fixtures, such as iColor Accent. PDS-500e provides a robust 500W power source and intelligent data drive circuitry. This data circuitry conditions data supplied from a DMX512 controller, including Color Kinetics full line of controllers, to a format compatible with the fixtures. This integration of power and data simplifies wiring installation.

The 500W power source features a built-in ventilation fan in addition to an automatic over-temperature shut-off to protect it from damage due to overheating. The data drive circuitry has been specifically designed with short circuit protection to prevent failures or damage due to incorrect wiring/installation. PDS-500e also features diagnostic LEDs to aid troubleshooting of Color Kinetics systems.

PDS-500e automatically accommodates supply voltages ranging from 100VAC to 240VAC (50-60 Hz), which must be hard-wired to the supply. Light fixtures are hard-wired to two-piece locking connectors for easy fixture disconnection and reconnection to output terminals. RJ45 data input and output connectors let you daisy-chain data from one power/data supply to another. A DMX repeater is provided to maintain the integrity of the data in large installations.

The entire package is housed in a NEMA-style enclosure with 14 pre-formed knockout holes sized for standard conduit connectors, which comply with National Electrical Code (NEC) requirements. PDS-500e is rated for indoor use only. For outdoor installations, a NEMA 4 (IP66) outdoor rated enclosure must be used.

PDS-500e is outfitted for advanced ethernet options using a Color Kinetics proprietary protocol. These control options are ideal for large installations, and will be available soon as standard products. For more information, contact Color Kinetics.

PDS-500e SPECIFICATIONS

POWER INPUT	100VAC to 240VAC (50Hz–60Hz) auto-ranging Power factor correction (PFC) 7A (115V)/3.5A (230V)
POWER OUTPUT	24VDC (480W Max.)
HEAT DISSIPATION	25 percent of total power output
AMBIENT OPERATING TEMP	14°F to 122°F (-10°C to 50°C)
HOUSING	NEMA-style indoor rated enclosure; housing dimensions: 10.38" (26.37 cm) x 10.10" (25.65 cm) x 4.38" (11.13 cm)
CONNECTORS	Data: Screw terminal or RJ45 input and output connectors; Power: Screw terminal output connectors
DATA INTERFACE	Color Kinetics full line of controllers or DMX512 (RS485) compatible
LISTINGS	C-UL US listed, CE listed

U.S. AND FOREIGN PATENTS AND PATENTS PENDING

LISTED 78GF

ITEM# 109-000009-00

BRO101 Rev05

Specifications subject to change without notice.

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Appendix L: Single-Line Diagram

This document is available under the “Technical Report 2” page at:
http://www.engr.psu.edu/ae/thesis/portfolios/2008/adk165

Appendix M: Riser Diagram

This document is available under the “Technical Report 2” page at:
http://www.engr.psu.edu/ae/thesis/portfolios/2008/adk165