Tech II Report

Susquehanna Center Renovations & Expansions

Brad Gaugh

10/28/2010

Executive Summary

This report analyzes the existing design of the electrical distribution and communication systems of the Susquehanna Center located in Bel Air, Maryland. The 110,000 square foot multi-use sports arena houses a 20,000 square foot main arena that can accommodate 2,200 home fans for the Harford Community College. There are other varying types of spaces such as an auxiliary gym, weight room, dance studios, and classrooms. The distribution system was designed in a unique way to accommodate all varying systems used in these spaces.

This report will specifically focus on the building's utility, voltage systems, major equipment and special equipment loads and other significant loads featured in the building. Also, a brief discussion will be provided on the special communication systems such as fire alarm and telecommunication. Lastly a single-line diagram is provided at the end in the appendix,

Table of Contents

Power Distribution Systems

Summary Description of Distribution System

The distribution system for this building is a radial system with the service entrance point on the north corner of the building. The building is fed from a pad-mounted transformer supplied by Baltimore Gas and Electric. The main switchgear is protected by two main circuit breakers. The breakers protect two different sections of the main switchgear, which are the existing portion of the building, and the other is the new expansion of the building. Branching from their prospective sections distribution panels feed branch panels, which in turn feed electrical loads. There are distribution panels dedicated to serving the mechanical loads of varying areas throughout the building as well, which are fed from the main switch board. There is one automated transfer switch that allows for the diesel-fueled generator to take over as the primary power being supplied to the building for any emergency.

Utility Company Information

The utility company for the Susquehanna Center is Baltimore Gas and Electric (BGE, http://www.bge.com/portal/site/bge/). They have many office locations, but their main office is located at 1068 North Front St, Baltimore, Maryland 21202. This project is currently in bidding phase and has not yet been registered with the power company, therefore the rate schedule is in the process of being designated and determined.

Service Entrance

The service entrance to the building is fed from a manhole located in the northwest portion of the site, which feed the pad-mounted transformer. The pad-mounted transformer is located on grade directly outside of the main electric room. The 2000kVA pad-mounted transformer then feeds into the 3200A, 3PH, 4W main switchgear. The switchgear is comprised of 5 sections. The first section is for the incoming service and acts as a service pull loop. The next two sections are dedicated to main circuit breakers. The first 2400A section serves loads in the expansion portion of the project and the second section is 1200A and serves the existing building loads. The fourth section is for auxiliary metering, and the last section is the main switch board.

Voltage Systems

The building contains two variations of voltage systems. Those two systems are 480Y/277V, 3PH and 208Y/120V, 3PH. All lighting equipment within the building is served at 277V, 1PH, while all receptacle loads are served at 120V, 1 PH. The mechanical equipment voltages vary depending on the specific type of equipment and voltages range from 480V, 3PH, 208V, 3PH, and lastly 120V, 1PH.

Emergency Power System

The building's main emergency system is supplied by a 60kW, 75kVA, 480Y/277V, 3PH, 4W, diesel-fueled generator that is pad-mounted on the exterior grade of the North portion of the building. The generator feeds only one 150A, 3PH automated transfer switch and one 30kVA transformer to drop the voltage from 480Y/277V to 208Y/120V. There are two panels that the generator serves, in which each panel serves the respective voltage systems listed.

Locations of Switchgear

The major equipment in the building is located in dedicated electric rooms that are stationed on the North West portion of the building. The branch panels and other distribution panels are also located within these three dedicated rooms, but on a rare occasion some equipment is located in a another non-based electric room. Those spaces include the pool and storage areas.

Major Equipment Schedule					
Tag	**Type of Equipment**	**Floor Level**	**Room Number**	**Room Name**	**DWG Number**
BGE XFMR	Utility XMFR	Exterior-Grade	N/A	N/A	E4.01
EM GEN	Generator	Exterior-Grade	N/A	N/A	E4.01
MDS	Main Switchgear	Main	138	Electric Room 2	E4.01
ATS	Automated Transfer Switch	Main	138	Electric Room 2	E4.01
XFMR	225 kVA Transformer	Arena	010	Electric Room 3	E2.05
XFMR	75 kVA Transformer	Main	157	Electric Room 1	E4.01
XFMR	45 kVA Transformer	Main	157	Electric Room 1	E4.01
XFMR	45 kVA Transformer	Arena	010	Electric Room 3	E2.05
XFMR	30kVA Transformer	Main	138	Electric Room 2	E4.01
XFMR	30kVA Transformer	Arena	012	Pool Mechanical	E2.05
XFMR	30kVA Transformer	Arena	010	Electric Room 3	E2.05
XFMR	30kVA Transformer	Arena	116	Washer/ Dryer	E2.02

Panel Schedule						
Tag	**Voltage**	**Main Size (AT)**	**Floor Level**	**Room Number**	**Room Name**	**DWG Number**
ELP	480Y/ 277V 3PH 4W	125A MCB	Main	138	Electric Room 2	E4.01
ERP	208Y/ 120V 3PH 4W	100A MCB	Main	138	Electric Room 2	E4.01
ERPA	208Y/ 120V 3PH 4W	100A MLO	Arena	010	Electric Room 3	E2.05
LPA	480Y/ 277V 3PH 4W	225A MCB	Main	138	Electric Room 2	E4.01
LPB	480Y/ 277V 3PH 4W	225A MCB	Arena	010	Electric Room 3	E2.05
LPC	480Y/ 277V 3PH 4W	225A MCB	Main	116	Washer/ Dryer	E2.02
MLP	480Y/ 277V 3PH 4W	600A MLO	Arena	157	Electric Room 1	E4.01
MRP	208Y/ 120V 3PH 4W	100A MCB	Main	157	Electric Room 1	E4.01
MRPA	208Y/ 120V 3PH 4W	100A MCB	Arena	010	Electric Room 3	E2.05
RPA	208Y/ 120V 3PH 4W	225A MCB	Main	157	Electric Room 1	E4.01
RPB	208Y/ 120V 3PH 4W	150A MCB	Arena	010	Electric Room 3	E2.05
RPC	208Y/ 120V 3PH 4W	100A MCB	Main	116	Washer/ Dryer	E2.02
FRP	208Y/ 120V 3PH 4W	100A MCB	Main	135	Fitness & Weight Room	E2.01
CRP	208Y/ 120V 3PH 4W	100A MLO	Main	165A	Concessions	E2.03
SITE	480Y/ 277V 3PH 4W	225A MCB	Arena	010	Electric Room 3	E2.05
SLP	480Y/ 277V 3PH 4W	100A MLO	Arena	012	Pool Mechanical Room	E2.05
SRP	208Y/ 120V 3PH 4W	100A MCB	Arena	012	Pool Mechanical Room	E2.05
ARP	208Y/ 120V 3PH 4W	800A MCB	Arena	010	Electric Room 3	E2.05

Over Current Devices

In the Susquehanna Center all circuit breakers are thermal magnetic molded case. The electrical distribution equipment has protection located in the panel up stream by a three pole circuit breaker. For all equipment that operates under the voltage system 480Y/277V, the over current device is rated for 35,000AIC and for 208Y/120V, the over current device is rated for 10,000AIC. Finally the main switchgear, which has two main circuit breakers are rated at 42,000AIC. Fused safety switches are used to provide additional over current protection to equipment requiring additional protection such as the photovoltaic system and mechanical equipment.

Transformers

Within the Susquehanna Center are nine transformers located throughout various spaces, but most typically found in electric rooms. There is only one exterior transformer, which is utility supplied. The other transformers located in electric rooms are used to drop voltage from 480Y/277V to 208Y/120V.

Transformer Schedule								
Tag	**Primary Voltage**	**Secondary Voltage**	**Size (kVA)**	**Type**	**Temp. Rise**	**Taps**	**Mounting**	**Remarks**
BGE XFMR	N/A	480Y/277V 3PH 4W	2000	N/A	N/A	N/A	Pad	
XFMR	480/277V 3PH 3W	208Y/120V 3PH 4W	225	Dry	150°C	(6) 2.5%	Pad on Floor	
XFMR	480/277V 3PH 3W	208Y/120V 3PH 4W	75	Dry	150°C	(6) 2.5%	Pad on Floor	
XFMR	480/277V 3PH 3W	208Y/120V 3PH 4W	45	Dry	150°C	(6) 2.5%	Pad on Floor	
XFMR	480/277V 3PH 3W	208Y/120V 3PH 4W	45	Dry	150°C	(6) 2.5%	Pad on Floor	
XFMR	480/277V 3PH 3W	208Y/120V 3PH 4W	30	Dry	150°C	(6) 2.5%	Pad on Floor	
XFMR	480/277V 3PH 3W	208Y/120V 3PH 4W	30	Dry	150°C	(6) 2.5%	Pad on Floor	
XFMR	480/277V 3PH 3W	208Y/120V 3PH 4W	30	Dry	150°C	(6) 2.5%	Pad on Floor	
XFMR	480/277V 3PH 3W	208Y/120V 3PH 4W	30	Dry	150°C	(6) 2.5%	Pad on Floor	

Grounding

The distribution is grounded at the exterior pad-mounted transformer, and the emergency system is grounded at the exterior pad-mounted generator. All transformers utilize ground conductors.

Special Equipment

There is only one system that is considered to be special equipment and that is the photovoltaic system. The system is comprised of solar panels, AC/DC inverter, net metering device and fused safety switches. There are three fused safety switches that provide over current protection to each device listed.

Lighting Loads

All lighting equipment throughout the entire building utilizes the voltage system of 277V 1PH. Fluorescent lamps are used in almost every space and down lights make use of compact fluorescent. Linear fluorescent fixtures exercise direct and indirect lighting technique, while compact fluorescent lamps typically operate with a 42 watt triple tube. There are only two spaces that do not use fluorescent or compact fluorescent lamps and those are the main and auxiliary gymnasiums. Those spaces use high intensity discharge (HID) metal halide pulse start fixtures.

The following Luminaire Schedule lists the tag, number of lamps, type of lamp, lamp wattage, ballast type, voltage, total input watts, ballast factor, operating current, and power factor. The ballast type abbreviations are as follows: electronic (E), electronic programmed start (E-PS), electronic rapid start (E-RS), electronic dimming (ED), and metal halide pulse start electronic (PS-E).

Luminaire Schedule									
Tag	**# of Lamps**	**Type of Lamp**	**Lamp Wattage**	**Ballast Type**	**Voltage**	**Total Inputs Watts**	**Ballast Factor**	**Starting/ Operating Current**	**Power Factor**
A	1	F54 T5HO/835	54W	E	277V	62W	0.99	0.24A	0.9
A1	1	F54 T5HO/835	54W	E	277V	62W	0.99	0.24A	0.9
B	1	F54 T5HO/835	54W	ED	277V	54W	0.9	0.23A	0.98
B1	1	F54 T5HO/835	54W	ED	277V	54W	0.9	0.23A	0.98
C	2	F28 T5/835	28W	E	277V	63W	1.03	0.23A	0.99
C1	2	F54 T5HO/835	54W	E	277V	117W	0.99	0.43A	0.98
D	2	F28 T5/835	28W	E	277V	63W	1.03	0.23A	0.99
D1	2	F28 T5/835	28W	E	277V	63W	1.03	0.23A	0.99
E	2	F26 DTT/835	26W	E	277V	54W	1.00	0.45A	0.99
F	2	F28 T5/835	28W	E-PS	277V	63W	1.03	0.23A	0.99
F1	2	F28 T5/835	28W	E-PS	277V	63W	1.03	0.23A	0.99
G	1	F32 T8/835	32W	E	277V	34W	0.9	0.13A	0.98
H	1	100MH PAR38/830	100W	PS-E	277V	118W	-	0.7A/ 0.45A	0.9/ 0.58
Hx	1	100MH PAR38/830	100W	PS-E	277V	118W	-	0.7A/ 0.45A	0.9/ 0.58

Luminaire Schedule Continued.									
Tag	**# of Lamps**	**Type of Lamp**	**Lamp Wattage**	**Ballast Type**	**Voltage**	**Input Watts**	**Ballast Factor**	**Starting/ Operating Current**	**Power Factor**
J	1	F25 T8/835	25W	E-RS	277V	33W	1.04	0.12A	0.98
K	1	400MH PS/736	400W	PS-E	277V	425W	-	2.1A/ 1.7A	0.9/ 0.73
Kx	1	400MH PS/736	400W	PS-E	277V	425W	-	2.10A/ 1.7A	0.9/ 0.73
K1	1	250MH PS/736	250W	PS-E	277V	272W	-	1.3A/ 1.08A	0.9/ 0.75
K1x	1	250MH PS/736	250W	PS-E	277V	272W	-	1.3A/ 1.08A	0.9/ 0.75
L	1	F32 T8/835	32W	E-PS	277V	34W	0.9	0.13A	0.98
M	1	F42 TRT/835	42W	E	277V	46W	0.98	0.38A	0.98
N	1	F32 TRT/835	32W	E	277V	36W	0.98	0.31A	0.98
N1	1	F42 TRT/835	42W	E	277V	46W	0.98	0.38A	0.98
P	1	F32 T8/835	32W	E	277V	34W	0.9	0.13A	0.98
R	1	250MH PS/736	250W	PS-E	277V	272W	-	1.3A/ 1.08A	0.9/ 0.75
Rx	1	250MH PS/736	250W	PS-E	277V	272W	-	1.3A/ 1.08A	0.9/ 0.75
S	1	CMH100 FL25/830	100W	PS-E	277V	118W	-	0.7A/ 0.45A	0.9/ 0.58
T	1	F28 T5/835	28W	PS-E	277V	33W	1.04	0.12A	0.98

Luminaire Schedule Continued.									
Tag	**# of Lamps**	**Type of Lamp**	**Lamp Wattage**	**Ballast Type**	**Voltage**	**Input Watts**	**Ballast Factor**	**Starting/ Operating Current**	**Power Factor**
U	2	F28 T5/835	28W	E-PS	277V	63W	1.03	0.23A	0.99
V	1	F28 T5/835	28W	E	277V	33W	1.04	0.12A	0.98
W	1	F42 TRT/835	42W	E	277V	46W	0.98	0.38A	0.98
X	1	CMH100 MP/830	100W	PS-E	277V	118W	-	0.7A/ 0.45A	0.9/ 0.58
Y	2	F42 TRT/835	42W	E	277V	46W	0.98	0.38A	0.98
Z	1	F42 TRT/835	42W	E	277V	46W	0.98	0.38A	0.98
AA	2	F42 TRT/835	42W	E	277V	93W	0.97	0.78A	0.99
BB	1	F42 TRT/835	42W	E	277V	46W	0.98	0.38A	0.98
CC	track	N/A	N/A	-	277V	-	-	-	-
CC1	1	CMH100 FL25/830	100W	PS-E	277V	118W	-	0.7A/ 0.45A	0.9/ 0.58
DD	1	CMH100 SP10/830	100W	PS-E	277V	118W	-	0.7A/ 0.45A	0.9/ 0.58
EE	1	F28 T5/835	28W	E-RS	277V	33W	1.04	0.12A	0.98
FF	2	F32 TRT/835	32W	E	277V	68W	0.98	0.57A	0.98

Lighting Control

Since the building is seeking LEED accreditation, the lighting control systems take significant measures to monitor and lower the energy consumption of the luminaires. There is a relay panel that centralizes photo sensors throughout the parking lot that control the fixtures throughout the lot. As for the indoor spaces, there are occupancy sensors located in various types of spaces such as classrooms, bathrooms, offices and other mixed use spaces. In addition there are also wall-mounted switches in all spaces except for the main arena. All lighting within this space is controlled by a circuit breaker within the panel serving the arena. In all public spaces emergency circuits are used to properly illuminate the areas for exit.

Mechanical and Other Loads

There is a diverse range of technologies that require an electric power supply. There are eight roof top units, numerous exhaust fans and fan coil units. Four of the eight roof top units serve the main arena at 17,200 CFM's each. Other systems that require electrical power are chillers, boilers, unit heaters, split system air conditioners, and typical pumps. Other loads include washer/ dryers, bleachers, curtain divider and simple systems found in typical concession stand.

Mechanical Equipment Schedule									
Tag	**Description**	**#**	**Units**	**Amps**	**Voltage/ Phase**	**Power Factor**	**kVA**	**kW**	**Total kW**
AC-1	air conditioning unit indoor	1	1 (MCA)	0.8A	208V/ 1PH	0.85	0.17	0.14	0.14
AC-2	air conditioning unit indoor	1	1 (MCA)	0.8A	208V/ 1PH	0.85	0.17	0.14	0.14
AC-3	air conditioning unit indoor	1	1 (MCA)	0.8A	208V/ 1PH	0.85	0.17	0.14	0.14
AC-4	air conditioning unit indoor	1	1 (MCA)	0.8A	208V/ 1PH	0.85	0.17	0.14	0.14
AC-5	air conditioning unit indoor	1	1 (MCA)	0.8A	208V/ 1PH	0.85	0.17	0.14	0.14
ACC-1	air cooled chiller	1	205 (Tons)	912A	480V/ 3PH	0.95	757.85	719.96	719.96
ACCU-1	Air conditioning unit outdoor	1	13 (MCA)	10.4A	208V/ 1PH	0.85	2.16	1.84	1.84
ACCU-2	Air conditioning unit outdoor	1	18 (MCA)	14.4A	208V/ 1PH	0.85	3.0	2.5	2.5
ACCU-3	Air conditioning unit outdoor	1	18 (MCA)	14.4A	208V/ 1PH	0.85	3.0	2.5	2.5
ACCU-4	Air conditioning unit outdoor	1	13 (MCA)	10.4A	208V/ 1PH	0.85	2.16	1.84	1.84
ACCU-5	Air conditioning unit outdoor	1	13 (MCA)	10.4A	208V/ 1PH	0.85	2.16	1.84	1.84
BP-1	boiler blend pump	1	0.5 (HP)	9.8A	120V/ 1PH	0.75	1.18	0.88	0.88
BP-2	boiler blend pump	1	0.5 (HP)	9.8A	120V/ 1PH	0.75	1.18	0.88	0.88
BP-3	boiler blend pump	1	0.5 (HP)	9.8A	120V/ 1PH	0.75	1.18	0.88	0.88

Mechanical Equipment Schedule									
Tag	**Description**	**#**	**Units**	**Amps**	**Voltage/ Phase**	**Power Factor**	**kVA**	**kW**	**Total kW**
BP-4	boiler blend pump	1	0.25 (HP)	5.8A	120V/ 1PH	0.75	0.7	0.52	0.52
CH-1	closet heater	1	0.1 (HP)	2.5A	120V/ 1PH	0.75	0.3	0.225	0.225
CWP-1	chilled water pump	1	40 (HP)	52A	480V/ 3PH	0.95	43.21	41.05	41.05
CWP-2	chilled water pump	1	40 (HP)	52A	480V/ 3PH	0.95	43.21	41.05	41.05
DHU-1	DX refrigerant air handling unit	1	7.5 (HP)	11A	480V/ 3PH	0.9	6.23	5.61	5.61
EF-1	exhaust fan	1	0.5 (HP)	9.8A	120V/ 1PH	0.75	1.18	0.88	0.88
EF-2	exhaust fan	1	0.25 (HP)	5.8A	120V/ 1PH	0.75	0.7	0.52	0.52
EF-3	exhaust fan	1	0.167 (HP)	4.4A	120V/ 1PH	0.75	0.53	0.4	0.4
EF-4	exhaust fan	1	0.25 (HP)	5.8A	120V/ 1PH	0.75	0.7	0.52	0.52
EF-5	exhaust fan	1	0.5 (HP)	9.8A	120V/ 1PH	0.75	1.18	0.88	0.88
EF-6	exhaust fan	1	0.167 (HP)	4.4A	120V/ 1PH	0.75	0.53	0.4	0.4
FC-1	fan coil unit	2	0.083 (HP)	4A	120V/ 1PH	0.75	0.48	0.36	0.36
FC-2	fan coil unit	1	0.167 (HP)	4.4A	120V/ 1PH	0.75	0.53	0.4	0.4
FC-3	fan coil unit	2	0.083 (HP)	4A	120V/ 1PH	0.75	0.48	0.36	0.36
FC-4	fan coil unit	2	0.167 (HP)	8.8A	120V/ 1PH	0.75	1.06	0.8	0.8

Mechanical Equipment Schedule									
Tag	**Description**	**#**	**Units**	**Amps**	**Voltage/ Phase**	**Power Factor**	**kVA**	**kW**	**Total kW**
HCFP-1	heating coil freeze protect	1	-	2A	120V/ 1PH	1.00	0.24	0.24	0.24
HCFP-10	heating coil freeze protect	1	-	2A	120V/ 1PH	1.00	0.24	0.24	0.24
HCFP-2	heating coil freeze protect	1	-	2A	120V/ 1PH	1.00	0.24	0.24	0.24
HCFP-3	heating coil freeze protect	1	-	2A	120V/ 1PH	1.00	0.24	0.24	0.24
HCFP-4	heating coil freeze protect	1	-	2A	120V/ 1PH	1.00	0.24	0.24	0.24
HCFP-5	heating coil freeze protect	1	-	2A	120V/ 1PH	1.00	0.24	0.24	0.24
HCFP-6	heating coil freeze protect	1	-	2A	120V/ 1PH	1.00	0.24	0.24	0.24
HCFP-7	heating coil freeze protect	1	-	2A	120V/ 1PH	1.00	0.24	0.24	0.24
HCFP-8	heating coil freeze protect	1	-	2A	120V/ 1PH	1.00	0.24	0.24	0.24
HCFP-9	heating coil freeze protect	1	-	2A	120V/ 1PH	1.00	0.24	0.24	0.24
HWP-1	heating water pump	1	30 (HP)	40A	480V/ 3PH	0.95	33.24	31.6	31.6
HWP-2	heating water pump	1	30 (HP)	40A	480V/ 3PH	0.95	33.24	31.6	31.6
HWP-3	heating water pump	1	7.5 (HP)	11A	480V/ 3PH	0.95	9.14	8.68	8.68
HWP-4	heating water pump	1	7.5 (HP)	11A	480V/ 3PH	0.95	9.14	8.68	8.68
PHWP-1	Pool heating water pump	1	7.5 (HP)	11A	480V/ 3PH	0.95	9.14	8.68	8.68

Mechanical Equipment Schedule									
Tag	**Description**	**#**	**Units**	**Amps**	**Voltage/ Phase**	**Power Factor**	**kVA**	**kW**	**Total kW**
PHWP-2	Pool heating water pump	1	2 (HP)	3.4A	480V/ 3PH	0.85	2.83	2.4	2.4
PHWP-3	Pool heating water pump	1	2 (HP)	3.4A	480V/ 3PH	0.85	2.83	2.4	2.4
PHWP-4	Pool heating water pump	1	0.5 (HP)	9.8A	120V/ 1PH	0.75	1.18	0.88	0.88
PHWP-5	Pool heating water pump	1	0.75 (HP)	1.6A	480V/ 3PH	0.85	1.33	1.13	1.13
PHWP-6	Pool heating water pump	1	1 (HP)	2.1A	480V/ 3PH	0.85	1.7	0.96	0.96
RTU-1	roof top unit	1	15 (HP)	21A	480V/ 3PH	0.95	17.46	16.6	16.6
RTU-2	roof top unit	1	20 (HP)	27A	480V/ 3PH	0.95	22.44	21.28	21.28
RTU-3	roof top unit	1	25 (HP)	34A	480V/ 3PH	0.95	28.25	26.84	26.84
RTU-4	roof top unit	1	15 (HP)	21A	480V/ 3PH	0.95	17.46	16.6	16.6
RTU-5	roof top unit	2	15 (HP)	42A	480V/ 3PH	0.95	34.92	33.17	33.17
RTU-6	roof top unit	2	15 (HP)	42A	480V/ 3PH	0.95	34.92	33.17	33.17
RTU-7	roof top unit	2	15 (HP)	42A	480V/ 3PH	0.95	34.92	33.17	33.17
RTU-8	roof top unit	2	15 (HP)	42A	480V/ 3PH	0.95	34.92	33.17	33.17
UH-1	unit heater	1	0.05 (HP)	1.5A	120V/ 1PH	0.75	0.18	0.14	0.14
UH-2	unit heater	1	0.167 (HP)	4.4A	120V/ 1PH	0.75	0.53	0.4	0.4

Mechanical Equipment Schedule									
Tag	**Description**	**#**	**Units**	**Amps**	**Voltage/ Phase**	**Power Factor**	**kVA**	**kW**	**Total kW**
VF-1	centrifugal fan	1	3 (HP)	4.8A	480V/ 3PH	0.85	2.5	2.12	2.12
-	elevator	1	20 (HP)	27A	480V/ 3PH	0.95	22.44	21.32	21.32
-	elevator pit sump pump	1	0.5 (HP)	9.8A	120V/ 1PH	0.75	1.18	0.88	0.88

Miscellaneous Equipment Schedule									
Tag	**Description**	**#**	**Units**	**Amps**	**Voltage/ Phase**	**Power Factor**	**kVA**	**kW**	**Total kW**
-	chemical mixer	1	0.2 (kVA)	1.67A	120V/ 1PH	0.9	0.2	0.18	0.18
-	coffee brewer	2	1.5 (kVA)	25A	120V/ 1PH	0.9	3	2.7	2.7
-	dryer	2	3 (W)	12A	480V/ 3PH	0.9	10	9	9
-	Ice machine	1	0.7 (kVA)	5.83A	120V/ 1PH	0.9	0.7	0.63	0.63
-	microwave	1	1.9 (kVA)	15.83A	120V/ 1PH	0.9	1.9	1.71	1.71
-	nacho cheese warmer	1	0.3 (kVA)	2.5A	120V/ 1PH	0.9	0.3	0.27	0.27
-	popcorn popper	1	1.2 (kVA)	10A	120V/ 1PH	0.9	1.2	1.08	1.08
-	pretzel warmer	2	1.5 (kVA)	12.5A	120V/ 1PH	0.9	1.5	1.35	1.35
-	refrigerator	1	0.8 (kVA)	6.67A	120V/ 1PH	0.9	0.8	0.72	0.72
-	washer	2	3 (W)	12A	480V/ 3PH	0.9	10	9	9

Service Entrance Size

The service size entrance is the most quintessential part of the electrical distribution system since it acts as the main anchor for the system. When determining the size of the service entrance there is three very distinct methods that allow the electrical designer to accurately size the main distribution equipment. The first is method A and is based a VA/SF measurement for a building type. The second is method B and takes a more detailed approach and breaks down the various types of equipment and multiplies once again by a VA/SF measurement. The last and final method is method C. In this case the demand loads for all the equipment requiring an electrical connection are compiled and the demand load for the entire system is configured.

Method A:

110,000 (SF) x 13 (VA/SF) = 1,430,000 (VA)

1,430 (kVA) / 0.831 (kV) = **1720A Service = 2,000A.**

Method B:

a) Normal Lighting– School = 3 (VA/SF)

b) Receptacles – 1 (VA/SF)

c) HVAC system – Exhaust Fans, Fossil Fuel Heating, Cooling

    a. Exhaust Fans – 2 (VA/SF)

    b. Fossil Fuel Heating – 4 (VA/SF)

    c. Cooling – 8 (VA/SF)

d) Kitchen Equipment – Concession/ Warming = 10 (VA/SF)

e) Architectural Equipment – Elevator = 50kW, PF = 1.0

Sum Loads = 24 (VA/SF) x 110,000 (SF) = 2,640,000 (VA)

2,640 (kVA) + 50 (kVA) = 2,690 (kVA) / 0.831 (kV) = **3237A, Service =4,000A**

Method C:

a) Lighting, Receptacle, and Small Equipment Demand Load = 1,510.686 (kVA)

b) Mechanical Demand Loads = 1,133.01 (kVA)

Sum Loads = 1,510.686 (kVA) + 1,133.01 (kVA) = 2,643.696 (kVA)

2,643.696 (kVA) x 1.25 (Demand Factor) = 3304.62 (kVA)

3,304.62 (kVA) / 0.831 (kV) = **3,976.68 A, Service = 4,000A**

Comparison:

Phase	Load - kVA	Voltage System	Load - Amps
Conceptual Design	1,430 kVA	480/277V, 3PH	1720A
Design Development	2,690 kVA	480/277V, 3PH	3237A
Working Drawings	3,305 kVA	480/277V, 3PH	3976A

The building has not yet been constructed thus the Actual Conditions for the service entrance have not been recorded.

Service Entrance	Size - Amps	Voltage System	Capacity - kVA
Actual Conditions	3200 A	480/277V, 3PH	2,659 kVA
Total Actual Conditions	N/A	480/277V, 3PH	N/A
Summary (VA/SF)	24.17 (VA/SF)	480/277V, 3PH	-

Environmental Stewardship Design

The Susquehanna Center is currently seeking USGBC's LEED rating. It utilizes the use of occupancy and vacancy sensors in the bathrooms, offices and classrooms as well as energy efficient lighting equipment.

Design Issues

The only design to be considered is the multi-section main circuit breaker section that serves the existing building and new expansions.

Communication Systems

Fire Alarm System

The fire alarm control panel is located at the main level of the lobby. There are numerous signal and detection devices throughout the building. There are horn strobes located throughout the corridors and large public spaces. Smoke detectors, manual pull stations and signaling devices are also located per standard NFPA 72 requirements.

Telecommunications

There are voice/ data outlets located in offices and classrooms to allow for telephone and internet connections. There is also an intercom system that serves the main arena of the gym to allow for commentary during games.

Appendix I

*Riser Diagram

See attached PDF version at end of Report.

Appendix II

HID Lamps and Ballasts

Tag: H, Hx, S, X, DD Lamp: (1) 100W Par38 Ballast: Pulse Start Electronic

Product Details http://ecom.mysylvania.com/sylvaniab2b/catalog/ProductDetailsPrint.inc....

Product Number: 64752

Order Abbreviation: MCP100PAR38/U/SP/830/ECO PB

General Description: 100W, high CRI, ceramic arc tube, reduced color shift, high performance, ECO, open fixture rated Par38 Metal Halide Lamp, clear, spot, universal burn

Product Information	
Abbrev. With Packaging Info.	MCP100PAR38USP830ECO PB 6/CS 1/SKU
Approx. Lumens (initial - horizontal)	6500
Approx. Lumens (initial - vertical)	6500
Average Rated Life - Horizontal (hr)	15000
Average Rated Life - (hr)	15000
Avg Rated Life (hrs)	15000
Base	E26 Medium
Beam Angle (deg)	15
Beam Type	SP
Bulb	PAR38
Centerbeam Candlepower (cp)	58000
Color Rendering Index (CRI)	88
Color Temperature/CCT (K)	3000
Diameter (in)	4.760
Diameter (mm)	121.00
Family Brand Name	Metalarc® Ceramic
Fixture Requirement	O
Hot Restrike Time (min)	4-6
Lamp Finish	Clear
Maximum Base Temperature - Fahrenheit	374
Maximum Base Temperature - Celsius	190
Maximum Bulb Temperature - Fahrenheit	662
Maximum Bulb Temperature - Celsius	400
Maximum Overall Length - MOL (in)	5.32
Maximum Overall Length - MOL (mm)	135
Nominal Voltage (V)	100.00
Nominal Wattage (W)	100.00
Operating Position	Universal

1 of 2 10/25/2010 3:24 PM

Warm-up Time (min)	2-4

Footnotes

- Consult your OSRAM SYLVANIA Lighting Representative for compatible electronic operating systems.
- Use with 4000V pulse rated sockets only.
- Passes Federal TCLP test based on NEMA LL Series Standards. TCLP data available upon request. Disposal regulations may vary depending on location. Please check your local and state/provincial regulations.
- O = Lamps classified as O-type, comply with ANSI standard C78.389 for containment testing and may be used in open luminaries. See lamp warning.
- Lamps may be operated on ANSI M140 Compliant Ballast.
- UV-Stop quartz
- Lamps with a E26 medium skirt base are not compatible with exclusionary medium sockets.

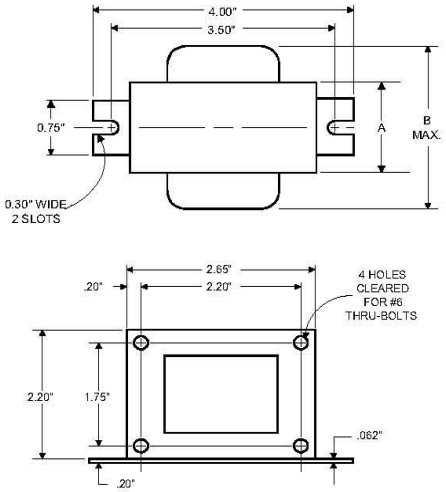
PHILIPS ADVANCE

Metal Halide Lamp Ballast

Catalog Number 71A5337BP
For 100W M90/M140
60 Hz R-HPF
Status: Active

DIMENSIONS AND DATA

2 5/8 X 2 3/16 CORE

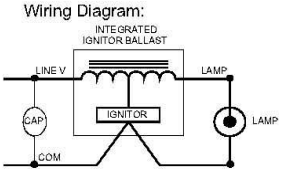


INPUT VOLTS		277				
CIRCUIT TYPE	R-HPF					
POWER FACTOR (min)	90%					
REGULATION						
Line Volts	±5%					
Lamp Watts	±10%					
LINE CURRENT (Amps)						
Operating		0.45				
Open Circuit		1.05				
Starting		0.70				
UL TEMPERATURE RATINGS						
Insulation Class	H(180°C)					
Coil Temperature Code	1029	A				
MIN. AMBIENT STARTING TEMP.	-20°F or -30°C					
NOM. OPEN CIRCUIT VOLTAGE	277					
INPUT VOLTAGE AT LAMP DROPOUT		190				
INPUT WATTS	118					
RECOMMENDED FUSE (Amps)		3				
CORE and COIL						
Dimension (A)	1.80					
Dimension (B)	3.10					
Weight (lbs.)	3.2					
Lead Lengths	12"					
CAPACITOR REQUIREMENT						
Microfarads	10.0					
Volts (min.)	280					
Fault Current Withstand (amps)						
60 Hz TEST PROCEDURES (Refer to Philips Lighting Electronics N.A. TEST Procedure for HID Ballasts - Form 127						
High Potential Test (Volts)						
1 minute	2000					
2 seconds	2500					
Open Circuit Voltage Test (Volts)	260-290					
Short-Circuit Current Test (Amps)						
Secondary Current	1.05-1.55					
Input Current		0.25-0.35	-	-	-	-

Capacitor: 7C100M30RA

Capacitance: 10
Dia/Oval Dim: 1.65
Height: 2.75
Temp Rating: 105°C

Wiring Diagram:



U.L. RECOGNIZED

Fig. H

Ignitor: INTEGRAL

An ignitor integral to the core and coil assembly is used to start the lamp.

Ballast to Lamp Distance (BTL) = 2 feet
Temp Rating: 125°C

Typical Ordering Information

(please call Philips Lighting Electronics N.A. for suffix availability)

Order Suffix	Description

Data is based upon tests performed by Philips Lighting Electronics N.A. in a controlled environment and is representitive of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice.

PHILIPS LIGHTING ELECTRONICS N.A.
10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Tel: 800-322-2086 · Fax: 888-423-1882 · www.philips.com/advance
Customer Support/Technical Service: 800-372-3331 · OEM Support: 866-915-5886

Revised: 07/31/09

Tag: K1, K1x, R, Rx Lamp: (1) 250W BT28 Ballast: Pulse Start Electronic

Product Details http://ecom.mysylvania.com/sylvaniab2b/catalog/ProductDetailsPrint.inc....

Product Number: 64617

Order Abbreviation: MS250/C/PS/BU-ONLY

General Description: 250W METALARC PULSE START quartz metal halide lamp, high output, position dedicated, reduced color shift, E39 base, BT28 bulb, enclosed fixture rated, base up only, coated, 3600K

Product Information	
Abbrev. With Packaging Info.	MS250CPSBUONLY 6/CS 1/SKU
ANSI Code	M153/E: M138/E
Approx. Lumens (initial - vertical)	21500
Approx. Lumens (mean - vertical)	15500
Average Rated Life - Vertical (hr)	20000
Base	E39 Mogul
Bulb	BT28
Color Rendering Index (CRI)	70
Color Temperature/CCT (K)	3600
Diameter (in)	3.500
Diameter (mm)	89.00
Family Brand Name	Metalarc® Pulse Start
Fixture Requirement	E
Hot Restrike Time (min)	5-7
Lamp Finish	Coated
Light Center Length - LCL (in)	5
Light Center Length - LCL (mm)	127
Maximum Base Temperature - Fahrenheit	482
Maximum Base Temperature - Celsius	250
Maximum Bulb Temperature - Fahrenheit	752
Maximum Bulb Temperature - Celsius	400
Maximum Overall Length - MOL (in)	8.31
Maximum Overall Length - MOL (mm)	211
Nominal Voltage (V)	133.00
Nominal Wattage (W)	250.00
Operating Position	Base up within 15deg only
Warm-up Time (min)	2-4

Footnotes
• Use with 4000V pulse rated sockets only. • E = Lamps classified as E-type are to be used ONLY in suitably enclosed luminaries. See lamp warning. • When operated on ballasts having a sustaining voltage less than 270V, lamp life may be significantly reduced.*

1 of 1 10/25/2010 3:55 PM

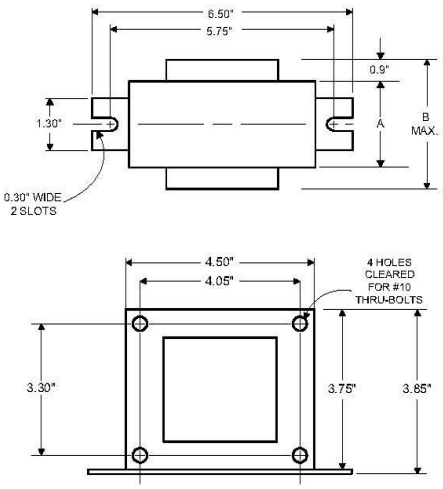
PHILIPS ADVANCE

Metal Halide Lamp Ballast

Catalog Number 71A5737BPEE
For 250W M138/M153 (P.S.)
60 Hz R-HPF
Status: Active

DIMENSIONS AND DATA

3 3/4 X 4 1/2 CORE

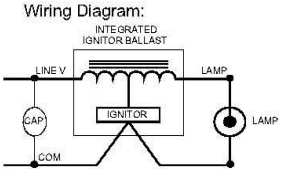


INPUT VOLTS		277				
CIRCUIT TYPE	R-HPF					
POWER FACTOR (min)	90%					
REGULATION						
Line Volts	±5%					
Lamp Watts	±10%					
LINE CURRENT (Amps)						
Operating		1.08				
Open Circuit		1.50				
Starting		1.30				
UL TEMPERATURE RATINGS						
Insulation Class	H(180°C)					
Coil Temperature Code	1029	A				
MIN. AMBIENT STARTING TEMP.	-20°F or -30°C					
NOM. OPEN CIRCUIT VOLTAGE	277					
INPUT VOLTAGE AT LAMP DROPOUT		200				
INPUT WATTS	272					
RECOMMENDED FUSE (Amps)		4				
CORE and COIL						
Dimension (A)	1.25					
Dimension (B)	3.20					
Weight (lbs.)	6.5					
Lead Lengths	12"					
CAPACITOR REQUIREMENT						
Microfarads	14.0					
Volts (min.)	300					
Fault Current Withstand (amps)						
60 Hz TEST PROCEDURES (Refer to Philips Lighting Electronics N.A. TEST Procedure for HID Ballasts - Form 127						
High Potential Test (Volts)						
1 minute	2000					
2 seconds	2500					
Open Circuit Voltage Test (Volts)	250-305					
Short-Circuit Current Test (Amps)						
Secondary Current	2.40-3.05					
Input Current		1.00-1.55	-	-	-	-

Capacitor: 7C140M30RA

Capacitance: 14
Dia/Oval Dim: 1.65
Height: 2.75
Temp Rating: 105°C

Wiring Diagram:



U.L. RECOGNIZED

Fig. H

Ignitor: INTEGRAL

An ignitor integral to the core and coil assembly is used to start the lamp.

Ballast to Lamp Distance (BTL) = 2 feet
Temp Rating: 125°C

Typical Ordering Information

(please call Philips Lighting Electronics N.A. for suffix availability)

Order Suffix	Description
001DEE	88% EFFICIENT BALLAST KIT - EISA COMPLIANT
EE	EISA COMPLIANT - 88% EFFICIENT BALLAST

Data is based upon tests performed by Philips Lighting Electronics N.A. in a controlled environment and is representitive of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice.

PHILIPS LIGHTING ELECTRONICS N.A.
10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Tel: 800-322-2086 · Fax: 888-423-1882 · www.philips.com/advance
Customer Support/Technical Service: 800-372-3331 · OEM Support: 866-915-5886

Revised: 10/26/09

Tag: K, Kx **Lamp: (1) 400W BT37** **Ballast: Pulse Start Electronic**

Product Details http://ecom.mysylvania.com/sylvaniab2b/catalog/ProductDetailsPrint.inc....

Product Number: 64527

Order Abbreviation: MS400/C/PS/BU-ONLY

General Description: 400W METALARC PULSE START quartz metal halide lamp, high output, position dedicated, reduced color shift, E39 base, BT37 bulb, enclosed fixture rated, base up only, coated, 3600K

Product Information	
Abbrev. With Packaging Info.	MS400CPSBUONLY 6/CS 1/SKU
ANSI Code	M155/S:M135/S
ANSI Code 2	M135/O & M135/S *
Approx. Lumens (initial - vertical)	42000
Approx. Lumens (mean - vertical)	29000
Average Rated Life - Vertical (hr)	20000
Base	E39 Mogul
Bulb	BT37
Color Rendering Index (CRI)	70
Color Temperature/CCT (K)	3600
Diameter (in)	4.600
Diameter (mm)	117.00
Family Brand Name	Metalarc® Pulse Start
Fixture Requirement	S
Hot Restrike Time (min)	5-7
Lamp Finish	Coated
Light Center Length - LCL (in)	7
Light Center Length - LCL (mm)	178
Maximum Base Temperature - Fahrenheit	482
Maximum Base Temperature - Celsius	250
Maximum Bulb Temperature - Fahrenheit	752
Maximum Bulb Temperature - Celsius	400
Maximum Overall Length - MOL (in)	11.5
Maximum Overall Length - MOL (mm)	292
Nominal Voltage (V)	135.00
Nominal Wattage (W)	400.00
Operating Position	Base up within 15deg only
Warm-up Time (min)	2-4

Footnotes

- Use with 4000V pulse rated sockets only.
- 20,000 average rated life based on 10 hrs/start. 30,000 average rated life based on 120 hrs/start.
- S = When operated within 15 degrees of vertical, this lamp may be operated in an open luminaire provided the installation is not near people or flammable or combustible material, otherwise it must be operated in a suitably enclosed luminaire. See lamp warning.
- When operated on ballasts having a sustaining voltage less than 270V, lamp life may be significantly reduced.*

1 of 2 10/25/2010 4:12 PM

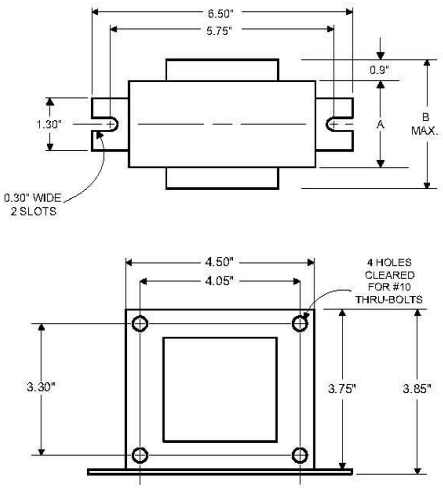
PHILIPS ADVANCE

Metal Halide Lamp Ballast

Catalog Number 71A6137BPEE
For 400W M135/M155 (P.S.)
60 Hz R-HPF
Status: Active

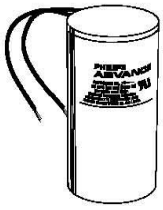
DIMENSIONS AND DATA

3 3/4 X 4 1/2 CORE



INPUT VOLTS		277				
CIRCUIT TYPE	R-HPF					
POWER FACTOR (min)	90%					
REGULATION						
Line Volts	±5%					
Lamp Watts	±9%					
LINE CURRENT (Amps)						
Operating		1.70				
Open Circuit		2.10				
Starting		2.10				
UL TEMPERATURE RATINGS	H(180°C)					
Insulation Class	1029					
Coil Temperature Code	-20°F or -30°C	A				
MIN. AMBIENT STARTING TEMP.	277					
NOM. OPEN CIRCUIT VOLTAGE						
INPUT VOLTAGE AT LAMP DROPOUT	425	200				
INPUT WATTS						
RECOMMENDED FUSE (Amps)		5				
CORE and COIL	1.60					
Dimension (A)	3.80					
Dimension (B)	9					
Weight (lbs.)	12"					
Lead Lengths						
CAPACITOR REQUIREMENT	20.0					
Microfarads	300					
Volts (min.)						
Fault Current Withstand (amps)						
60 Hz TEST PROCEDURES (Refer to Philips Lighting Electronics N.A. TEST Procedure for HID Ballasts - Form 127						
High Potential Test (Volts)	2000					
1 minute	2500					
2 seconds	250-305					
Open Circuit Voltage Test (Volts)						
Short-Circuit Current Test (Amps)	3.80-4.60					
Secondary Current						
Input Current		1.70-2.60	-	-	-	-

Capacitor: 7C200P30-RA



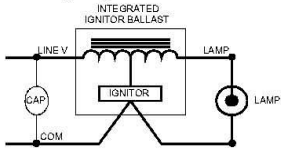
Capacitance: 20
Dia/Oval Dim: 1.65
Height: 3.7
Temp Rating: 105°C

Ignitor: INTEGRAL

An ignitor integral to the core and coil assembly is used to start the lamp.

Ballast to Lamp Distance (BTL) = 2 feet
Temp Rating: 125°C

Wiring Diagram:



U.L. RECOGNIZED

Fig. H

Typical Ordering Information

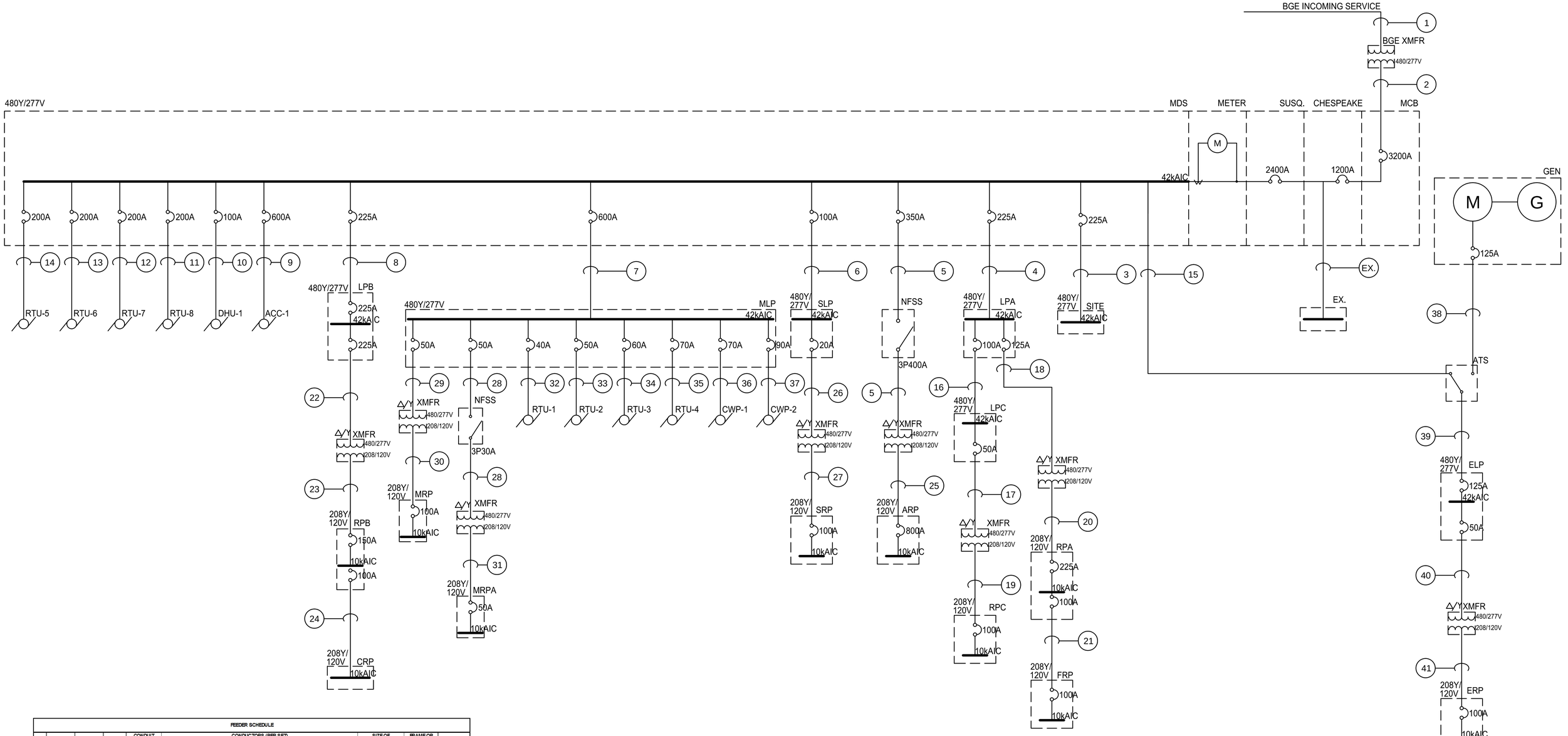
(please call Philips Lighting Electronics N.A. for suffix availability)

Order Suffix	Description
EE	EISA COMPLIANT - 88% EFFICIENT BALLAST

Data is based upon tests performed by Philips Lighting Electronics N.A. in a controlled environment and is representitive of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice.

PHILIPS LIGHTING ELECTRONICS N.A.
10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Tel: 800-322-2086 · Fax: 888-423-1882 · www.philips.com/advance
Customer Support/Technical Service: 800-372-3331 · OEM Support: 866-915-5886

Revised: 10/26/09



SINGLE LINE DIAGRAM

FEEDER SCHEDULE

TAG	FROM	TO	NO. OF SETS	CONDUIT (PER SET) SIZE	CONDUIT (PER SET) TYPE	CONDUCTORS (PER SET) PHASE CONDUCTORS No.	PHASE CONDUCTORS SIZE	PHASE CONDUCTORS TYPE	NEUTRAL CONDUCTORS No.	NEUTRAL CONDUCTORS SIZE	NEUTRAL CONDUCTORS TYPE	GROUND CONDUCTORS No.	GROUND CONDUCTORS SIZE	GROUND CONDUCTORS TYPE	SIZE OF OVERCURRENT PROTECTION	FRAME OR SWITCH SIZE	REMARKS
1	UTILITY	BGE XFMR	2	5"	PVC												BY UTILITY
2	BGE XFMR	MDS	8	4"	PVC										3200	4000A/3P	
3	MDS	SITE	1	2 1/2"	EMT	3	4/0 AWG	CU THWN	1	4/0 AWG	CU THWN	1	4 AWG	CU THWN	225	225A/3P	
4	MDS	LPA	1	2 1/2"	EMT	3	4/0 AWG	CU THWN	1	4/0 AWG	CU THWN	1	4 AWG	CU THWN	225	225A/3P	
5	MDS	XFMR	1	3 1/2"	EMT	3	500 MCM	CU THWN	0	N/A	N/A	1	3 AWG	CU THWN	350	400A/3P	
6	MDS	SLP	1	1 1/4"	EMT	3	4 AWG	CU THWN	1	4 AWG	CU THWN	1	8 AWG	CU THWN	100	100A/3P	
7	MDS	MLP	2	3"	EMT	3	350 MCM	CU THWN	1	350 MCM	CU THWN	1	1 AWG	CU THWN	600	600A/3P	
8	MDS	LPB	1	2 1/2"	EMT	3	4/0 AWG	CU THWN	1	4/0 AWG	CU THWN	1	4 AWG	CU THWN	225	225A/3P	
9	MDS	ACC-1	2	3"	EMT	3	350 MCM	CU THWN	0	N/A	N/A	1	1 AWG	CU THWN	600	800A/3P	
10	MDS	DHU-1	1	1 1/4"	EMT	3	3 AWG	CU THWN	0	N/A	N/A	1	8 AWG	CU THWN	100	100A/3P	
11	MDS	RTU-8	1	2"	EMT	3	3/0 AWG	CU THWN	0	N/A	CU THWN	1	6 AWG	CU THWN	225	200A/3P	
12	MDS	RTU-7	1	2"	EMT	3	3/0 AWG	CU THWN	0	N/A	CU THWN	1	6 AWG	CU THWN	225	200A/3P	
13	MDS	RTU-6	1	2"	EMT	3	3/0 AWG	CU THWN	0	N/A	CU THWN	1	6 AWG	CU THWN	225	200A/3P	
14	MDS	RTU-5	1	2"	EMT	3	3/0 AWG	CU THWN	0	N/A	CU THWN	1	6 AWG	CU THWN	225	200A/3P	
15	MDS	ATS	1	1 1/2"	EMT	3	1 AWG	CU THWN	1	1 AWG	CU THWN	1	6 AWG	CU THWN	150	150A/3P	
16	LPA	LPC	1	1 1/4"	EMT	3	3 AWG	CU THWN	1	3 AWG	CU THWN	1	8 AWG	CU THWN	100	225A/3P	
17	LPC	XFMR	1	3/4"	EMT	3	8 AWG	CU THWN	0	N/A	N/A	1	10 AWG	CU THWN	50	100A/3P	
18	LPA	XFMR	1	1 1/2"	EMT	3	1 AWG	CU THWN	0	N/A	N/A	1	6 AWG	CU THWN	125	225A/3P	
19	XFMR	RPC	1	1 1/4"	EMT	3	3 AWG	CU THWN	1	3 AWG	CU THWN	1	8 AWG	CU THWN	100	100A/3P	
20	XMFR	RPA	1	2 1/2"	EMT	3	4/0 AWG	CU THWN	1	4/0 AWG	CU THWN	1	4 AWG	CU THWN	225	225A/3P	
21	RPA	FRP	1	1 1/4"	EMT	3	3 AWG	CU THWN	1	3 AWG	CU THWN	1	8 AWG	CU THWN	100	225A/3P	
22	LPB	XFMR	1	1"	EMT	3	4 AWG	CU THWN	0	N/A	N/A	1	8 AWG	CU THWN	225	225A/3P	
23	XFMR	RPB	1	2"	EMT	3	1/0 AWG	CU THWN	1	1/0 AWG	CU THWN	1	6 AWG	CU THWN	150	150A/3P	
24	RPB	CRP	1	1 1/4"	EMT	3	3 AWG	CU THWN	1	3 AWG	CU THWN	1	8 AWG	CU THWN	100	100A/3P	
25	XFMR	ARP	2	3 1/2"	EMT	3	600 MCM	CU THWN	1	600 MCM	CU THWN	1	2/0 AWG	CU THWN	800	800A/3P	
26	SLP	XFMR	1	3/4"	EMT	3	8 AWG	CU THWN	0	N/A	N/A	1	10 AWG	CU THWN	20	100A/3P	
27	XFMR	SRP	1	1 1/4"	EMT	3	3 AWG	CU THWN	1	3 AWG	CU THWN	1	8 AWG	CU THWN	100	100A/3P	
28	MLP	XFMR	1	1"	EMT	3	4 AWG	CU THWN	0	N/A	N/A	1	8 AWG	CU THWN	50	600A/3P	
29	MLP	XFMR	1	3/4"	EMT	3	8 AWG	CU THWN	0	N/A	N/A	1	10 AWG	CU THWN	50	600A/3P	
30	XFMR	MRP	1	2"	EMT	3	1/0 AWG	CU THWN	1	1/0 AWG	CU THWN	1	6 AWG	CU THWN	100	100A/3P	
31	XFMR	MRPA	1	1 1/4"	EMT	3	3 AWG	CU THWN	1	3 AWG	CU THWN	1	8 AWG	CU THWN	50	100A/3P	
32	MLP	RTU-1	1	3/4"	EMT	3	8 AWG	CU THWN	0	N/A	CU THWN	1	10 AWG	CU THWN	40	100A/3P	
33	MLP	RTU-2	1	3/4"	EMT	3	8 AWG	CU THWN	0	N/A	CU THWN	1	10 AWG	CU THWN	50	600A/3P	
34	MLP	RTU-3	1	1"	EMT	3	6 AWG	CU THWN	0	N/A	CU THWN	1	8 AWG	CU THWN	60	600A/3P	
35	MLP	RTU-4	1	1 1/4"	EMT	3	4 AWG	CU THWN	0	N/A	CU THWN	1	8 AWG	CU THWN	70	600A/3P	
36	MLP	CWP-1	1	1 1/4"	EMT	3	3 AWG	CU THWN	0	N/A	CU THWN	1	8 AWG	CU THWN	70	600A/3P	
37	MLP	CWP-2	1	1 1/4"	EMT	3	3 AWG	CU THWN	0	N/A	CU THWN	1	8 AWG	CU THWN	90	600A/3P	
38	GEN	ATS	1	1 1/4"	EMT	3	1 AWG	CU THWN	1	1 AWG	CU THWN	1	6 AWG	CU THWN	125	125A/3P	
39	ATS	ELP	1	1 1/4"	EMT	3	1 AWG	CU THWN	1	1 AWG	CU THWN	1	6 AWG	CU THWN	125	125A/3P	
40	ELP	XFMR	1	3/4"	EMT	3	8 AWG	CU THWN	0	N/A	N/A	1	10 AWG	CU THWN	50	125A/3P	
41	XFMR	ERP	1	1 1/4"	EMT	3	3 AWG	CU THWN	1	3 AWG	CU THWN	1	8 AWG	CU THWN	100	100A/3P	
42	ERP	ERPA	1	1 1/4"	EMT	3	3 AWG	CU THWN	1	3 AWG	CU THWN	1	8 AWG	CU THWN	100	100A/3P	

NOTES:
1. REFER TO RISER DIAGRAM FOR FEEDER TAGS

AL=ALUMINUM
CU=COPPER

NAME:	DATE:
BRAD GAUGH	OCTOBER 20, 2010
SCALE:	PROJECT:
NOT TO SCALE	SUSQUEHANNA CENTER RENOVATIONS & EXPANSIONS