AE 481W

TECHNICAL REPORT 2 | ELECTRICAL SYSTEMS

Towson West Village Commons

Towson University
Towson, Maryland

100% Submission

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Executive Summary

The following report reviews and presents information for Towson West Village Commons. The building covers 86,339 square feet and requires various electrical needs. Systems include snow melting, elevators, lighting, receptacles, and mechanical loads. The primary system for the building is 480Y/277V 3PH, 4W but is transformed down to 208Y/120V for various loads.

The building includes its own emergency generator and shares a quick connect switchboard with Towson Run Apartments for a portable generator connection. The primary service and emergency systems feed through one service entrance, Electrical Room 003. The building is served by a 2000A switchboard which provides radial distribution to all loads. A preliminary single-line diagram was generated from the riser diagrams provided by James Posey Associates.

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Description of Distribution System

Towson West Village Commons utilizes a simple radial distribution to provide electricity throughout the building. Power enters the building from the service provider, Baltimore Gas and Electric, at a typical 13.2 kV. Once entering the building, distribution is handled by a single-ended substation found in the basement. Voltage is immediately stepped down to 480Y/277V, 3Ph, 4W, and then is distributed throughout the building. The 480Y/277V, 3Ph, 4W distributes power to the lighting control panels, mechanical distribution panel, snow melting system, and the cafeteria kitchen panels from switchboard SWB. Through transformer TDPB, the distribution changes to a 208Y/120V, 3Ph, 4W system. This system distributes power primarily to the rented retail spaces, building monitoring systems, and receptacle loads from distribution panel DPB. Both distribution systems stem from the electrical room found in the basement of the South end of the building.

To provide for emergency situations, the building receives power from a 150 kW natural gas generator located outside of the building. The 480Y/277V, 3Ph, 4W emergency service enters the building and is transferred to panelboard EB and SB through automatic transfer switches. Two small pad-mounted transformers, TEPB and TSPB, reduce the power distribution to a 208Y/120V, 3Ph, 4W system. This voltage is distributed to panelboard EPB and SPB. These four panels are the primary means of emergency power.

For long term power issues, a quick connect generator switchboard can be connected to a large generator. The switchboard is enclosed in a NEMA rated 3R enclosure and has a main circuit breaker rated for 2000A. The generator connected through this switchboard must be rated at 480Y/277V. Connection is made directly into the buildings main switchboard, SWB.

Utility Company Information

The utility company for the Towson West Village Commons is:

Baltimore Gas and Electric
7225 Windsor Blvd,
Windsor Mill, MD 21244
410.685.0123
http://www.bge.com

In the residence areas of Towson University, metering is conducted by BGE and rated at typically General Service Large of GL status. Because of the connection to Towson Run Apartments, the meter reads well over the 60 kW at peak demand, but does not go above 600kW needed for Primary Service Voltage.

The rate schedule below is provided for the months of September and October of 2010.

Monthly Service Charge: $110.00

Transmission Charge: $1.74/kW

Table 1: BGE Rate Schedule per kWh

	On-Peak	Inter-Peak	Off-Peak
Sept. 1 - Sept. 30	$11.68	$9.264	$8.927
Oct. 1 - Nov. 1	$9.134	$7.821	$6.337

Table 2: Demand Hours

	On-Peak	Inter-Peak	Off-Peak
Sept. 1 - Sept. 30	10am – 8pm	7am – 10am, 8pm – 11pm	11pm – 7am
Oct. 1 - Nov. 1	11am – 5pm	7am – 11am, 5pm – 9pm	9pm – 7am

Service Entrance

Towson West Village Commons is one of the new additions to the West Village area. West Village is made up of various residence halls, either previously constructed or currently in use. The distribution system for the West Village Commons begins with an existing outdoor connection to the local electric grid. Towson Run Apartments and the new West Village Commons will use an existing three section switch gear to be metered and divided between the buildings. Power enters the building through Electrical Room 003 found in the basement, level 0. Power is transformed from 13.2 kV to 480Y/277V which is then distributed throughout the building via the 2000 A main switchboard.

Voltage Systems

There are two primary voltage systems within the building, 480Y/277V, 3Ph, 4W and 208Y/120V, 3Ph, 4W. Each of these systems serves different electrical needs in the building. The list below describes the typical loads of each voltage system.

480Y/277V, 3Ph, 4W

- Lighting Loads
- HVAC Equipment
- Snow Melting System

208Y/120V, 3Ph, 4W

- Convenience Store
- Kitchen(Towson) Loads
- Kitchen(Rented) Loads
- Lighting Loads, Dimmed
- Receptacles

Emergency Power Systems

The emergency power system is a 480Y/277V, 3Ph, 4W system based around a 150 kW natural gas generator. Through Automatic Transfer Switch 1 found in Electrical Room 003, life safety loads are connected to the generator. These loads include panel boards EP and EPB. Transformer TEPB is also connected to the distribution to step the 480Y/277V, 3Ph, 4W system down to 277Y/120V, 3Ph, 4W system for panel EPB. While this serves the life safety system, the generator is also capable of maintaining the standby panels SB, SPB, and SP2 and elevator panels VB and VPB.

Along with this primary emergency system, there is also a quick connect switchboard rated at 2000A. A generator rated at either 1600 kW or 2000 kW can be used to power the main switchboards and all building loads for both Towson Run Apartments and West Village Commons.

Locations of Switchgear

All major distribution equipment, except for a wall-mounted transformer is located in electrical room 003 or the adjacent boiler room 001. Due to its size and ventilation requirements, the gas generator is located outside of the building along with the existing switchgear provided by BGE for electrical service.

Table 3: Major Distribution Equipment

Tag	Type of Equipment	Floor Level	Room Number	Room Name	DWG Number
ATS-1	Automatic Transfer Switch	Level 0	003	Electrical Room	E4.0
ATS-2	Automatic Transfer Switch	Level 0	003	Electrical Room	E4.0
ATS-3	Automatic Transfer Switch	Level 0	003	Electrical Room	E4.0
DPB	Distribution Panel	Level 0	003	Electrical Room	E4.0
MDB	Distribution Panel	Level 0	001	Boiler Room	E4.0
---	Generator	Site	---	---	ME0.1
---	Switchboard	Site	---	---	ME0.1
SWB	Switchboard	Level 0	003	Electrical Room	E4.0
---	Switchgear	Site	---	---	ME0.1
---	Transformer	Level 0	003	Electrical Room	E4.0
TDPB	Transformer	Level 0	003	Electrical Room	E4.0
TEPB	Transformer	Level 0	003	Electrical Room	E4.0
TMPB	Transformer	Level 0	001	Boiler Room	E4.0
TRP4	Transformer	Level 4	409A	Electrical Room	E4.1
TSPB	Transformer	Level 0	003	Electrical Room	E4.0
TVPB	Transformer	Level 0	003	Electrical Room	E4.0

Table 4: Panel Board Listing

Tag	Voltage System	Main Amps	Type	Level	Room Number	Room Name	DWG Number
EB	480Y/277V, 3Ph, 4W	400	MCB	0	003	Electrical Room	E4.0
EPB	208Y/120V, 3Ph, 4W	100	MCB	0	003	Electrical Room	E4.0
LPB	480Y/277V, 3Ph, 4W	125	MLO	0	003	Electrical Room	E4.0
MPB	208Y/120V, 3Ph, 4W	100	MCB	0	001	Boiler Room	E4.0
RPB	208Y/120V, 3Ph, 4W	225	MCB	0	003	Electrical Room	E4.0
SB	480Y/277V, 3Ph, 4W	125	MCB	0	003	Electrical Room	E4.0
SMB	480Y/277V, 3Ph, 4W	250	MLO	0	003	Electrical Room	E4.0
SPB	208Y/120V, 3Ph, 4W	225	MCB	0	003	Electrical Room	E4.0
VB	480Y/277V, 3Ph, 4W	125	MCB	0	003	Electrical Room	E4.0
VPB	208Y/120V, 3Ph, 4W	100	MCB	0	003	Electrical Room	E4.0
CS1	208Y/120V, 3Ph, 4W	225	MCB	1	111	Convenience Store	E2.1
LP1	480Y/277V, 3Ph, 4W	125	MCB	1	118	Corridor	E2.1
R1	208Y/120V, 3Ph, 4W	400	MCB	1	123	Retail Kitchen	E2.1
R1A	208Y/120V, 3Ph, 4W	225	MLO	1	125	Coyote Jack's	E2.1
R1C	208Y/120V, 3Ph, 4W	100	MCB	1	126	Jamba Juice	E2.1
SP1	208Y/120V, 3Ph, 4W	100	MCB	1	118	Corridor	E2.1
KH2	480Y/277V, 3Ph, 4W	250	MCB	2	207	Dry Storage	E2.2
KL2	208Y/120V, 3Ph, 4W	400	MCB	2	217	Kitchen Corridor	E2.2
KL2A	208Y/120V, 3Ph, 4W	400	MCB	2	207	Dry Storage	E2.2
LP2	480Y/277V, 3Ph, 4W	125	MCB	2	207	Dry Storage	E2.2
RP2	208Y/120V, 3Ph, 4W	100	MCB	2	202	Security Office	E2.2
SP2	208Y/120V, 3Ph, 4W	100	MCB	2	217	Kitchen Corridor	E2.2
RP3	208Y/120V, 3Ph, 4W	225	MCB	3	315	ECS Storage	E2.3
DM4	480Y/277V, 3Ph, 4W	80	MLO	4	414	Storage	E4.4
DM4A	208Y/120V, 3Ph, 4W	80	MLO	4	414	Storage	E4.4
LP4	480Y/277V, 3Ph, 4W	400	MCB	4	409A	Electrical Room	E4.1
MP4	480Y/277V, 3Ph, 4W	400	MCB	4	409A	Electrical Room	E4.1
RP4	208Y/120V, 3Ph, 4W	400	MCB	4	409A	Electrical Room	E4.1
RP4A	208Y/120V, 3Ph, 4W	100	MCB	4	414	Storage	E4.4

Over-current Devices

The main switchgear provided by BGE is protected by a 2000A, 15 kV non-fused switch. Once entering the building, the main switchboard is protected by a 15 kV fused interrupted switch. Each branch is protected by 35K AIC rated molded-case circuit breakers. All but three panel boards are protected by the main circuit breaker. Size and AIC rating are based on panel board size and load. This also applies to the distribution panel. For Main Lug Only boards, molded-case circuit breakers found in the panel board upstream are the protective devices.

Transformers

The transformers found in Towson West Village Commons are primarily pad-mounted dry type transformers. There is one wall mounted transformer to serve elevator loads at 208Y/120V. All but TVPB can be found in the electrical or boiler room on level 0, the basement.

Table 5: Transformer Schedule

Tag	Primary Voltage	Secondary Voltage	Size	Type	Temp. Rise	Taps	Mounting	Remarks
---	132000V, 3Ph, 3W	480Y/277V, 3Ph, 4W	1500 kVA	Dry Type	115 DEG. C	(4) 2.5%	Indoor Pad Mounted	N/A
TDPB	480Y/277V, 3Ph, 4W	208Y/120V, 3Ph, 4W	500 kVA	Dry Type	220 DEG. C	(4) 2.5%	Indoor Pad Mounted	N/A
TEPB	480Y/277V, 3Ph, 4W	208Y/120V, 3Ph, 4W	15 kVA	Dry Type	220 DEG. C	(2) 5%	Indoor Pad Mounted	N/A
TMPB	480Y/277V, 3Ph, 4W	208Y/120V, 3Ph, 4W	30 kVA	Dry Type	220 DEG. C	(4) 2.5%	Indoor Pad Mounted	N/A
TRP4	480Y/277V, 3Ph, 4W	208Y/120V, 3Ph, 4W	150 kVA	Dry Type	220 DEG. C	(4) 2.5%	Indoor Pad Mounted	N/A
TSPB	480Y/277V, 3Ph, 4W	208Y/120V, 3Ph, 4W	45 kVA	Dry Type	220 DEG. C	(4) 2.5%	Indoor Pad Mounted	N/A
TVPB	480Y/277V, 3Ph, 4W	208Y/120V, 3Ph, 4W	15 kVA	Dry Type	220 DEG. C	(2) 5%	Wall Mounted	N/A

NOTES:
N/A

KEY:
N/A=NOT APPLICABLE

Grounding

Grounding is conducted at various points. All grounding is run through busbars and transported down to the main electrical room by way of column E/3. Details are contained on drawings E5.1, E5.1A, E5.2, and E5.3.

Specialty Equipment

Transient Voltage Surge Suppressors, TVSS, are connected to several of the panels. TVSS is used to protect against high surges that can cause damage to the panel. Usually found on 480Y/277V lighting

panels, the suppression system has been specified to protect against surges reaching lamps containing mercury. Potential explosions could cause building environment problems.

A power factor correction supplied by BGE on site that will serve both Towson Runs Apartments and West Villages Commons. This device is not specified in any of the drawings or specifications, only located on the site plan.

Lighting Loads

Lighting for West Village Commons is primarily achieved using fluorescent sources on 480Y/208V distribution. For higher end spaces, LEDs, metal halides and some incandescents are used. Most spaces use general lighting provided by either T5 linear fixtures or recessed downlights utilizing compact fluorescent technology.

Luminaire Tag	Lamp Source	Lamp Type	Lamp Watts	# of Lamps	Ballast Type	Volt.	Fixture Watts	BF	Current Amps	PF
A1	FLUOR	F32PLT/835	32	1	ELEC	277	36	0.98	0.13	0.98
A2	FLUOR	F18DTT/835/4P	18	2	ELEC	277	42	1.00	0.16	0.99
A4	FLUOR	F18PLT/835	18	1	ELEC	277	20	1.05	0.08	0.97
A5	FLUOR	F26PLT/835	26	1	ELEC	277	28	1.00	0.10	0.96
A6	MH	CDM39/T4/G8.5	39	1	ELEC	277	43	1.00	0.16	0.90
AD	FLUOR	F32PLT/835	32	1	ELEC	277	36	0.98	0.13	0.98
AL	FLUOR	F26PLT/835	26	1	ELEC	277	28	1.00	0.10	0.96
AL4	LED	WW LED	3	1	N/A	120	3	N/A	0.70	0.90
AW	FLUOR	F32PLT/835	32	1	ELEC	277	36	0.98	0.13	0.98
AWD	FLUOR	F32PLT/835	32	1	ELEC	277	36	0.98	0.13	0.98
B1	MH	CMH35/T6/G12/3K	35	1	ELEC	277	43	1.00	0.16	0.90
C1	FLUOR	F28T5/835	28	1	ELEC	277	33	1.04	0.12	0.98
C2	FLUOR	F28T5/835	28	1	ELEC	277	33	1.04	0.12	0.98
CJ1	QUARTZ	250W WHITE INFRARED	250	1	N/A	120	250	N/A	2.08	1.00
CJ2	FLUOR	F26PLT/835	26	1	ELEC	120	28	1.00	0.24	0.99
CJ3	FLUOR	F26PLT/835	26	1	ELEC	277	28	1.00	0.10	0.96
D	FLUOR	F24T5HO/835	24	2	ELEC	277	55	1.10	0.21	0.98

Luminaire Tag	Lamp Source	Lamp Type	Lamp Watts	# of Lamps	Ballast Type	Volt.	Fixture Watts	BF	Current Amps	PF
DL	FLUOR	F28T5/835	28	1	ELEC	277	33	1.04	0.12	0.98
DLA	FLUOR	F28T5/835	28	1	ELEC	277	33	1.04	0.12	0.98
DLS	FLUOR	F28T5/835	28	2	ELEC	277	63	1.03	0.23	0.99
DP1	LED	RGB LED	5	1	Power Supply	120	150	N/A	2.00	0.93
DP2	LED	RGB LED	5	1						
DP3	LED	RGB LED	5	1						
DP5	FLUOR	23W E27	23	2	INTEGRATED	277	46	N/A	0.17	1.00
EA	FLUOR	F26PLT/835	26	1	ELEC	120	28	1.00	0.24	0.99
EB1	MH	CMH39PAR30/FL25	39	1	ELEC	277	43	1.00	0.16	0.90
F	LED	COOL-WHITE LED	23.5	1	N/A	277	23.5	N/A	0.70	0.90
G	FLUOR	F32PLT/835	32	1	ELEC	277	36	0.98	0.13	0.98
J	FLUOR	F32PLT/835	32	1	ELEC	277	36	0.98	0.13	0.98
JA	FLUOR	14W T5/835	14	2	ELEC	277	34	1.06	0.13	0.98
JA1	FLUOR	24W T5 HO/835	24	2	ELEC	277	55	1.10	0.21	0.98
JA1A	FLUOR	24W T5 HO/835	24	2	ELEC	120	55	1.10	0.47	0.98
JA2	FLUOR	24W T5 HO/835	24	2	ELEC	277	55	1.10	0.21	0.98
JB	FLUOR	28W T5/835	28	2	ELEC	277	63	1.03	0.23	0.99
JB1	FLUOR	54W T5 HO/835	54	2	ELEC	277	117	0.99	0.43	0.98
JB2	FLUOR	54W T5 HO/835	54	2	ELEC	277	117	0.99	0.43	0.98
JC	FLUOR	28W T5/835	28	2	ELEC	277	63	1.03	0.23	0.99
JD	FLUOR	28W T5/835	28	2	ELEC	277	63	1.03	0.23	0.99
JD1	FLUOR	28W T5/835	28	2	ELEC	277	63	1.03	0.23	0.99
JDS	FLUOR	28W T5/835	28	2	ELEC	277	63	1.03	0.23	0.99
JE	FLUOR	28W T5/835	28	2	ELEC	277	63	1.03	0.23	0.99
JF	FLUOR	26W CFL/835	26	1	ELEC	277	29	1.00	0.11	0.95
JG	FLUOR	28W T5/835	28	2	ELEC	277	63	1.03	0.23	0.99
JH	FLUOR	14W T5/835	14	1	ELEC	120	19	1.07	0.16	0.98

Luminaire Tag	Lamp Source	Lamp Type	Lamp Watts	# of Lamps	Ballast Type	Volt.	Fixture Watts	BF	Current Amps	PF
JK	FLUOR	28W T5/835	28	2	ELEC	277	63	1.03	0.23	0.99
JK1	FLUOR	28W T5/835	28	2	ELEC	277	63	1.03	0.23	0.99
JS	FLUOR	F32PLT/835	32	1	ELEC	277	36	0.98	0.13	0.98
JW	FLUOR	F32PLT/835	32	1	ELEC	277	36	0.98	0.13	0.98
K	FLUOR	F32PLT/835	32	1	ELEC	277	36	0.98	0.13	0.98
N	FLUOR	F54T5HO/835	54	1	ELEC	277	62	0.99	0.24	0.90
NJ	FLUOR	F28T5/835	28	2	ELEC	120	64	1.03	0.55	0.99
OA1	FLUOR	F26PLT/835	26	1	ELEC	120	28	1.00	0.24	0.99
OB	FLUOR	F28T5/835	28	1	ELEC	120	33	1.04	0.28	0.98
OC1	MH	CMH39PAR30/FL25	39	1	ELEC	120	44	1.00	0.38	0.90
OD	FLUOR	F14T5/835	14	2	ELEC	120	34	1.06	0.29	0.98
OE	FLUOR	F18PLT/835	18	1	ELEC	120	20	1.05	0.17	0.98
P	MH	CMH39PAR30/FL25	39	1	ELEC	277	43	1.00	0.16	0.90
PM	MH	CMH39PAR30/FL25	39	1	ELEC	277	43	1.00	0.16	0.90
R	FLUOR	F26PLT/835	26	1	ELEC	277	28	1.00	0.10	0.96
S	FLUOR	F32PLT/835	32	1	ELEC	277	36	0.98	0.13	0.98
SW	FLUOR	F32PLT/835	32	1	ELEC	277	36	0.98	0.13	0.98
SA	INCAN	100W PAR38	100	1	N/A	120	100	N/A	0.83	N/A
T	FLUOR	F32PLT/835	32	1	ELEC	277	36	0.98	0.13	0.98
U	FLUOR	F28T5/835	28	1	ELEC	277	63	1.03	0.23	0.99
WE	FLUOR	F28T5/835	28	2	ELEC	277	63	1.03	0.23	0.99
WL	FLUOR	F28T5/835	28	2	ELEC	277	63	1.03	0.23	0.99
WS	FLUOR	F21T5/835	21	2	ELEC	277	48	1.02	0.17	0.98
X1	LED	LED	3.3	1	N/A	277	3.3	N/A	0.03	0.39
X2	LED	LED	3.3	1	N/A	277	3.3	N/A	0.03	0.39
X3	LED	LED	5.9	1	N/A	277	5.9	N/A	0.04	0.53
Z	INCAN	5.4W PAR36	5.4	2	N/A	120	10.8	N/A	0.12	1.00

Luminaire Tag	Lamp Source	Lamp Type	Lamp Watts	# of Lamps	Ballast Type	Volt.	Fixture Watts	BF	Current Amps	PF
AA	MH	MH100/C/U/MED COATED	100	1	ELEC	277	107	0.94	0.41	0.98
BB	FLUOR	F42PLT/841	42	1	ELEC	277	46	0.98	0.17	0.98
CC	FLUOR	F32PLT/841	32	2	ELEC	277	72	0.98	0.13	0.98
DD	MH	MH175/C/U/MED	175	1	ELEC	277	205	0.85	0.75	0.90
TT1	LED	LED	21	1	Power Supply	277	21	0.00	0.70	0.90
TT2	LED	LED	42	1	Power Supply	277	42	0.00	0.70	0.90
UU	MH	CMH70/C/U/MED/3 K/O	70	1	ELEC	277	77	0.91	0.30	0.97
WW	MH	CMH70/C/U/MED/3 K/O	70	1	ELEC	277	77	0.91	0.30	0.97
XX	LED	LED	2.7	1	N/A	277	2.7	N/A	0.04	0.39

Lighting Control

The primary lighting control for West Village Commons is a Digital Building System. This system will handle lighting and mechanical controls for the space. Each lighting circuit is wired to a lighting panel board. Contacts are controlled by the system to turn circuits on and off. Each room is equipped with occupancy sensors and switching to comply with ASHRAE 90.1 – 2007. In the multipurpose room, dimming panels are the lighting controls. Scene controls are mounted within the room. Each panel can control either the entire space, or an individual room. This flexibility is a result of the use of movable partition sensors.

Mechanical and Other Loads

West Village Commons has a large number of mechanical and other loads due to its use as a cooking facility. Between the main kitchen on the second floor and the warming kitchen on the fourth floor, several hundred kitchen appliances can be found. They are typically run from the 208Y/120V, 3PH, 4W distribution. The mechanical loads consist of the various pumps and fans required for the air handling units, ductless split systems, perimeter heating system and cooling tower. One major load for the building is the snow melting system which encompasses 2,440 ft2. Architectural loads also include the

one freight and two passenger elevators. Typical mechanical and architectural systems use 480Y/277V, 3PH, 4W distribution system.

Table 6: Architectural Loads

Tag	Description	Quantity	Magnitude	Units	Amps	Volt	Phase	Assumed PF	Equivalent Load in kVA	Equivalent Load in kw
ELEV-A	Elevator A	1	20	hp	27	480	3	0.95	2.24	2.13
ELEV-B	Elevator B	1	10	hp	14	480	3	0.95	1.16	1.11
ELEV-C	Elevator C	1	10	hp	14	480	3	0.95	1.16	1.11
DL	Dock Leveler	2	1.5	hp	6.6	208	3	0.85	4.76	4.04
SM	Snow Melting System, 2,440 ft^2	1	40	W/ft^2	117.45	480	3	1	97.6	97.60
	Total								106.93	105.98

Table 7: Kitchen Loads

Tag	Description	Quantity	Magnitude	Units	Amps	Volt	Phase	Assumed PF	Equivalent Load in kVA	Equivalent Load in kw
8	Walk-In Freezer	1	1.56	kW	13	120	1	0.75	2.08	1.56
13	Walk-In Cooler	1	1.09	kW	9.1	120	1	0.75	1.46	1.09
18	Walk-In Cooler	1	1.09	kW	9.1	120	1	0.75	1.46	1.09
23	Walk-In Cooler	1	1.09	kW	9.1	120	1	0.75	1.46	1.09
39	Ice Flaker w/Bin	1	1.32	kW	11	120	1	0.75	1.76	1.32
48	Soda System - By Purveyor	1	1.20	kW	10	120	1	0.75	1.60	1.20
53	Food Cutter	1	0.50	hp	9.8	120	1	0.85	1.18	1.00
56	PrepTable with Sinks	1	1.80	kW	15	120	1	1	1.80	1.80
62	Work Table w/Sink	1	1.80	kW	15	120	1	1	1.80	1.80
66	Work Table	1	1.80	kW	15	120	1	1	1.80	1.80
72	Exhaust Hood	1	1.80	kW	15	120	1	1	1.80	1.80
		1	1.80	kW	15	120	1	1	1.80	1.80
73	Fire Suppression System	1	1.20	kW	10	120	1	1	1.20	1.20
74	Tilting	1	0.60	kW	5	120	1	1	0.60	0.60

Tag	Description	Quantity	Magnitude	Units	Amps	Volt	Phase	Assumed PF	Equivalent Load in kVA	Equivalent Load in kw
	Skillet/Braising Pan									
78	Tilt Kettle, 40 Ga.	1	0.60	kW	5	120	1	1	0.60	0.60
80	Combi Oven; Double Deck	1	1.13	kW	9.4	120	1	1	1.13	1.13
		1	1.13	kW	9.4	120	1	1	1.13	1.13
81	Combi Oven; Roll-In	1	2.60	kW	22	120	1	1	2.64	2.64
84	Mixer; 20 Qt.	1	0.50	hp	9.8	120	1	0.85	1.18	1.00
89	Exhaust Hood	1	1.80	kW	15	120	1	1	1.80	1.80
		1	1.80	kW	15	120	1	1	1.80	1.80
90	Fire Suppression System	1	1.20	kW	10	120	1	1	1.20	1.20
92	Refrigerated Base	1	0.33	hp	7.2	120	1	0.75	0.86	0.65
94	Fryer Assembly	2	0.42	kW	3.5	120	1	1	0.84	0.84
95	Fry Dump Station	1	1.08	kW	9	120	1	1	1.08	1.08
96	Fry Filter	1	1.20	kW	10	120	1	1	1.20	1.20
100	Undercounter Refrigerator	2	0.33	hp	7.2	120	1	0.75	1.73	1.30
102	Work Table with Sink	1	1.80	kW	15	120	1	1	1.80	1.80
103	Exhaust Hood	1	1.80	kW	15	120	1	1	1.80	1.80
		1	1.80	kW	15	120	1	1	1.80	1.80
104	Fire Suppression System	1	1.20	kW	10	120	1	1	1.20	1.20
114	HEATED HOLDING CABINET	1	2.04	kW	17	120	1	1	2.04	2.04
115	Serving Counter	1	1.80	kW	15	120	1	1	1.80	1.80
116	Food Shield, with Heat Lamp	1	1.44	kW	12	120	1	1	1.44	1.44
117	Heated Shelf, Drop-In	1	1.20	kW	10.2	120	1	1	1.22	1.22
118	Food Shield, with Heat Lamp w/Lights	1	1.44	kW	12	120	1	1	1.44	1.44
121	Food Shield, with Heat Lamp	1	1.44	kW	12	120	1	1	1.44	1.44
122	Heated Shelf, Drop-In	1	1.20	kW	10.2	120	1	1	1.22	1.22
125	Refrigerated	1	0.25	hp	5.8	120	1	0.75	0.70	0.52

Tag	Description	Quantity	Magnitude	Units	Amps	Volt	Phase	Assumed PF	Equivalent Load in kVA	Equivalent Load in kw
	Counter									
127	Pizza Oven	1	0.48	kW	4	120	1	1	0.48	0.48
128	Exhaust Hood	1	1.80	kW	15	120	1	1	1.80	1.80
		1	1.80	kW	15	120	1	1	1.80	1.80
129	Fire Suppression System	1	1.20	kW	10	120	1	1	1.20	1.20
131	Pizza Prep Table	1	0.33	hp	7.2	120	1	0.75	0.86	0.65
133	Food Shield, with Heat Lamp	1	0.83	kW	6.9	120	1	1	0.83	0.83
135	Hot/Cold Pan	1	2.00	kW	16.7	120	1	1	2.00	2.00
136	Food Shield, with Heat Lamp	1	1.13	kW	9.4	120	1	1	1.13	1.13
137	Heated Shelf, Drop-In	1	1.20	kW	10.2	120	1	1	1.22	1.22
138	Food Shield, with Heat Lamp	1	1.13	kW	9.4	120	1	1	1.13	1.13
139	Heated Cabinet, Undercounter	1	0.70	kW	5.8	120	1	1	0.70	0.70
140	Serving Counter	1	1.80	kW	15	120	1	1	1.80	1.80
141	Work Counter	1	1.80	kW	15	120	1	1	1.80	1.80
143	Freezer, Reach-in	1	0.50	hp	9.8	120	1	0.85	1.18	1.00
145	Exhaust Hood	1	1.80	kW	15	120	1	1	1.80	1.80
		1	1.80	kW	15	120	1	1	1.80	1.80
147	Fire Suppression System	1	1.20	kW	10	120	1	1	1.20	1.20
148	Fryer Assembly	2	0.42	kW	3.5	120	1	1	0.84	0.84
149	Fry Dump Station	1	1.08	kW	9	120	1	1	1.08	1.08
150	Fry Filter	1	1.20	kW	10	120	1	1	1.20	1.20
152	Refrigerated Base	1	1.51	kW	12.6	120	1	1	1.51	1.51
154	Refrigerator, Reach-In	1	0.33	hp	7.2	120	1	0.75	0.86	0.65
156	Serving Counter	1	1.80	kW	15	120	1	1	1.80	1.80
157	Food Shield, with Heat Lamp	1	1.44	kW	12	120	1	1	1.44	1.44
158	Heated Shelf,	1	1.20	kW	10.2	120	1	1	1.22	1.22

Tag	Description	Quantity	Magnitude	Units	Amps	Volt	Phase	Assumed PF	Equivalent Load in kVA	Equivalent Load in kw
	Drop-In									
159	Exhaust Hood	1	1.80	kW	15	120	1	1	1.80	1.80
		1	1.80	kW	15	120	1	1	1.80	1.80
160	Fire Suppression System	1	1.20	kW	10	120	1	1	1.20	1.20
163	Refrigerated Base	1	1.51	kW	12.6	120	1	1	1.51	1.51
164	Food Shield, with Heat Lamp	1	1.44	kW	12	120	1	1	1.44	1.44
165	Heated Shelf, Drop-In	1	1.20	kW	13.3	120	1	1	1.60	1.60
168	Refrigerator, Reach-in	1	0.50	hp	9.8	120	1	0.85	1.18	1.00
169	Serving Counter	1	1.80	kW	15	120	1	1	1.80	1.80
170	Food Shield, with Heat Lamp	2	1.37	kW	5.7	120	1	1	1.37	1.37
172	Hot/Cold Pan	2	4.01	kW	16.7	120	1	1	4.01	4.01
173	Cold Food Pan, Drop-In	2	0.33	hp	7.2	120	1	0.75	1.73	1.30
174	Cold Food Pan, Drop-In	2	1.44	kW	6	120	1	1	1.44	1.44
175	Food Shield, with Light	4	0.10	kW	0.2	120	1	1	0.10	0.10
177	Refrigerator, Undercounter	1	0.47	kW	3.9	120	1	1	0.47	0.47
178	Food Shield, with Light	2	0.05	kW	0.2	120	1	1	0.05	0.05
179	Cold Food Pan	1	0.25	hp	5.8	120	1	0.75	0.70	0.52
180	Milk Dispenser	2	0.65	kW	2.7	120	1	1	0.65	0.65
181	Juice Dispenser - By Purveyor	3	5.40	kW	15	120	1	1	5.40	5.40
183	Ice Tea Brewer - By Purveyor	3	2.00	kW	9.62	120	1	1	3.46	3.46
184	Ice & Soda Dispenser - By Purveyor	3	3.24	kW	9	120	1	1	3.24	3.24
185	Soda Carbonator - By Purveyor	3	3.60	kW	10	120	1	1	3.60	3.60
186	Beverage Counter w/Drip Trough	1	1.80	kW	15	120	1	1	1.80	1.80
187	Beverage Counter w/Drip Trough	1	1.80	kW	15	120	1	1	1.80	1.80

Tag	Description	Quantity	Magnitude	Units	Amps	Volt	Phase	Assumed PF	Equivalent Load in kVA	Equivalent Load in kw
188	Sandwitch Grill/Toaster	2	3.36	kW	14	120	1	1	3.36	3.36
189	Serving Counter	1	1.80	kW	15	120	1	1	1.80	1.80
190	Food Shield, with Light	1	0.02	kW	0.2	120	1	1	0.02	0.02
191	Cold Pan	1	0.33	hp	7.2	120	1	0.75	0.86	0.65
192	Food Slicer	1	0.50	hp	9.8	120	1	0.85	1.18	1.00
194	Food Shield, with Light	1	0.02	kW	0.2	120	1	1	0.02	0.02
195	Cold Pan	1	0.33	hp	7.2	120	1	0.75	0.86	0.65
196	Exhaust Hood	1	1.80	kW	15	120	1	1	1.80	1.80
		1	1.80	kW	15	120	1	1	1.80	1.80
197	Fire Suppression System	1	1.20	kW	10	120	1	1	1.20	1.20
199	Range w/Refrigerated Base	1	0.25	hp	9.8	120	1	0.75	1.18	0.88
200	Food Shield, with Light	1	0.02	kW	0.2	120	1	1	0.02	0.02
201	Cold Pan	1	0.33	hp	7.2	120	1	0.75	0.86	0.65
202	Food Shield, with Light	1	0.02	kW	0.2	120	1	1	0.02	0.02
203	Soup Wells	2	0.50	hp	9.8	120	1	0.85	2.35	2.00
204	Food Shield, with Light	1	0.02	kW	0.2	120	1	1	0.02	0.02
205	Cold Pan	1	0.33	hp	7.2	120	1	0.75	0.86	0.65
206	Serving Counter	1	1.80	kW	15	120	1	1	1.80	1.80
209	Refrigerator, Reach-in	1	1.25	kW	10.4	120	1	1	1.25	1.25
213	Cold Pan	1	0.36	kW	3	120	1	1	0.36	0.36
214	Food Shield w/Light	1	0.02	kW	0.2	120	1	1	0.02	0.02
215	Microwave Oven	1	2.14	kW	17.8	120	1	1	2.14	2.14
216	Waffle Bakers	2	1.99	kW	8.3	120	1	1	1.99	1.99
220	Refrigerator, Special Needs	1	0.30	kW	2.5	120	1	1	0.30	0.30
221	Milk Dispenser	1	0.32	kW	2.7	120	1	1	0.32	0.32
182	Coffee Brewer - By Purveyor	3	6.00	kW	28.87	120	1	1	10.39	10.39
34	Disposer	1	3.00	hp	10.6	208	3	0.85	3.82	3.25
40	Ice Maker w/Bin	1	2.81	kW	7.8	208	3	1	2.81	2.81
54	Food Processor	1	1.00	hp	4.6	208	3	0.85	1.66	1.41

Tag	Description	Quantity	Magnitude	Units	Amps	Volt	Phase	Assumed PF	Equivalent Load in kVA	Equivalent Load in kw
58	Disposer	1	1.50	hp	6.6	208	3	0.85	2.38	2.02
64	Blast Chiller, Undercounter	1	1.46	kW	7	208	1	1	1.46	1.46
76	Tilt Kettle 20 Qt.	1	6.30	kW	18	208	3	1	6.48	6.48
86	Mixer; 60 Qt.	1	3.60	kW	10	208	3	1	3.60	3.60
119	Hot/Cold Food Wells	1	3.00	kW	14.4	208	1	1	3.00	3.00
166	Soft-Serve Machine	1	1.87	kW	9	208	1	1	1.87	1.87
		1	1.87	kW	9	208	1	1	1.87	1.87
167	Hot Food Wells	1	1.70	kW	8.2	208	1	1	1.71	1.71
218	Toasters	2	5.41	kW	13	208	1	1	5.41	5.41
107	Steamer, Countertop	1	15.00	kW	18.04	480	3	1	15.00	15.00
111	Steamer; Countertop	1	15.00	kW	18.04	480	3	1	15.00	15.00
231	Trough Veyor	1	6.73	kW	8.1	480	3	1	6.73	6.73
	Total								238.85	233.42

Table 8: Mechanical Loads

Tag	Description	Quantity	Magnitude	Units	Amps	Volt	Phase	Assumed PF	Equivalent Load in kVA	Equivalent Load in kw
AHU-1S	AHU Supply Fan	1	10	hp	14	480	3	0.95	11.639	11.06
AHU-1R	AHU Return Fan	1	5	hp	7.6	480	3	0.95	6.319	6.00
AHU-2S	AHU Supply Fan	1	7.5	hp	11	480	3	0.95	9.145	8.69
AHU-2R	AHU Return Fan	1	3	hp	4.8	480	3	0.85	3.991	3.39
AHU-3S	AHU Supply Fan	1	10	hp	14	480	3	0.95	11.639	11.06
AHU-3R	AHU Return Fan	1	5	hp	7.6	480	3	0.95	6.319	6.00
AHU-4S	AHU Supply Fan	1	40	hp	52	480	3	0.95	43.232	41.07
AHU-4R	AHU Return Fan	1	15	hp	21	480	3	0.95	17.459	16.59
AHU-5S	AHU Supply Fan	1	10	hp	14	480	3	0.95	11.639	11.06
AHU-5R	AHU Return Fan	1	5	hp	7.6	480	3	0.95	6.319	6.00
AHU-6S	AHU Supply Fan	1	25	hp	34	480	3	0.95	28.267	26.85

Tag	Description	Quantity	Magnitude	Units	Amps	Volt	Phase	Assumed PF	Equivalent Load in kVA	Equivalent Load in kw
AHU-6R	AHU Return Fan	1	7.5	hp	11	480	3	0.95	9.145	8.69
AHU-7S	AHU Supply Fan	1	25	hp	34	480	3	0.95	28.267	26.85
AHU-7R	AHU Return Fan	1	10	hp	14	480	3	0.95	11.639	11.06
CH	Chiller	1	196.5	kW	236.5	480	3	1	196.50	196.50
CT	Cooling Tower, Basin Heaters	3	12	kW	14.4	480	3	1	36.00	36.00
CT-M	Cooling Tower, Motor	1	20	hp	27.0	480	3	0.95	2.24	2.13
DSS-1	Elevator Control DSS	1	0.21	kW	1	208	1	1	0.208	0.21
DSS-2	Telecom Closet DDS	1	0.21	kW	1	208	1	1	0.208	0.21
DSS-3	Dry Storage DDS	1	0.14	kW	1.2	120	1	1	0.144	0.14
DSS-4	Telecom Closet DDS	1	0.14	kW	1.2	120	1	1	0.144	0.14
DSS-5	Elevator Control DSS	1	0.21	kW	1	208	1	1	0.208	0.21
DSS-6	Dry Storage DDS	1	0.14	kW	1.2	120	1	1	0.144	0.14
DSS-7	Dry Storage DDS	1	0.21	kW	1	208	1	1	0.208	0.21
DSS-8	Telecom Closet DDS	1	0.21	kW	1	208	1	1	0.208	0.21
DSS-9	Telecom Closet DDS	1	0.21	kW	1	208	1	1	0.208	0.21
EF-1	Hood Exhaust Fan	1	3	hp	4.8	480	3	0.85	3.991	3.39
EF-10	Hood Exhaust Fan	1	0.5	hp		120	1	0.85	0.000	0.00
EF-11	Hood Exhaust Fan	1	3	hp	4.8	480	3	0.85	3.991	3.39
EF-12	Exhaust Fan	1	0.25	hp		120	1	0.75	0.000	0.00
EF-13	Exhaust Fan	1	3	hp		120	1	0.85	0.000	0.00
EF-2	Hood Exhaust Fan	1	5	hp	7.6	480	3	0.95	6.319	6.00
EF-3	Hood Exhaust Fan	1	0.5	hp		120	1	0.85	0.000	0.00
EF-4	Hood Exhaust Fan	1	5	hp	7.6	480	3	0.95	6.319	6.00
EF-5	Exhaust Fan	1	0.33	hp		120	1	0.75	0.000	0.00
EF-6	Exhaust Fan	1	0.75	hp	1.6	480	3	0.85	1.330	1.13
EF-7	Purge	1	1	hp	2.1	480	3	0.85	1.746	1.48
EF-8	Exhaust Fan	1	5	hp	7.6	480	3	0.95	6.319	6.00
EF-9	Exhaust Fan	1	0.75	hp		120	1	0.85	0.000	0.00

Tag	Description	Quantity	Magnitude	Units	Amps	Volt	Phase	Assumed PF	Equivalent Load in kVA	Equivalent Load in kw
MAU -1	Make up Air Handling Unit	1	5	hp	7.6	480	3	0.95	6.319	6.00
MAU -2	Make up Air Handling Unit	1	5	hp	7.6	480	3	0.95	6.319	6.00
UH-1	Horizontal Propeller	1	0.02	kW	0.13	120	1	1	0.016	0.02
UH-10	Cabinet	1	0.07	hp	4.4	120	1	0.75	0.528	0.40
UH-11	Vertical Propeller	1	0.02	kW	0.13	120	1	1	0.016	0.02
UH-2	Horizontal Propeller	1	0.02	kW	0.13	120	1	1	0.016	0.02
UH-3	Horizontal Propeller	1	0.02	kW	0.13	120	1	1	0.016	0.02
UH-4	Horizontal Propeller	1	0.02	kW	0.13	120	1	1	0.016	0.02
UH-5	Cabinet	1	0.07	hp	4.4	120	1	0.75	0.528	0.40
UH-6	Horizontal Propeller	1	0.05	hp	4.4	120	1	0.75	0.528	0.40
UH-7	Cabinet	1	0.07	hp	4.4	120	1	0.75	0.528	0.40
UH-8	Cabinet	1	0.07	hp	4.4	120	1	0.75	0.528	0.40
UH-9	Cabinet	1	0.07	hp	4.4	120	1	0.75	0.528	0.40
	Total								487.34	472.55

Table 9: Plumbing Loads

Tag	Description	Quantity	Magnitude	Units	Amps	Volt	Phase	Assumed PF	Equivalent Load in kVA	Equivalent Load in kw
P-1	Heating Water	1	15	hp	21	480	3	0.95	17.459	16.59
P-2	Heating Water	1	15	hp	21	480	3	0.95	17.459	16.59
P-3	Cooling Water	1	25	hp	34	480	3	0.95	28.267	26.85
P-4	Cooling Water	1	25	hp	34	480	3	0.95	28.267	26.85
P-5	Condenser Water	1	20	hp	27	480	3	0.95	22.447	21.33
P-6	Condenser Water	1	20	hp	27	480	3	0.95	22.447	21.33
P-7	Domestic Hot Water	1	0.17	hp	4.4	120	1	0.75	0.528	0.40
P-8	Domestic Hot Water	1	0.17	hp	4.4	120	1	0.75	0.528	0.40
P-9	AHU Preheat	1	0.25	hp	5.8	120	1	0.75	0.696	0.52
P-10	AHU Preheat	1	0.25	hp	5.8	120	1	0.75	0.696	0.52
P-11	AHU Preheat	1	0.25	hp	5.8	120	1	0.75	0.696	0.52
P-12	AHU Preheat	1	0.5	hp	9.8	120	1	0.85	1.176	1.00

Tag	Description	Quantity	Magnitude	Units	Amps	Volt	Phase	Assumed PF	Equivalent Load in kVA	Equivalent Load in kw
P-13	AHU Preheat	1	0.25	hp	5.8	120	1	0.75	0.696	0.52
P-14	AHU Preheat	1	0.5	hp	9.8	120	1	0.85	1.176	1.00
P-15	AHU Preheat	1	0.33	hp	7.2	120	1	0.75	0.864	0.65
P-16	Boiler	1	1.5	hp	3	480	3	0.85	2.494	2.12
P-17	Boiler	1	1.5	hp	3	480	3	0.85	2.494	2.12
P-18	Heating Water Blend Pump	1	1.5	hp	3	480	3	0.85	2.494	2.12
P-19	Perimeter Heat	1	0.125	hp	4.4	120	1	0.75	0.528	0.40
P-20	Perimeter Heat	1	0.125	hp	4.4	120	1	0.75	0.528	0.40
P-21	Perimeter Heat	1	0.125	hp	4.4	120	1	0.75	0.528	0.40
	Total								152.47	142.60

Service Entrance Sizing

As part of electrical design, the load must be estimated in each stage of design to allow for equipment room. The primary sizing concern is with the service entrance, and being able to provide the correct equipment. Below are estimations for the service entrance sizing for various phases of building design.

Table 10: Schematic Sizing

Building Type	Area (ft^2)	VA/ft^2	Load - KVA	Amps
Student Union	86,339	13	1122	1351
Service Entrance Size	1600A			

Table 11: Design Development Sizing

Load Type	Area (ft^2)	VA/ft^2	Demand Factor	Demand Load (kVA)	Load - Amps
Lighting	86,339	3	1.0	259.02	311.69
Receptacle	86,339	0.5	1.0	10.00	12.03
			0.5	16.58	19.96
Kitchen					
Full Service	4279	20	0.65	0.01	0.02
Warming	454	10	0.65	2.95	3.55
Architectural					
Elevators	3 units	50 kVA/unit	0.9	135.00	162.45
HVAC					
Exhaust Fans	4,733	2	1.0	9.47	11.39
Fossil Fuel Heating	86,339	4	1.0	345.36	415.59
Cooling	86,339	8	1.0	690.71	831.18
			Total	1469.10	1767.87
Service Entrance Size	2000A				

Table 12: Working Drawings Sizing

Load Type	Connected Load (kVA)	Demand Factor	Demand Load (kVA)	Demand w/ Capacity (kVA)	Load - Amps
Architectural	106.93	0.90	96.24	120.30	144.76
Lighting	160.40	1.00	160.40	200.50	241.28
Kitchen	238.85	0.65	155.25	194.07	233.53
Mechanical	487.34	1.00	487.34	609.18	733.06
Plumbing	152.47	1.00	152.47	190.59	229.35
Receptacle	10.00	1.00	10.00	12.50	15.04
	188.50	0.50	94.25	117.81	141.77
			Total	1444.94	1738.79
Service Entrance Size	2000A				

Table 13: Sizing Summary

Phase	Load- kVA	Voltage System	Load - Amps
Conceptual/Schematic Design	1122	480Y/277V, 3Ph, 4W	1351
Design Development	1469	480Y/277V, 3Ph, 4W	1768
Working Drawings	1445	480Y/277V, 3Ph, 4W	1739

Table 14: Actual Size Summary

Service Entrance	Size - Amps	Voltage System	Capacity - kVA
Actual Conditions - Entrance 1	2000	480Y/277V, 3Ph, 4W	1662
Summary - VA/ft^2	19.2		
Notes [1] Based on 86,339 ft^2			

Environmental Stewardship

Towson West Village Commons is applying for LEED Silver status. Most of the credits will be working with site maintenance and resources and materials. The electrical and lighting design will also help to reduce energy consumption. Transformers are specified to meet NEMA TP-1 for energy efficiency. Lighting consists mostly of linear fluorescent, compact fluorescent and LED based sources. Dimming,

occupancy sensors and a building lighting control system have been employed to manage and minimize the lighting loads in spaces. Along with mechanical load reduction, the building is charted as meeting LEED gold status.

Design Issues

As with most new construction, there have been little design issues outside of architectural changes. The architect provided plenty of room for both the mechanical and electrical spaces in the building. Some special consideration was given to those tenants supplying their own panel boards and equipment, retail food vendors. After the project began construction, Towson requested that all systems be able to be run by a portable generator. After several attempts, it was resolved that both Towson Run Apartments and West Village Commons would share a quick generator switch located between both buildings.

Communication Systems

Access Control System

Utilizing magnetic locks, certain doors require use an access system to gain entry. Most doors not meant for the public, use card readers or remote keypads to gain entry. Motion detectors are mounted above automatic open doors. All doors with electronic control are combined with a local panic/alarm button. Cabling is to be specified by the manufacturer.

Audio/Visual and Video Systems

The system will utilize coaxial and category 6 data cable and will be distributed through the building through the various telecom closets.

CCTV

The system will be provided by Towson towards the end of construction. Locations are to be determined but the system will tie back to the second floor security office. Cabling is specified to be Category 6 data cable and will run through the various telecom closets.

Data and Voice

The system branches from the campus feed for Towson Run Apartments. The system enters the building through Boiler Room 001 and is distributed through the building with cable trays until eventually reaching individual telecom closets. Cabling is consistent with the category 6 cable for data outlets. Voice outlets will utilize category 5E cable. Between telecom rooms, the cabling will consist of 12 strand single mode and 12 multimode fiber optic cable for data and 100-pair cable for voice. Racks found in

each telecom room will tie into the main telecom room, room 117. This also houses the telephone switch.

Fire Alarm

Based around a control panel found at the second floor vestibule, the fire alarm system has various monitors, pull stations and strobes and speakers located throughout the building. To set off those systems, various smoke and heat detectors are located throughout the building. The fire alarm system ties into the elevator controls and access controls for various door locations.

Appendix

- ***Feeder Schedule***
- ***E6.0 – Single-Line Diagram***
- ***E0.1 – Electrical Symbols, Abbreviations, and diagram (James Posey Assoc.)***
- ***E6.1 – Power Diagrams (James Posey Assoc.)***
- ***HID Lamps and Ballasts***

FEEDER SCHEDULE																	
TAG	FROM	TO	NO. OF SETS	CONDUIT (PER SET)		CONDUCTORS (PER SET)									SIZE OF OVERCURRENT PROTECTION	FRAME OR SWITCH SIZE	REMARKS
				SIZE	TYPE	PHASE CONDUCTORS No.	SIZE	TYPE	NEUTRAL CONDUCTORS No.	SIZE	TYPE	GROUND CONDUCTORS No.	SIZE	TYPE			
1	UTILITY	SWB	3	5"		1	#2								1200A		15kV Cable
2	SWB	TDPB	2	4"	EMT	3	500 KCMIL	CU THWN	1	500 KCMIL	CU THWN	1	1/0	CU THWN	600A	800A/3P	
3	SWB	MP4	1	4"	EMT	3	500 KCMIL	CU THWN	1	500 KCMIL	CU THWN	1	2/0	CU THWN	600A	400A/3P	
4	SWB	LP4	1	4"	EMT	3	500 KCMIL	CU THWN	2	500 KCMIL	CU THWN	2	2/0	CU THWN	600A	400A/3P	
5	SWB	KH2	1	4"	EMT	3	500 KCMIL	CU THWN	3	500 KCMIL	CU THWN	3	2/0	CU THWN	600A	400A/3P	
6	SWB	LPB	1	2"	EMT	3	1/0	CU THWN	1	1/0	CU THWN	1	#6	CU THWN	125A	125A/3P	
7	SWB	LP1	1	2"	EMT	3	1/0	CU THWN	1	1/0	CU THWN	1	#6	CU THWN	125A	125A/3P	
8	SWB	LP2	1	2"	EMT	3	1/0	CU THWN	1	1/0	CU THWN	1	#6	CU THWN	125A	125A/3P	
9	SWB	SMB	1	3"	EMT	3	4/0	CU THWN	1	4/0	CU THWN	1	#4	CU THWN	225A	250A/3P	
10	SWB	MDB	1	4"	EMT	3	500 KCMIL	CU THWN	1	500 KCMIL	CU THWN	1	2/0	CU THWN	600A	400A/3P	
11	SWB	ATS-1	1	1-1/4"	EMT	3	#2	CU THWN	1	#2	CU THWN	1	#8	CU THWN	100A	125A/3P	
12	SWB	ATS-2	1	2"	EMT	3	1/0	CU THWN	1	1/0	CU THWN	1	#6	CU THWN	125A	125A/3P	
13	SWB	ATS-3	1	2"	EMT	3	1/0	CU THWN	---	---	CU THWN	1	#6	CU THWN	125A	125A/3P	
14	QSWB	SWB	6	4"	EMT	3	500 KCMIL	CU THWN	1	500 KCMIL	CU THWN	1	250 KCMIL	CU THWN	2000A	2000A/3P	
15	TDPB	DPB	4	3"	EMT	3	350 KCMIL	CU THWN	1	350 KCMIL	CU THWN	1	3/0	CU THWN	---	---	PROTECTED AT PANEL ABOVE XFMR
16	DPB	RPB	1	2-1/2"	EMT	3	4/0	CU THWN	1	4/0	CU THWN	1	#4	CU THWN	225A	225A/3P	
17	DPB	R1	1	4"	EMT	3	500 KCMIL	CU THWN	1	500 KCMIL	CU THWN	1	#2	CU THWN	400A	400A/3P	
18	R1	R1A	1	2-1/2"	EMT	3	3/0	CU THWN	1	1/0	CU THWN	1	#6	CU THWN	200A	200A/3P	
19	R1A	R1C	1	1"	EMT	3	#6	CU THWN	1	#6	CU THWN	1	#10	CU THWN	50A	50A/3P	
20	DPB	RP2	1	1-1/4"	EMT	3	#2	CU THWN	1	#2	CU THWN	1	#8	CU THWN	100A	225A/3P	
21	DPB	KL2	1	4"	EMT	3	500 KCMIL	CU THWN	1	500 KCMIL	CU THWN	1	#2	CU THWN	400A	400A/3P	
22	DPB	KL2A	1	4"	EMT	3	500 KCMIL	CU THWN	1	500 KCMIL	CU THWN	1	#2	CU THWN	400A	400A/3P	
23	DPB	CS1	1	2"	EMT	3	2/0	CU THWN	1	2/0	CU THWN	1	#4	CU THWN	150A	225A/3P	
24	DPB	DL	1	3/4"	EMT	3	#10	CU THWN	---	---	CU THWN	1	#10	CU THWN	20A	225A/3P	
25	DPB	DL	1	3/4"	EMT	3	#10	CU THWN	---	---	CU THWN	1	#10	CU THWN	20A	225A/3P	
26	MP4	AHU-4S	1	1-1/4"	EMT	1	#3	CU THWN	---	---	CU THWN	1	#8	CU THWN	100A	100A/3P	
27	MP4	AHU-4R	1	3/4"	EMT	1	#8	CU THWN	---	---	CU THWN	1	#10	CU THWN	40A	40A/3P	

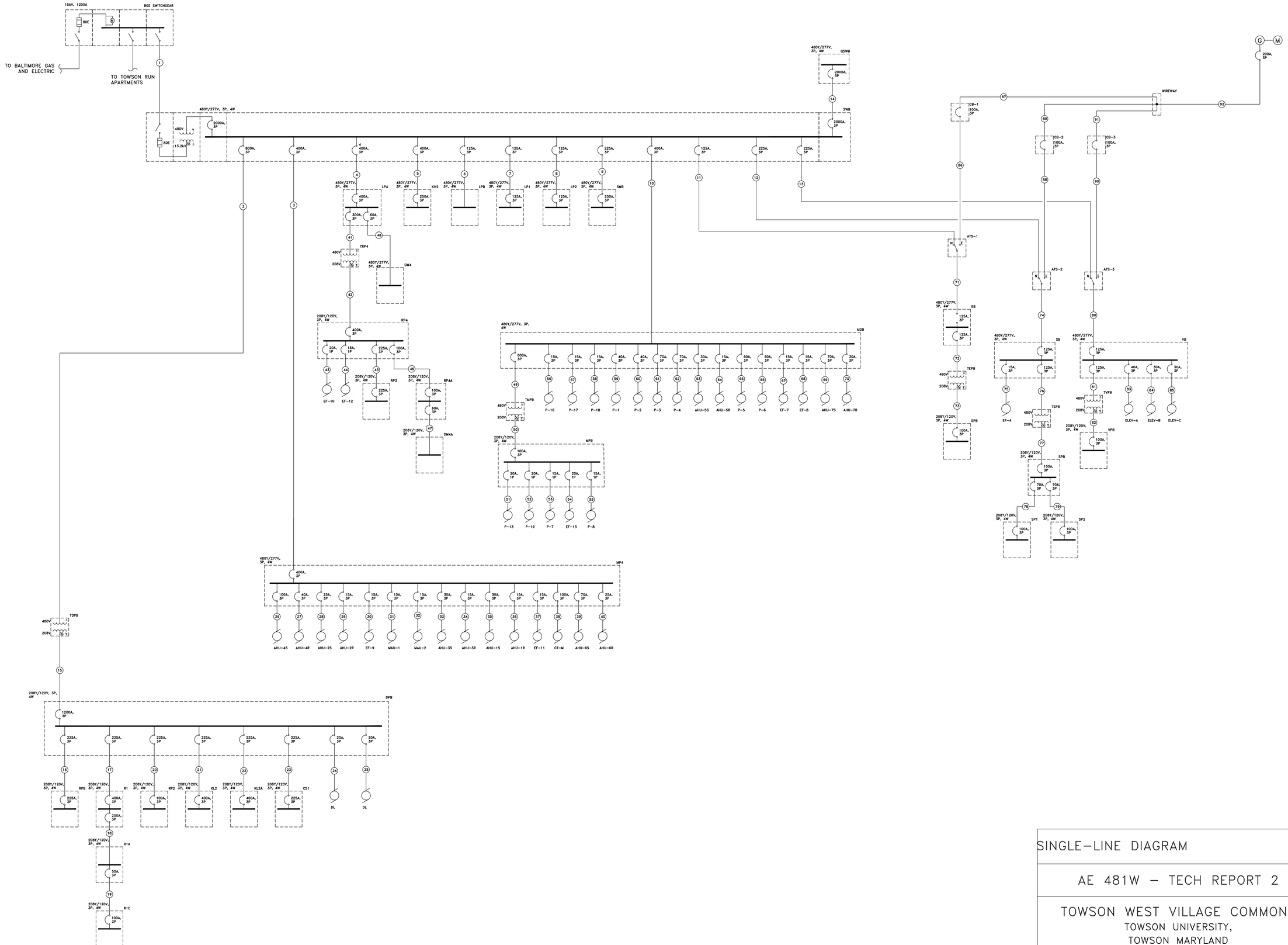
28	MP4	AHU-2S	1	3/4"	EMT	1	#10	CU THWN	---	---	CU THWN	1	#10	CU THWN	25A	25A/3P	
29	MP4	AHU-2R	1	3/4"	EMT	1	#12	CU THWN	---	---	CU THWN	1	#12	CU THWN	15A	15A/3P	
30	MP4	EF-9	1	3/4"	EMT	1	#12	CU THWN	---	---	CU THWN	1	#12	CU THWN	15A	15A/3P	
31	MP4	MAU-1	1	3/4"	EMT	1	#12	CU THWN	---	---	CU THWN	1	#12	CU THWN	15A	15A/3P	
32	MP4	MAU-2	1	3/4"	EMT	1	#12	CU THWN	---	---	CU THWN	1	#12	CU THWN	15A	15A/3P	
33	MP4	AHU-3S	1	3/4"	EMT	1	#10	CU THWN	---	---	CU THWN	1	#10	CU THWN	30A	30A/3P	
34	MP4	AHU-3R	1	3/4"	EMT	1	#12	CU THWN	---	---	CU THWN	1	#12	CU THWN	15A	15A/3P	
35	MP4	AHU-1S	1	3/4"	EMT	1	#10	CU THWN	---	---	CU THWN	1	#10	CU THWN	30A	30A/3P	
36	MP4	AHU-1R	1	3/4"	EMT	1	#12	CU THWN	---	---	CU THWN	1	#12	CU THWN	15A	15A/3P	
37	MP4	EF-11	1	3/4"	EMT	1	#12	CU THWN	---	---	CU THWN	1	#12	CU THWN	15A	15A/3P	
38	MP4	CT-M	1	1-1/4"	EMT	1	#3	CU THWN	---	---	CU THWN	1	#8	CU THWN	100A	100A/3P	
39	MP4	AHU-6S	1	3/4"	EMT	1	#4	CU THWN	---	---	CU THWN	1	#8	CU THWN	70A	70A/3P	
40	MP4	AHU-6R	1	3/4"	EMT	1	#10	CU THWN	---	---	CU THWN	1	#10	CU THWN	25A	25A/3P	
41	LP4	TRP4	1	3"	EMT	3	350 KCMIL	CU THWN	---	---	CU THWN	1	#4	CU THWN	300A	300A/3P	
42	TRP4	RP4	2	3"	EMT	3	350 KCMIL	CU THWN	1	350 KCMIL	CU THWN	1	3/0	CU THWN	---	---	PROTECTED AT PANEL ABOVE XFMR
43	RP4	EF-10	1	3/4"	EMT	1	#12	CU THWN	1	#12	CU THWN	---	---	CU THWN	20A	20A/1P	
44	RP4	EF-12	1	3/4"	EMT	1	#12	CU THWN	1	#12	CU THWN	---	---	CU THWN	15A	15A/1P	
45	RP4	RP3	1	3"	EMT	1	4/0	CU THWN	1	4/0	CU THWN	1	#4	CU THWN	225A	225A/3P	
46	RP4	RP4A	1	1-1/4"	EMT	1	#2	CU THWN	1	#2	CU THWN	1	#8	CU THWN	100A	100A/3P	
47	RP4A	DM4A	1	1"	EMT	1	#6	CU THWN		#6	CU THWN	1	#10	CU THWN	60A	60A/3P	
48	LP4	DM4	1	1"	EMT	3	#6	CU THWN	1	#6	CU THWN	1	#10	CU THWN	60A	60A/3P	
49	MDB	TMPB	1	1"	EMT		#6	CU THWN	---	---	CU THWN	1	#10	CU THWN	60A	100A/3P	
50	TMPB	MPB	1	1"	EMT	3	#8	CU THWN	1	#8	CU THWN	1	#8	CU THWN	---	---	PROTECTED AT PANEL ABOVE XFMR
51	MPB	P-13	1	3/4"	EMT	1	#12	CU THWN	1	#12	CU THWN	---	---	CU THWN	20A	20A/1P	
52	MPB	P-19	1	3/4"	EMT	1	#12	CU THWN	1	#12	CU THWN	---	---	CU THWN	20A	20A/1P	
53	MPB	P-7	1	3/4"	EMT	1	#12	CU THWN	1	#12	CU THWN	---	---	CU THWN	15A	15A/1P	
54	MPB	EF-13	1	3/4"	EMT	1	#12	CU THWN	1	#12	CU THWN	---	---	CU THWN	20A	20A/1P	
55	MPB	P-8	1	3/4"	EMT	1	#12	CU THWN	1	#12	CU THWN	---	---	CU THWN	15A	15A/1P	
56	MDB	P-16	1	3/4"	EMT	3	#12	CU THWN	---	---	CU THWN	1	#12	CU THWN	60A	100A/3P	
57	MDB	P-17	1	3/4"	EMT	3	#12	CU THWN	---	---	CU THWN	1	#12	CU THWN	15A	100A/3P	

58	MDB	P-18	1	3/4"	EMT	3	#12	CU THWN	---	---	CU THWN	1	#12	CU THWN	15A	100A/3P	
59	MDB	P-1	1	3/4"	EMT	3	#10	CU THWN	---	---	CU THWN	1	#10	CU THWN	40A	100A/3P	
60	MDB	P-2	1	3/4"	EMT	3	#10	CU THWN	---	---	CU THWN	1	#10	CU THWN	40A	100A/3P	
61	MDB	P-3	1	1"	EMT	3	#6	CU THWN	---	---	CU THWN	1	#10	CU THWN	70A	100A/3P	
62	MDB	P-4	1	1"	EMT	3	#6	CU THWN	---	---	CU THWN	1	#10	CU THWN	70A	100A/3P	
63	MDB	AHU-5S	1	3/4"	EMT	3	#10	CU THWN	---	---	CU THWN	1	#10	CU THWN	30A	100A/3P	
64	MDB	AHU-5R	1	3/4"	EMT	3	#12	CU THWN	---	---	CU THWN	1	#12	CU THWN	15A	100A/3P	
65	MDB	P-5	1	1"	EMT	3	#8	CU THWN	---	---	CU THWN	1	#10	CU THWN	60A	100A/3P	
66	MDB	P-6	1	1"	EMT	3	#8	CU THWN	---	---	CU THWN	1	#10	CU THWN	60A	100A/3P	
67	MDB	EF-7	1	3/4"	EMT	3	#12	CU THWN	---	---	CU THWN	1	#12	CU THWN	15A	100A/3P	
68	MDB	EF-8	1	3/4"	EMT	3	#12	CU THWN	---	---	CU THWN	1	#12	CU THWN	15A	100A/3P	
69	MDB	AHU-7S	1	1-1/4"	EMT	3	#4	CU THWN	---	---	CU THWN	1	#8	CU THWN	70A	100A/3P	
70	MDB	AHU-7R	1	3/4"	EMT	3	#10	CU THWN	---	---	CU THWN	1	#10	CU THWN	30A	100A/3P	
71	ATS-1	EB	1	1-1/2"	EMT	3	#2	CU THWN	1	#2	CU THWN	1	#2	CU THWN	---	---	PROTECTED AT PANEL OR ECB ABOVE ATS
72	EB	TEPB	1	3/4"	EMT	3	#10	CU THWN	---	---	CU THWN	1	#10	CU THWN	30A	30A/3P	
73	TEPB	EPB	1	1"	EMT	3	#6	CU THWN	1	#6	CU THWN	1	#8	CU THWN	---	---	PROTECTED AT PANEL ABOVE XFMR
74	ATS-2	SB	1	1-1/2"	EMT	3	#2	CU THWN	1	#2	CU THWN	1	#2	CU THWN	---	---	PROTECTED AT PANEL OR ECB ABOVE ATS
75	SB	EF-4	1	3/4"	EMT	3	#12	CU THWN	---	---	CU THWN	1	#12	CU THWN	15A	15A/3P	
76	SB	TSPB	1	1-1/4"	EMT	3	#3	CU THWN	---	---	CU THWN	1	#6	CU THWN	90A	90A/3P	
77	TSPB	SPB	1	2"	EMT	3	1/0	CU THWN	1	1/0	CU THWN	1	#6	CU THWN	---	---	PROTECTED AT PANEL ABOVE XFMR
78	SPB	SP1	1	1-1/4"	EMT	3	#4	CU THWN	1	#4	CU THWN	1	#8	CU THWN	70A	70A/3P	
79	SPB	SP2	1	1-1/4"	EMT	3	#4	CU THWN	1	#4	CU THWN	1	#8	CU THWN	70A	70A/3P	
80	ATS-3	VB	1	1-1/4"	EMT	3	#2	CU THWN	1	#2	CU THWN	1	#6	CU THWN	---	---	PROTECTED AT PANEL OR ECB ABOVE ATS
81	VB	TVPB	1	3/4"	EMT	3	#10	CU THWN	---	---	CU THWN	1	#10	CU THWN	30A	30A/3P	
82	TVPB	VPB	1	1"	EMT	3	#8	CU THWN	1	#8	CU THWN	1	#8	CU THWN	---	---	PROTECTED AT PANEL ABOVE XFMR
83	VB	ELEV-1	1	3/4"	EMT	3	#8	CU THWN	---	---	CU THWN	1	#10	CU THWN	30A	40A/3P	
84	VB	ELEV-2	1	3/4"	EMT	3	#10	CU THWN	---	---	CU THWN	1	#10	CU THWN	30A	30A/3P	
85	VB	ELEV-3	1	3/4"	EMT	3	#10	CU THWN	---	---	CU THWN	1	#10	CU THWN	30A	30A/3P	
86	CB-1	ATS-1	1	1-1/2"	EMT	3	#2	CU THWN	1	#2	CU THWN	1	#2	CU THWN	100A	100A/3P	
87	WIREWAY	CB-1	1	1-1/2"	EMT	3	#2	CU THWN	1	#2	CU THWN	1	#2	CU THWN	---	---	PROTECTED AT GENERATOR

88	CB-2	ATS-2	1	1-1/2"	EMT	3	#2	CU THWN	1	#2	CU THWN	1	#2	CU THWN	100A	100A/3P	
89	WIREWAY	CB-2	1	1-1/2"	EMT	3	#2	CU THWN	1	#2	CU THWN	1	#2	CU THWN	---	---	PROTECTED AT GENERATOR
90	CB-3	ATS-3	1	1-1/4"	EMT	3	#2	CU THWN	1	#2	CU THWN	1	#6	CU THWN	100A	100A/3P	
91	WIREWAY	CB-3	1	1-1/4"	EMT	3	#2	CU THWN	1	#2	CU THWN	1	#6	CU THWN	---	---	PROTECTED AT GENERATOR
92	GENERATOR	WIREWAY	1	4"	EMT	3	3/0	CU THWN	1	3/0	CU THWN	1	#2	CU THWN	200A	200A/3P	

NOTES:

AL=ALUMINUM
CU=COPPER



SINGLE–LINE DIAGRAM	
AE 481W – TECH REPORT 2	
TOWSON WEST VILLAGE COMMONS TOWSON UNIVERSITY, TOWSON MARYLAND	
PATRICK MORGAN	OCTOBER 20, 2010

ELECTRICAL SYMBOLS AND ABBREVIATIONS

GENERAL

Symbol	Description
(1)	DENOTES REFERENCE TO SPECIFIC NOTE ON DRAWING.
1/E001	DETAIL NUMBER / DRAWING NUMBER WHERE DETAIL IS LOCATED.
#/E#.#	DETAIL REFERENCE: DETAIL NUMBER/DRAWING NUMBER
[1]	DENOTES REFERENCE TO DETAIL NOTE ON SHEET.

CONDUIT

Symbol	Description
------	EMPTY CONDUIT WITH TWO PULL WIRES RUN IN SLAB OR UNDER SLAB.
—UGE—	UNDERGROUND DIRECT BURIED ELECTRICAL 1" EMPTY CONDUIT WITH TWO PULL WIRES, UON. PROVIDE WIRING IN CONDUIT WHERE NOTED. REFER TO DETAILS 4/E5.1 AND 5/E5.1 FOR ADDITIONAL INFORMATION.
—UGT—	UNDERGROUND DIRECT BURIED (TELE)COMMUNICATIONS 1" EMPTY CONDUIT WITH TWO PULL WIRES, UON. REFER TO DETAILS 4/E5.1 AND 5/E5.1 FOR ADDITIONAL INFORMATION.
	CONDUIT TURNING DOWN.
	CONDUIT TURNING UP.
	CONDUIT STUB WITH INSULATED BUSHING ON END.
	ELECTRIC DUCTBANK. REFER TO DETAILS 1/E5.1, 2/E5.1 AND 3/E5.1 FOR ADDITIONAL INFORMATION.

LIGHTING

Symbol	Description
	CONCRETE POLE BASE FOR FUTURE EXTERIOR POST LIGHT. REFER TO DETAIL 11/E5.1 FOR ADDITIONAL INFORMATION.
	REMOVE EXTERIOR ROADWAY POST LIGHT TO BE RELOCATED.
	ETR OR RELOCATED EXTERIOR POST OR POLE LIGHT.

POWER PROVISIONS

Symbol	Description
H A, H B	HANDHOLE. REFER TO DETAIL 7/E5.1 FOR ADDITIONAL INFORMATION.
H	ETR HANDHOLE.
	ELECTRICAL CONNECTION TO SNOW-MELTING SYSTEM. PROVIDE TWO 1" CONDUITS FROM RESPECTIVE AREA OF SNOW-MELTING SYSTEM TO ADJACENT HANDHOLE. REFER TO DETAIL 12/E5.1 FOR ADDITIONAL INFORMATION.
	GROUND ROD.
BB	GROUNDING BUSBAR ASSEMBLY. REFER TO DETAIL 9/E5.1 FOR ADDITIONAL INFORMATION.
FB	FLOOR BOX FOR POWER AND COMMUNICATIONS, RECESSED IN FLOOR. REFER TO DETAIL 8/E5.1 FOR ADDITIONAL INFORMATION.

ABBREVIATIONS

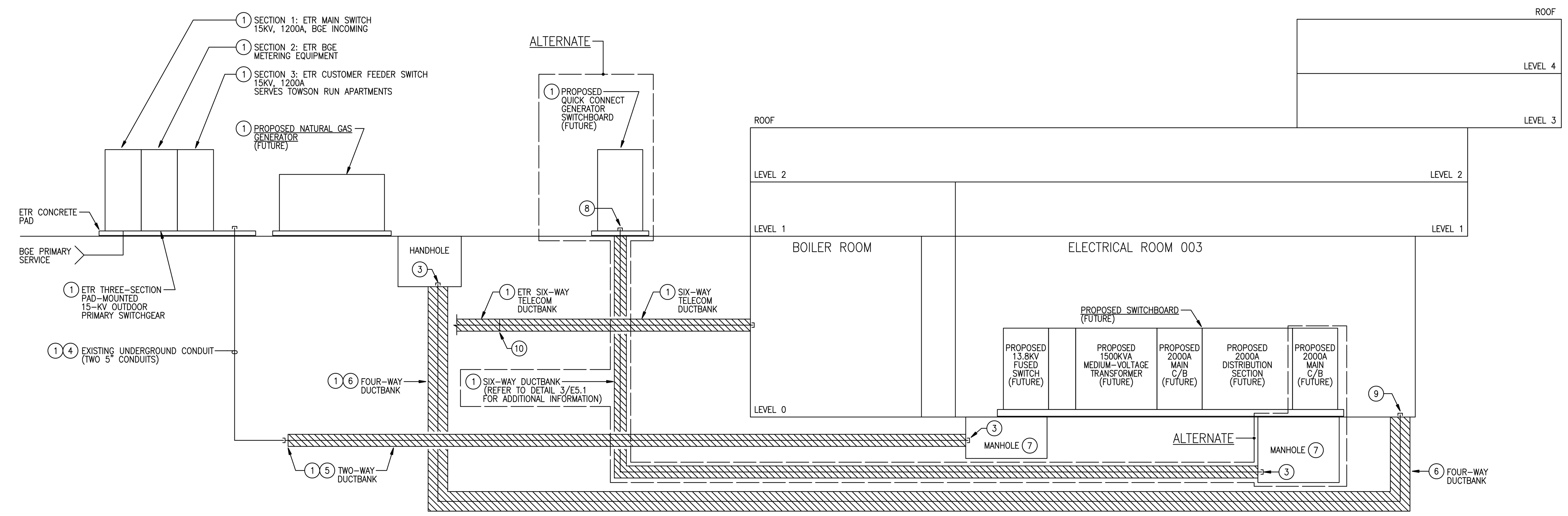
Abbreviation	Meaning
A, AMP	AMPERE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AWG	AMERICAN WIRE GAUGE
C	CONDUIT
DWG	DRAWING
EC	EMPTY CONDUIT WITH PULL STRING
ELEV	ELEVATION
ETR	EXISTING TO REMAIN
EUGE	EXISTING UNDERGROUND ELECTRIC
EUGT	EXISTING UNDERGROUND TELECOMMUNICATIONS
EX	EXISTING
EXIST	EXISTING
G, GND	GROUND
MAX	MAXIMUM
MH	MOUNTING HEIGHT OR MANHOLE
MIN	MINIMUM
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
OC	ON CENTER
PSI	POUNDS PER SQUARE INCH
RGS	RIGID GALVANIZED STEEL
RM	ROOM
RX	REMOVE EXISTING
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
UGE	UNDERGROUND ELECTRICAL
UGT	UNDERGROUND TELECOMMUNICATIONS
V	VOLT, VOLTS
W	WATTS/WIRE, WIRES
ø	PHASE
&	AND
{	BRACKET

GENERAL NOTES:

A. REFER TO SITE PLAN ON SHEET ME0.1 FOR ADDITIONAL INFORMATION.

SPECIFIC NOTES:

1. REFER TO SITE PLAN ON DRAWING ME0.1 FOR LOCATION OF EQUIPMENT, CONDUIT, AND DUCTBANKS AS NOTED.
2. REFER TO SITE PLAN ON DRAWING ME0.1 FOR CONTINUATION.
3. PROVIDE BUSHINGS AT END OF CONDUITS AND CAP TO PREVENT MOISTURE FROM ENTERING CONDUITS.
4. TWO EXISTING 5" UNDERGROUND CONDUITS ARE STUBBED UP 6 INCHES ABOVE EXISTING CONCRETE PAD TO 10 FEET EAST OF THE EXISTING OUTDOOR PRIMARY SWITCHGEAR. COORDINATE EXACT LOCATION OF EXISTING UNDERGROUND CONDUITS IN FIELD.
5. CONNECT TWO-WAY DUCTBANK TO TWO EXISTING 5" CONDUITS. REFER TO SPECIFIC NOTE 4 ABOVE. REFER TO DETAIL 1/E5.1 FOR ADDITIONAL INFORMATION ON TWO-WAY DUCTBANK.
6. REFER TO DETAIL 2/E5.1 FOR ADDITIONAL INFORMATION ON FOUR-WAY DUCTBANK.
7. REFER TO DETAIL 6/E5.1 FOR ADDITIONAL INFORMATION ON MANHOLE.
8. STUB-UP CONDUITS TO 12" ABOVE FINISHED GRADE. PROVIDE BUSHINGS AT END OF CONDUITS AND CAP TO PREVENT MOISTURE FROM ENTERING CONDUITS.
9. STUB-UP CONDUITS TO 12" ABOVE FINISHED FLOOR IN ELECTRICAL ROOM 003. PROVIDE BUSHINGS AT END OF CONDUITS AND CAP.
10. CONNECT TO EXISTING DUCTBANK. COORDINATE EXACT LOCATION OF EXISTING DUCTBANK IN FIELD.



1/E0.1 UNDERGROUND DUCTS AND UTILITY STRUCTURES RISER DIAGRAM

NOT TO SCALE

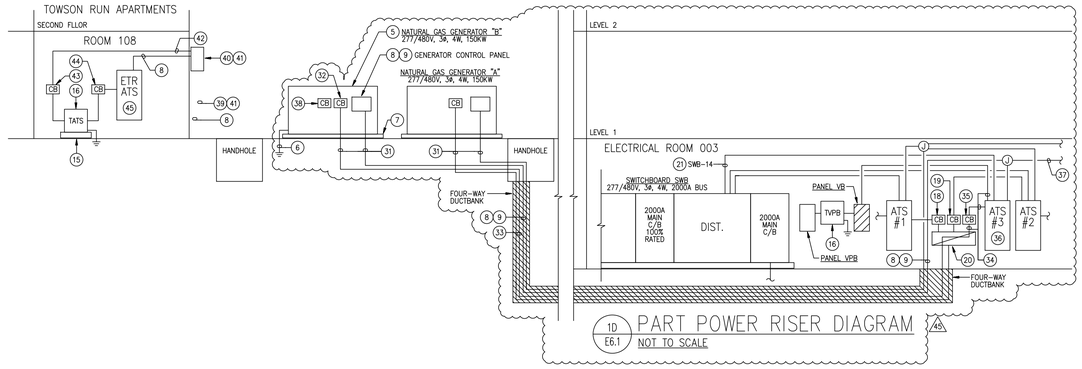
5-22-09 RESUBMISSION

THIS DRAWING WAS CREATED AND SUBMITTED UNDER "PACKAGE 1". IT IS BEING RESUBMITTED AS PART OF "PACKAGE 2" WITH REVISIONS AND ADDITIONS INCLUDED ON DRAWING E0.1A. CONTRACTOR SHALL INCLUDE THE WORK INDICATED ON THESE DRAWINGS WITH THE WORK INCLUDED UNDER "PACKAGE 2".

PJM
NONE PJM
FEBRUARY 20, 2009 REL

ELECTRICAL SYMBOLS, ABBREVIATIONS AND DIAGRAM

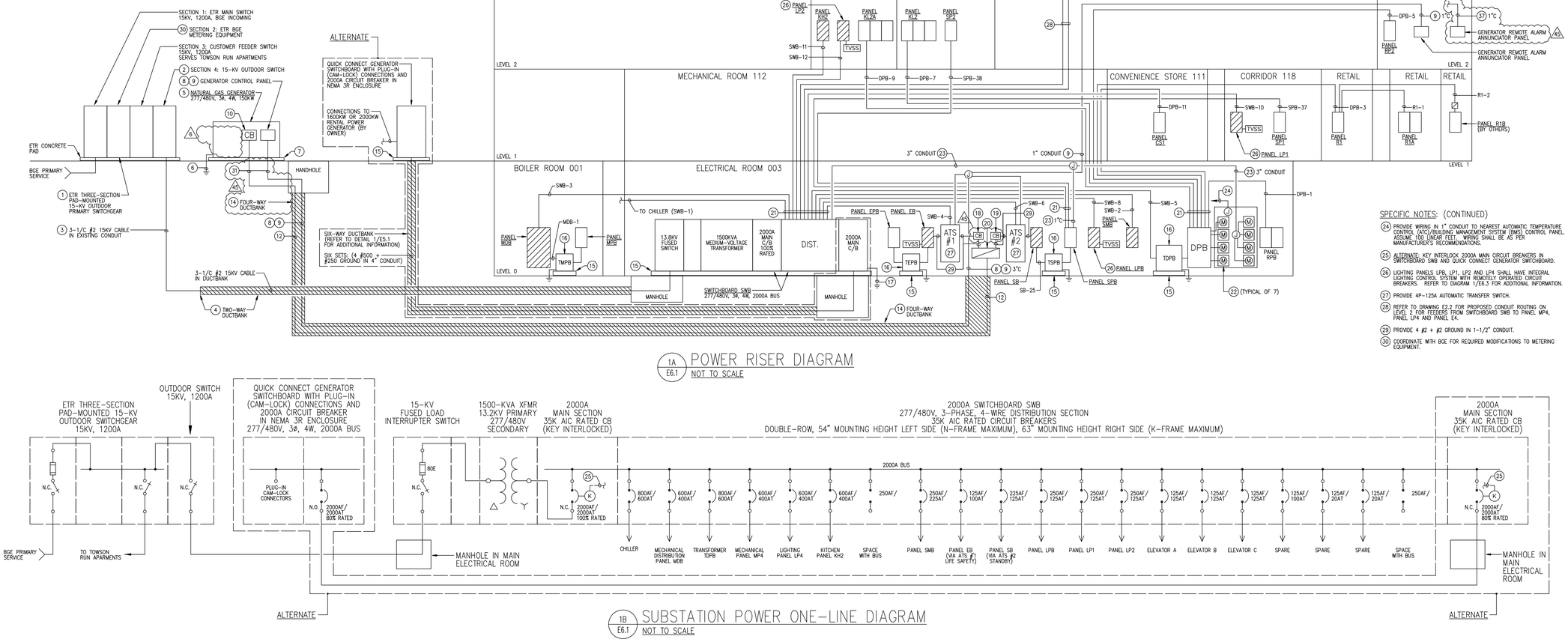
E0.1



1D E6.1 PART POWER RISER DIAGRAM
NOT TO SCALE

SPECIFIC NOTES: (CONTINUED) 45 54

31. PROVIDE FOUR 4" DIRECT BURIED CONDUITS FROM HANDHOLE TO RESPECTIVE GENERATOR.
32. PROVIDE 3P-100A SHUNT TRIP CIRCUIT BREAKER TO SERVE ELEVATOR LOADS AT WEST VILLAGE COMMONS. MOUNT CIRCUIT BREAKER WITHIN GENERATOR ENCLOSURE AND MAKE ALL CONNECTIONS. COORDINATE LOCATION OF CIRCUIT BREAKER WITH GENERATOR MANUFACTURER.
33. PROVIDE 4 #2 + #6 GROUND IN 4" CONDUIT.
34. PROVIDE 4 #2 + #6 GROUND IN 1-1/4"C" CONDUIT.
35. PROVIDE 3P-100A ECB TO SERVE ELEVATOR LOADS.
36. PROVIDE 4P-125A AUTOMATIC TRANSFER SWITCH.
37. PROVIDE WIRING IN CONDUIT FROM GENERATOR "B" CONTROL PANEL TO GENERATOR REMOTE ALARM ANNUNCIATOR PANEL FOR GENERATOR "B". WIRING SHALL BE AS PER GENERATOR MANUFACTURER'S RECOMMENDATIONS.
38. PROVIDE 3P-175A SHUNT TRIP CIRCUIT BREAKER TO SERVE GENERATOR LOADS IN TOWSON RUN APARTMENTS. MOUNT CIRCUIT BREAKER WITHIN GENERATOR ENCLOSURE AND MAKE ALL CONNECTIONS. COORDINATE LOCATION OF CIRCUIT BREAKER WITH GENERATOR MANUFACTURER.



SPECIFIC NOTES:

1. EXISTING THREE-SECTION OUTDOOR SWITCHGEAR IS BY POWERCON CORP, 15kV, 1200A. REFER TO SITE PLAN ON DRAWING ME0.1 FOR LOCATION. THE EXISTING CONCRETE PAD IS LARGE ENOUGH TO ADD A FOURTH SECTION TO THE END OF THE SWITCHGEAR.
2. PROVIDE ADDITIONAL SECTION TO EXISTING OUTDOOR SWITCHGEAR. EXTEND BUS OF EXISTING SWITCHGEAR TO SERVE NEW SECTION. SECTION SHALL BE 15KV, 1200A NON-FUSED SWITCH. SECTION SHALL MATCH EXISTING.
3. UTILIZE ONE OF TWO EXISTING 5" UNDERGROUND CONDUITS STUBBED UP 6 INCHES ABOVE EXISTING CONCRETE PAD TO 10 FEET EAST OF THE EXISTING OUTDOOR PRIMARY SWITCHGEAR. COORDINATE EXACT LOCATION OF EXISTING UNDERGROUND CONDUITS IN FIELD.
4. CONNECT TWO-WAY DUCTBANK TO TWO EXISTING 5" CONDUITS. REFER TO SPECIFIC NOTE 3 ABOVE. REFER TO DETAIL 1/E5.1A FOR ADDITIONAL INFORMATION ON DUCTBANK.
5. PROVIDE TYPE 10 GENERATOR, PER NFPA 110. THE GENERATOR SHALL BE ABLE TO PROVIDE GENERATOR POWER TO THE SCHOOL WITHIN 10-SECONDS AFTER A UTILITY POWER OUTAGE (TYPE 10).
6. REFER TO DETAIL 8/E5.1A FOR GENERATOR GROUNDING.
7. PROVIDE GENERATOR CONCRETE PAD. REFER TO DETAIL 9/E5.1A FOR ADDITIONAL INFORMATION.
8. PROVIDE GENERATOR CONTROL WIRING IN CONDUIT BETWEEN GENERATOR CONTROL PANEL AND ASSOCIATED AUTOMATIC TRANSFER SWITCHES. MAKE ALL CONNECTIONS NECESSARY FOR COMPLETE INSTALLATION. GENERATOR CONTROL WIRING SHALL BE AS PER GENERATOR MANUFACTURER'S RECOMMENDATIONS.
9. PROVIDE WIRING IN CONDUIT FROM GENERATOR CONTROL PANEL TO GENERATOR REMOTE ALARM ANNUNCIATOR PANEL. WIRING SHALL BE AS PER GENERATOR MANUFACTURER'S RECOMMENDATIONS.
10. PROVIDE 3P-200A SHUNT TRIP CIRCUIT BREAKER TO SERVE GENERATOR LOADS. MOUNT CIRCUIT BREAKER WITHIN GENERATOR ENCLOSURE AND MAKE ALL CONNECTIONS. COORDINATE LOCATION OF CIRCUIT BREAKER WITH GENERATOR MANUFACTURER.
11. NOT USED. 6
12. PROVIDE 4 #3/0 + #2 GROUND IN 4" CONDUIT.
13. PROVIDE 4 #2 + #6 GROUND IN 1-1/4" CONDUIT TO LOAD BANK MOUNTED ON RADIATOR OF GENERATOR.
14. REFER TO DETAIL 2/E5.1A FOR ADDITIONAL INFORMATION ON DUCTBANK.
15. PROVIDE 4" HIGH CONCRETE HOUSEKEEPING PAD.
16. REFER TO TRANSFORMER SCHEDULE ON THIS SHEET FOR ADDITIONAL INFORMATION.
17. REFER TO DETAIL 10/E5.1A FOR GROUNDING CONNECTIONS AT SWITCHBOARD.
18. PROVIDE 3P-100A ECB TO SERVE LIFE SAFETY LOADS. 45
19. PROVIDE 3P-100A ECB TO SERVE STANDBY LOADS.
20. SIZE WIREWAY AS REQUIRED TO ACCOMMODATE CABLE SPLICES.
21. REFER TO SWITCHBOARD AND PANELBOARD SCHEDULES FOR ADDITIONAL INFORMATION ON FEEDERS AS NOTED.
22. PROVIDE POWER MONITORS AS INDICATED TO MONITOR THE FOLLOWING EQUIPMENT:
    1. SWITCHBOARD SWB (ENTIRE BUILDING)
    2. PANEL CS1 (CONVENIENCE STORE)
    3. PANEL R1 (RETAIL SPACES)
    4. PANEL LP2
    5. PANEL KH2
    6. PANEL KL2A
    7. PANEL KL2A
    8. PANEL SP2 (MONITOR FROM PANEL SPB)

    PROVIDE CURRENT TRANSFORMERS, POTENTIAL TRANSFORMERS, AND WIRING IN CONDUIT NECESSARY FOR COMPLETE INSTALLATION.
23. PROVIDE WIRING FOR POWER MONITORING IN CONDUIT FROM POWER MONITORS TO CT'S AND PT'S IN RESPECTIVE PANELBOARD. WIRING SHALL BE AS PER MANUFACTURER'S RECOMMENDATIONS.

SPECIFIC NOTES: (CONTINUED)

24. PROVIDE WIRING IN 1" CONDUIT TO NEAREST AUTOMATIC TEMPERATURE CONTROL (ATC)/BUILDING MANAGEMENT SYSTEM (BMS) CONTROL PANEL. ASSUME 100 LINEAR FEET. WIRING SHALL BE AS PER MANUFACTURER'S RECOMMENDATIONS.
25. ALTERNATE: KEY INTERLOCK 2000A MAIN CIRCUIT BREAKERS IN SWITCHBOARD SWB AND QUICK CONNECT GENERATOR SWITCHBOARD.
26. LIGHTING PANELS LPB, LP1, LP2 AND LP4 SHALL HAVE INTEGRAL LIGHTING CONTROL SYSTEM WITH REMOTELY OPERATED CIRCUIT BREAKERS. REFER TO DIAGRAM 1/E6.3 FOR ADDITIONAL INFORMATION.
27. PROVIDE 4P-125A AUTOMATIC TRANSFER SWITCH.
28. REFER TO DRAWING E2.2 FOR PROPOSED CONDUIT ROUTING ON LEVEL 2 FOR FEEDERS FROM SWITCHBOARD SWB TO PANEL MP4, PANEL LP4 AND PANEL E4.
29. PROVIDE 4 #2 + #2 GROUND IN 1-1/2" CONDUIT.
30. COORDINATE WITH BGE FOR REQUIRED MODIFICATIONS TO METERING EQUIPMENT.

1B E6.1 SUBSTATION POWER ONE-LINE DIAGRAM
NOT TO SCALE

1C E6.1 ELEVATION
SUBSTATION SWITCHBOARD SWB
NOT TO SCALE

WIRING SCHEDULE SWITCHBOARD SWB

277 / 480 VOLTS, 3 PHASE 4 WIRE — 2000 AMP MAIN BUS, 2000 AMP MAIN BREAKER — FREE STANDING, 35,000 AIC RATING

FEEDER NO.	EQUIPMENT SERVED	FEEDER SIZE	CIRCUIT BREAKER FRAME	POLE	AMP	CONNECTED LOAD (KVA) A Ø	B Ø	C Ø	NOTES
1	CHILLER	2 SETS: (3 #350 + #1G - 3"C)	800	3	600	96.7	96.7	96.7	1
3	DISTRIBUTION PANEL PANEL MDB	4 #500 + #2G - 4"C	600	3	400	69.5	69.1	69.2	
5	DISTRIBUTION PANEL DPB (XFMR TDPB)	2 SETS (4 #500 + #1/0G - 4"C)	800	3	800	200.9	207.9	196.5	
7	PANEL MP4	4 #500 + #2G - 4"C	600	3	400	80.7	76.7	70.7	
9	PANEL LP4	4 #500 + #2G - 4"C	600	3	400	65.1	62.6	58.9	
11	PANEL KH2	4 #500 + #2G - 4"C	600	3	400	34.1	34.1	34.1	
-	SPACE AND PROVISION	-	250	3	-	-	-	-	
2	PANEL SMB	4 #4/0 + #4G - 3"C	250	3	225	32.6	32.6	32.6	
4	PANEL EB (VIA ATS 1 - LIFE SAFETY)	4 #2 + #8G - 1-1/4"C	125	3	100	7.1	4.1	3.9	
6	PANEL SB (VIA ATS 2 - STANDBY)	4 #1/0 + #6G - 2"C	125	3	125	23.6	19.6	17.0	
8	PANEL LPB	4 #1/0 + #6G - 2"C	125	3	125	2.2	4.0	4.0	
10	PANEL LP1	4 #1/0 + #6G - 2"C	125	3	125	2.8	0.8	3.7	
12	PANEL LP2	4 #1/0 + #6G - 2"C	125	3	125	2.9	2.6	3.5	
45 14	PANEL VB (VIA ATS-3 - ELEVATOR)	3 #1/0 + #6G - 2"C	125	3	125	25.0	21.5	22.9	
	SPARE		125	3	125				
	SPARE		125	3	125				
	SPARE		125	3	100				
	SPARE		125	3	20				
	SPARE		125	3	20				
-	SPACE AND PROVISION	-	250	3	-	-	-	-	
						643.2	632.3	613.7	

CONNECTED LOAD = 1889.2 KVA

DEMAND LOAD = 1544.9 KVA

LOCATION ELECTRICAL 003

NOTES:
1. PROVIDE 400A CIRCUIT BREAKER 3 #500 + 2G - 4"C FEEDER SIZE IF ALTERNATE UNIT IS ACCEPTED.

SCHEDULE OF TRANSFORMERS

TRANSFORMER DESIG.	KVA	LOCATION	PRIMARY FEEDER	SECONDARY FEEDER	SERVICE GROUND CONDUCTOR	EQUIPMENT SERVED	NOTES
TDPB	500	ELECTRIC ROOM 003	SWB-5	4 SETS: (4 #350 + #3/0G IN 3"C)	#3/0	DIST. PANEL DPB	1,2,3,4,5
TEPB	15	ELECTRIC ROOM 003	EB-25	4 #8 + #8G IN 1"C	#8	PANEL EPB	1,2,3,4,5
TSPB	45	ELECTRIC ROOM 003	SB-25	4 #1/0 + #6G IN 2"C	#6	PANEL SPB	1,2,3,4,5
TMPB	30	BOILER ROOM 001	MDB-1	4 #3 + #8G IN 1-1/2"C	#8	PANEL MPB	1,2,3,4,5
TRP4	150	ELECTRIC ROOM 409A	LP4-37	2 SETS: (4 #350 + #2/0G IN 3"C)	#2/0	PANEL RP4	1,2,3,4,5
45 TVPB	15	ELECTRIC ROOM 003	VB-25	4 #8 + #8G IN 1"C	#8	PANEL VPB	1,2,3,4,5,6
54 TATS	112.5	TOWSON RUN 108	NOTE 7	4 #500 + #1/0 GROUND IN 4"C	#1/0	EX. 400A ATS	1,2,3,4,5

TRANSFORMER NOTES:

1. TRANSFORMER SHALL HAVE 480-VOLT, 3-PHASE, DELTA PRIMARY AND 120/208-VOLT, 3-PHASE, WYE SECONDARY.
2. GROUND PRIMARY AND SECONDARY OF TRANSFORMER AS PER NEC.
3. PROVIDE SERVICE GROUND CONDUCTOR TO MAIN BUILDING ELECTRIC GROUNDING BUSBAR WITH SIZE AS INDICATED ON SCHEDULE.
4. UTILIZE FLEXIBLE METAL CONDUITS TO CONNECT TO TRANSFORMER.
5. TRANSFORMER SECONDARY CONDUCTORS SHALL NOT EXCEED 10 FEET LONG TO FIRST OVERCURRENT PROTECTION DEVICE.
6. TRANFORMER SHALL BE WALL-MOUNTED. PROVIDE WITH WALL MOUNTING BRACKET. 45
7. PROVIDE 3 #2/0 + #4 GROUND IN 2" CONDUIT. 54

6	6/29/2009	ADDENDUM NO. 6
45	5/17/2010	ASI 30

PJM
NONE PJM
REL

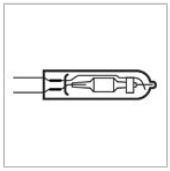
POWER DIAGRAMS E6.1

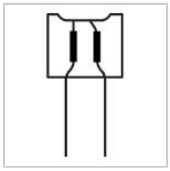
GE Lighting

90352 - CMH39TCU830/G8.5

GE ConstantColor® PulseArc® CMH® Ceramic Metal Halide T4.5

a product of ecomagination





GENERAL CHARACTERISTICS

Lamp Type	High Intensity Discharge - Ceramic Metal Halide
Bulb	T4.5
Base	Bi-Pin (G8.5)
Wattage	39
Rated Life	16500 hrs
Bulb Material	Quartz
Lamp Enclosure Type (LET)	Enclosed fixtures only
LEED-EB MR Credit	125 picograms Hg per mean lumen hour
Additional Info	UV control

PHOTOMETRIC CHARACTERISTICS

Initial Lumens	3400
Mean Lumens	2300
Nominal Initial Lumens per Watt	87
Color Temperature	3000 K
Color Rendering Index (CRI)	84

ELECTRICAL CHARACTERISTICS

Burn Position	Universal burning position
Warm Up Time to 90%	2 min
Warm Up Time to 90% (MAX)	2 min
Hot Restart Time to 90% (MIN)	10 min
Hot Restart Time to 90% (MAX)	15 min

DIMENSIONS

Maximum Overall Length (MOL)	3.37 cm
Bulb Diameter (DIA)	0.563 cm
Bulb Diameter (DIA) (MAX)	0.563 cm
Light Center Length (LCL)	2 cm

PRODUCT INFORMATION

Product Code	90352
Description	CMH39TCU830/G8.5
ANSI Code	C130/M130
Standard Package	Case
Standard Package GTIN	10043168903520
Standard Package Quantity	12
Sales Unit	Unit
No Of Items Per Sales Unit	1
No Of Items Per Standard Package	12
UPC	043168903523

CAUTIONS & WARNINGS

R- WARNING: This lamp can cause serious skin burn and eye inflammation from shortwave ultraviolet radiation if outer envelope of the lamp is broken or punctured, and the arc tube continues to operate. Do not use where people will remain for more than a few minutes unless adequate shielding or other safety precautions are used. Certain types of lamps that will automatically extinguish when the outer envelope is broken or punctured are commercially available. Visit the FDA website for more information: http://www.fda.gov/cdrh/radhealth/products/urburns.html

Caution

- Lamp may shatter and cause injury if broken
  - Do not use excessive force when installing lamp.
  - Do not use lamp if outer glass is scratched or broken.

Warning

- Risk of Electric Shock
  - Do not use where directly exposed to water or outdoors without an enclosed fixture.
  - Turn power off before inspection, installation or removal.
- Risk of Fire
  - Keep combustible materials away from lamp.
  - Use fused or thermally protected ballast - see instructions.
  - Use in fixture rated for this product.
- Risk of Burn
  - Allow lamp to cool before handling.
  - Do not turn on lamp until fully installed.
- A damaged lamp emits UV radiation which may cause eye/skin injury
  - Turn power off if glass bulb is broken. Remove and dispose of lamp.
- Unexpected lamp rupture may cause injury, fire, or property damage
  - Do not exceed rated voltage.
  - Do not turn on lamp until fully installed.
  - Do not use beyond rated life.
  - Do not use lamp if outer glass is scratched or broken.
  - Do not use where directly exposed to water or outdoors without an enclosed fixture.
  - Operate lamp only in specified position.
  - Use in enclosed fixture rated for this product.
  - Use only properly rated ballast.

NOTES

- Rated life is 15,000 hours on magnetic ballasts.

MasterColor® CDM-T T6

MasterColor CDM-T 35W/830 T6 1CT

The Elite family is at the very top of the MasterColor® CDM range, and gives a unique combination of unbeatable light quality and consistent performance over lifetime. While keeping running costs low. The Philips MasterColor® 3000KTubular Single-Ended T6 lamp is a compact, energy efficient, ceramic metal halide lamp that provides crisp, sparkling light.

See full MasterColor® CDM-T T6 range

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Specifications | Range

Product Data

Order code	223289
Full product code	223289

+ More info / Hide info

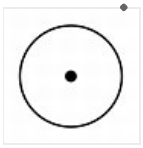
Downloads

- Leaflet
- Family - full data sheet
- Product Images
- Product Diagrams

General Characteristics

Base	G12
Bulb	T6 [Diameter: 6/8 inch /19mm]
Bulb Finish	Clear
Operating Position	Universal [Any or Universal (U)]
Life to 5% failures	8000 hr
Life to 10% failures	9000 hr
Life to 20% failures	10000 hr
RatedAvgLife(See Family Notes)	12000 hr

+ Zoom



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Electrical Characteristics

System Power EM	47 W
System Power EL	44 W
Lamp Wattage	35 W
Lamp Wattage EM	38.0 W
Lamp Wattage EL	38 W
Lamp Voltage	88 V

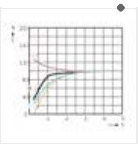
Lamp Current EM	0.53 A
Lamp Current EL	0.47 A
Ignition Time	30 s
Run-up time 90%	3 min
Ignition Peak Voltage	3500 V
Re-ignition Time [min]	15 min
Dimmable	No

Environmental Characteristics

Mercury (Hg) Content	3.1 mg

Light Technical Characteristics

Color Code	830 [CCT of 3000K]
Color Rendering Index	76 (min), 81 (nom) Ra8
Color Designation	Warm White
Color Temperature	3095 K
Color Temperature technical	3095 K
Chromaticity Coordinate X	428 -
Chromaticity Coordinate Y	397 -
Initial Lumens	3300 Lm
Initial Lumens	3300 Lm
Luminous Efficacy Lamp EM	87 Lm/W
Luminous Efficacy Lamp EL	83 Lm/W
Lumen Maintenance EM 2000h	75 %
Lumen Maintenance EL 2000h	80 %
Lumen Maintenance EM 5000h	65 %
Lumen Maintenance EL 5000h	70 %
Lumen Maintenance EM 10000h	45 %
Lumen Maintenance EL 10000h	50 %



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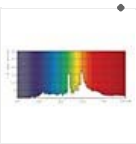


MASTERColour CDM-T 35 & 70W /830
+ Zoom

UV-related Characteristics

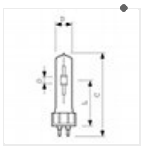
PET (NIOSH)	44 h.klx
Damage Factor D/fc	0.27 -

Product Dimensions

Reference Length A	90 mm
Overall Length C	103 mm
Diameter D	20 mm
Light Center Length L	55 (min), 56 (nom), 57 (max) mm
Arc Length O	5 mm

Luminaire Design Requirements

Cap-Base Temperature	280 C
Pinch Temperature	350 C
Bulb Temperature	500 C



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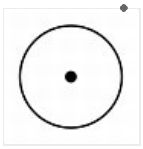

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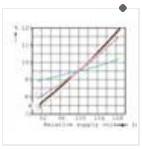

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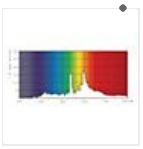

MASTERColour
CDM-T 35 &
70W /830
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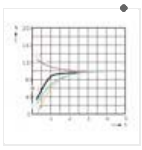

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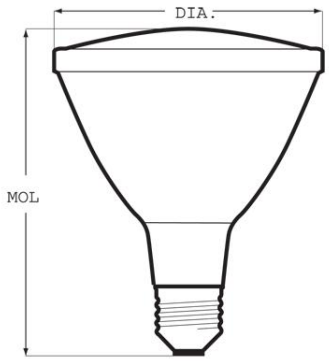
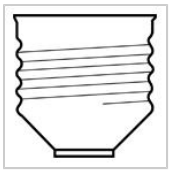
GE Lighting

42067 - CMH39PAR30L/FL25

GE ConstantColor® PulseArc® CMH® Ceramic Metal Halide PAR30L





CAUTIONS & WARNINGS

R- WARNING: This lamp can cause serious skin burn and eye inflammation from shortwave ultraviolet radiation if outer envelope of the lamp is broken or punctured, and the arc tube continues to operate. Do not use where people will remain for more than a few minutes unless adequate shielding or other safety precautions are used. Certain types of lamps that will automatically extinguish when the outer envelope is broken or punctured are commercially available. Visit the FDA website for more information: http://www.fda.gov/cdrh/radhealth/products/urburns.html

Caution

- Lamp may shatter and cause injury if broken
  - Do not use lamp if outer glass is scratched or broken.

Warning

- Risk of Burn
  - Allow lamp to cool before handling.
  - Do not turn on lamp until fully installed.
- Risk of Electric Shock
  - Do not use where directly exposed to water or outdoors without an enclosed fixture.
  - Turn power off before inspection, installation or removal.
- Risk of Fire
  - Keep combustible materials away from lamp.
  - Use fused or thermally protected ballast - see instructions.
  - Use in fixture rated for this product.
- Unexpected lamp rupture may cause injury, fire, or property damage
  - Do not exceed rated voltage.
  - Do not store flammable materials near/below lamp.
  - Do not turn on lamp until fully installed.
  - Do not use beyond rated life.
  - Do not use lamp if outer glass is scratched or broken.
  - Do not use where directly exposed to water or outdoors without an enclosed fixture.
  - Use only properly rated ballast.

NOTES

- Rated life based on 11 hours per start
- Use electronic ballast, peak lead ballast, or system which can shut itself off if ballast overheating occurs

GENERAL CHARACTERISTICS

Lamp Type	High Intensity Discharge - Ceramic Metal Halide
Bulb	PAR30L
Base	Medium Screw (E26)
Wattage	39
Rated Life	10000 hrs
Bulb Material	Hard glass
Lamp Enclosure Type (LET)	Open or enclosed fixtures
LEED-EB MR Credit	208 picograms Hg per mean lumen hour
Additional Info	Ballast thermal protection/ UV control

PHOTOMETRIC CHARACTERISTICS

Initial Lumens	2400
Nominal Initial Lumens per Watt	61
Beam Spread	25 °
Center Beam Candlepower (CBCP)	11000
Color Temperature	3000 K
Color Rendering Index (CRI)	81

ELECTRICAL CHARACTERISTICS

Burn Position	Universal burning position
Open Circuit Voltage (peak lead ballast)	280 V
Open Circuit Voltage (RMS lag ballast)	198 V
Warm Up Time to 90%	2 min
Warm Up Time to 90% (MAX)	2 min
Hot Restart Time to 90% (MIN)	10 min
Hot Restart Time to 90% (MAX)	15 min

DIMENSIONS

Maximum Overall Length (MOL)	4.75 cm
Nominal Length	4.6 cm
Bulb Diameter (DIA)	3.813 cm
Bulb Diameter (DIA) (MAX)	3.813 cm

PRODUCT INFORMATION

Product Code	42067
Description	CMH39PAR30L/FL25
ANSI Code	M130
Standard Package	Case
Standard Package GTIN	10043168420676
Standard Package Quantity	6
Sales Unit	Unit
No Of Items Per Sales Unit	1
No Of Items Per Standard Package	6
UPC	043168420679

Revised: 10/8/2009

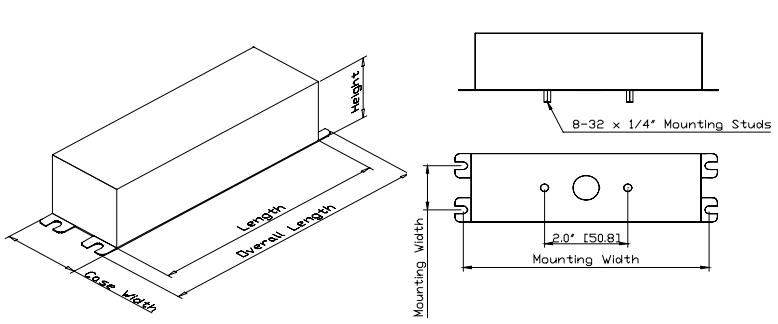
PHILIPS ADVANCE

e-Vision® Electronic Ballast for Metal Halide Lamps

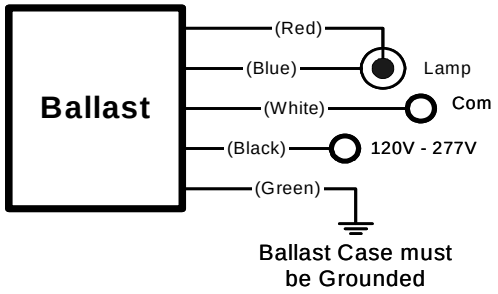
Catalog Number: IMH-39-E
For 39W Metal Halide Lamps
ANSI M130
120-277V 50/60Hz Electronic
Status: RELEASED

DIMENSIONS AND DATA

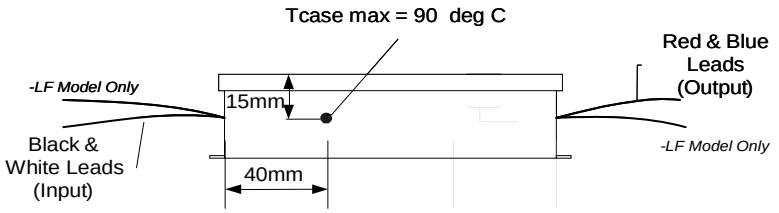
Lamp Number	Lamp Watts	Input Volts	Catalong Number*	Line Current (Amps)	Input Power (Watts)	Min Power Factor	Wiring Diag	Fig.	Weight (lb)	Max. Distance to Lamp (ft)
39W Watt Lamp, ANSI Code M130 Minimum Starting Temp -20°C/-4°F										
1	39	120	IMH-39-E-XXX	0.38	44	0.9	3	E	0.6	5
		277		0.16	43					



Case Figure	Overall Length	Case Length	Case Width	Height	Mountin Length	Mounting Width
E	140mm [5.5"]	127mm [5.0"]	44mm [1.7"]	30mm [1.2"]	135mm [5.3"]	26mm [1.0"]



Wiring Diagram 3



Case Temperature Measurement Location

INSTALLATION & APPLICATION NOTES:

1. Maximum allowable case temperature is 90°C. See figure above for measurement location
2. Ignition pulse is 4 kV max
3. All leads are 12 inches long
4. Ballast output will shutdown after 20 minutes if lamp fails to ignite
5. Power must be cycled off – then on, after replacing lamp

***Ordering Information**

Order Suffix	Description
-LF	Ballast with side exit leads and mounting feet, Leads exit either end

Data is based on tests performed by Philips Advance in a controlled environment and is representative of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice. All specifications are nominal unless otherwise noted.

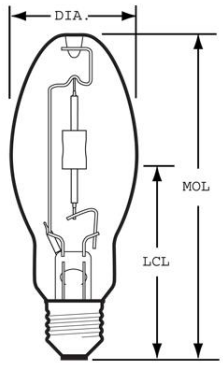
Philips Lighting Electronics N.A.
10275 West Higgins Road • Rosemont, IL 60018 • www.philips.com/advance
Tel: 800-322-2086 • Fax: 800-423-1882 • Customer Support: 800-372-3331 • OEM Support: 866-915-5886

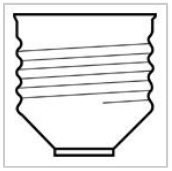
GE Lighting

22137 - CMH100/C/U830MED

GE ConstantColor® PulseArc® CMH® Ceramic Metal Halide BD17

a product of ecomagination





GENERAL CHARACTERISTICS

Lamp Type	High Intensity Discharge - Ceramic Metal Halide
Bulb	BD17
Base	Medium Screw (E26)
Bulb Finish	Coated
Wattage	100
Rated Life	15000 hrs
Bulb Material	Hard glass
Lamp Enclosure Type (LET)	Enclosed fixtures only
LEED-EB MR Credit	77 picograms Hg per mean lumen hour

PHOTOMETRIC CHARACTERISTICS

Initial Lumens	8700 /8700
Mean Lumens	6300 /6300
Nominal Initial Lumens per Watt	87
Color Temperature	3000 K
Color Rendering Index (CRI)	83
Effective Arc Length	0.3125 cm

ELECTRICAL CHARACTERISTICS

Burn Position	Universal burning position
Open Circuit Voltage (peak lead ballast)	332 V
Open Circuit Voltage (RMS lag ballast)	235 V
Warm Up Time to 90% (MIN)	2 min
Warm Up Time to 90% (MAX)	5 min
Hot Restart Time to 90%	15 min
Hot Restart Time to 90% (MAX)	15 min

DIMENSIONS

Maximum Overall Length (MOL)	5.43 cm
Nominal Length	5.43 cm
Bulb Diameter (DIA)	2.125 cm
Bulb Diameter (DIA) (MAX)	2.125 cm
Light Center Length (LCL)	3.37 cm

PRODUCT INFORMATION

Product Code	22137
Description	CMH100/C/U830MED
ANSI Code	M140/M90
Standard Package	Case
Standard Package GTIN	10043168221372
Standard Package Quantity	6
Sales Unit	Unit
No Of Items Per Sales Unit	1
No Of Items Per Standard Package	6
UPC	043168221375

CAUTIONS & WARNINGS

R- WARNING: This lamp can cause serious skin burn and eye inflammation from shortwave ultraviolet radiation if outer envelope of the lamp is broken or punctured, and the arc tube continues to operate. Do not use where people will remain for more than a few minutes unless adequate shielding or other safety precautions are used. Certain types of lamps that will automatically extinguish when the outer envelope is broken or punctured are commercially available. Visit the FDA website for more information: http://www.fda.gov/cdrh/radhealth/products/urburns.html

Caution

- Lamp may shatter and cause injury if broken
  - Dispose of lamp in a closed container.
  - Do not use excessive force when installing lamp.
  - Do not use lamp if outer glass is scratched or broken.

Warning

- Risk of Electric Shock
  - Do not use where directly exposed to water or outdoors without an enclosed fixture.
  - Turn power off before inspection, installation or removal.
- Risk of Burn
  - Allow lamp to cool before handling.
  - Do not turn on lamp until fully installed.
- Risk of Fire
  - Keep combustible materials away from lamp.
  - Use in fixture rated for this product.
- Unexpected lamp rupture may cause injury, fire, or property damage
  - Do not exceed rated voltage.
  - Do not turn on lamp until fully installed.
  - Do not use beyond rated life.
  - Do not use lamp if outer glass is scratched or broken.
  - Do not use where directly exposed to water or outdoors without an enclosed fixture.
  - Use in enclosed fixture rated for this product.
  - Use only properly rated ballast.
- A damaged lamp emits UV radiation which may cause eye/skin injury
  - Turn power off if glass bulb is broken. Remove and dispose of lamp.

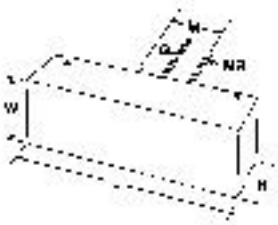
NOTES

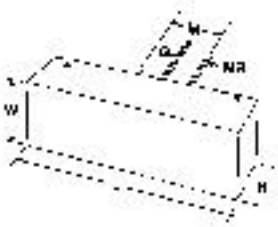
- Rated life based on 11 hours per start

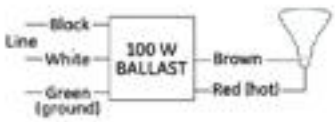
GE Lighting

87561 - GEMH100-SLJ-MV

GE HID UltraMax™ eHID Electronic Low Frequency Ballast







GENERAL CHARACTERISTICS

Category	High Intensity Discharge
Ballast Type	Electronic - Low Frequency
Line Voltage Regulation (+/-)	10 %
Ambient Temperature (MAX)	55 °C(13 °C)
Case Temperature	90 °C(194 °F)
Ballast Factor	Normal
Sound Rating	A (20-24 decibels)
Enclosure Type	Metal
Distance to Lamp	8 ft
Additional Info	End of Life Protection (EOL)/ Thermally protected

PRODUCT INFORMATION

Product Code	87561
Description	GEMH100-SLJ-MV
Standard Package	Case
Standard Package GTIN	10043168875612
Standard Package Quantity	10
Sales Unit	Case
No Of Items Per Sales Unit	1
No Of Items Per Standard Package	10
UPC	043168875615

DIMENSIONS

Case dimensions			
Length (L)		7.3 in(184.91 mm)	
Width (W)		2.6 in(65.53 mm)	
Height (H)		2.2 in(55.88 mm)	
Mounting dimensions			
Mount Length (M)		0.4 in(10.92 mm)	
Weight		0.38 lb	
Exit Type		Bottom Leads with Studs	
Remote Mounting Distance to Lamp		8 ft	
Remote Mounting Wire Gauge		18 AWG	
Lead lengths	Qty	Exit	Length (± 1 in.)
Black	1	Left	10.0 (254mm)
Red	1	Right	10.0 (254mm)
White	1	Left	10.0 (254mm)
Brown	1	Right	10.0 (254mm)

ELECTRICAL CHARACTERISTICS

Lamp Operating Frequency	130 Hz

SAFETY & PERFORMANCE

- ANSI - C62.41
- cUL Listed
- UL Type 1 Outdoor
- RoHs Compliant
- UL 1029 Listed
- Suitable for recessed use

SPECIFICATIONS BY LAMP & LINE VOLTAGE

Lamp	# of Lamps	Specifications by Line Voltage	System Wattage	Nominal Current	Ballast Factor	Ballast Efficiency	Max.Input Current	Starting Current	Open Circuit Voltage	Drop Out Voltage	Power factor	Min.starting temperature	Fuse rating	UL bench top rise
M90	1	277	107.0	0.41A	1	0.935				96V	0.98	0.0°F	3	
M90	1	120	110.0	0.93A	1	0.909				96V	0.99	0.0°F	3	
M140	1	277	107.0	0.41A	1	0.935				96V	0.98	0.0°F	3	
M140	1	120	110.0	0.93A	1	0.909				96V	0.99	0.0°F	3	
C140	1	120	110.0	0.93A	1					96V	0.99	0.0°F	3	
C140	1	277	107.0	0.41A	1					96V	0.98	0.0°F	3	

NOTES

- 200C rated lead wires
- Do not connect brown or red wires to ground

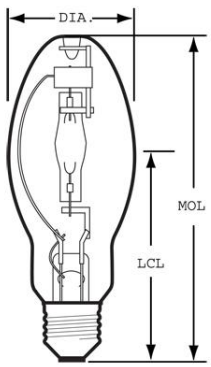
WARRANTY INFORMATION

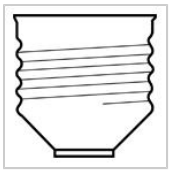
GE Lighting warrants to the purchaser that each ballast will be free from defects in material or workmanship for period as defined in the attached documents from the date of manufacture when properly installed and under normal conditions of use.

GE Lighting

19976 - MVR175/C/U/MED

GE Multi-Vapor® Quartz Metal Halide BD17





GENERAL CHARACTERISTICS

Lamp Type	High Intensity Discharge - Quartz Metal Halide
Bulb	BD17
Base	Medium Screw (E26)
Bulb Finish	Coated
Wattage	175
Rated Life	6000 hrs
Bulb Material	Hard glass
Lamp Enclosure Type (LET)	Enclosed fixtures only
LEED-EB MR Credit	306 picograms Hg per mean lumen hour

PHOTOMETRIC CHARACTERISTICS

Initial Lumens	11900 /12900
Mean Lumens	7900 /8400
Nominal Initial Lumens per Watt	68
Color Temperature	3900 K
Color Rendering Index (CRI)	65

ELECTRICAL CHARACTERISTICS

Burn Position	Universal burning position
Open Circuit Voltage (peak lead ballast)	540 V
Open Circuit Voltage (RMS lag ballast)	382 V
Warm Up Time to 90% (MIN)	2 min
Warm Up Time to 90% (MAX)	5 min

DIMENSIONS

Maximum Overall Length (MOL)	5.7500 in(146.0 mm)
Nominal Length	5.750 in(146.0 mm)
Bulb Diameter (DIA)	2.125 in(54.0 mm)
Bulb Diameter (DIA) (MAX)	2.125 in(54.0 mm)
Light Center Length (LCL)	3.430 in(87.1 mm)

PRODUCT INFORMATION

Product Code	19976
Description	MVR175/C/U/MED
ANSI Code	M57
Standard Package	Case
Standard Package GTIN	10043168199763
Standard Package Quantity	6
Sales Unit	Unit
No Of Items Per Sales Unit	1
No Of Items Per Standard Package	6
UPC	043168199766

CAUTIONS & WARNINGS

R- WARNING: This lamp can cause serious skin burn and eye inflammation from shortwave ultraviolet radiation if outer envelope of the lamp is broken or punctured, and the arc tube continues to operate. Do not use where people will remain for more than a few minutes unless adequate shielding or other safety precautions are used. Certain types of lamps that will automatically extinguish when the outer envelope is broken or punctured are commercially available. Visit the FDA website for more information: http://www.fda.gov/cdrh/radhealth/products/urburns.html

Caution

- Lamp may shatter and cause injury if broken
  - Dispose of lamp in a closed container.
  - Do not use excessive force when installing lamp.
  - Do not use lamp if outer glass is scratched or broken.

Warning

- Risk of Burn
  - Allow lamp to cool before handling.
  - Do not turn on lamp until fully installed.
- Risk of Electric Shock
  - Do not use where directly exposed to water or outdoors without an enclosed fixture.
  - Turn power off before inspection, installation or removal.
- Risk of Fire
  - Keep combustible materials away from lamp.
  - Use in fixture rated for this product.
- A damaged lamp emits UV radiation which may cause eye/skin injury
  - Turn power off if glass bulb is broken. Remove and dispose of lamp.
- Unexpected lamp rupture may cause injury, fire, or property damage
  - Do not exceed rated voltage.
  - Do not turn on lamp until fully installed.
  - Do not use beyond rated life.
  - Do not use lamp if outer glass is scratched or broken.
  - Do not use where directly exposed to water or outdoors without an enclosed fixture.
  - If used on a dimming system, see instructions.
  - Operate lamp only in specified position.
  - Turn lamp off at least once for 15 minutes per week.
  - Use in enclosed fixture rated for this product.
  - Use only properly rated ballast.

GRAPHS & CHARTS

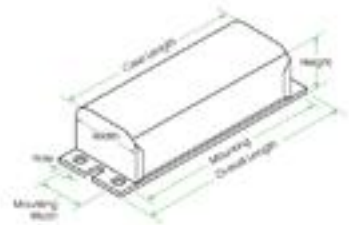
Spectral Power Distribution

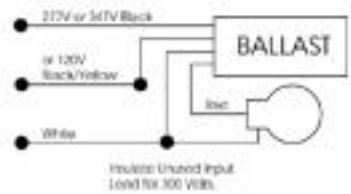
GE Lighting

86563 - 1110245SCTC000I

GE HID Magnetic F-Can Ballast

- For applications requiring quieter or cooler operation than provided by standard coil & coil ballasts.
- Excellent sound-deadening and heat transfer qualities.





GENERAL CHARACTERISTICS

Application	1- 175w M57 120/277 Enclosed & Potted
Category	High Intensity Discharge
Ballast Type	Magnetic - F-Can
Type	Standard
Line Voltage Regulation (+/-)	10 %
Ballast Factor	Normal
Circuit Type	CWA
Sound Rating	B (25-30 decibels)
Insulation Class	90C
Additional Info	Thermally protected

PRODUCT INFORMATION

Product Code	86563
Description	1110245SCTC000I
Standard Package	Master
Standard Package GTIN	30043168865631
Standard Package Quantity	2
Sales Unit	Standard Pack
No Of Items Per Sales Unit	1
No Of Items Per Standard Package	2
UPC	043168865630

DIMENSIONS

Case dimensions	
Length (L)	14.3 in(363.73 mm)
Width (W)	3.2 in(80.96 mm)
Height (H)	2.6 in(66.68 mm)
Mounting dimensions	
Mount Length (M)	13.8 in(349.25 mm)
Mount Width (X or F)	2.0 in(50.80 mm)
Mount Slots (MS)	0.2 in(5.84 mm)
Weight	14 lb
Exit Type	Side

Lead lengths	Qty	Exit	Length (± 1 in.)
Black/Yellow	1		12 in (NaNmm)
Black	1		12 in (NaNmm)
Red	1		12 in (NaNmm)
White	1		12 in (NaNmm)

ELECTRICAL CHARACTERISTICS

Supply Current Frequency	60 Hz

SAFETY & PERFORMANCE

- cUL Listed
- UL Listed

SPECIFICATIONS BY LAMP & LINE VOLTAGE

Lamp	# of Lamps	Specifications by Line Voltage	System Wattage	Nominal Current	Ballast Factor	Ballast Efficiency	Max.Input Current	Starting Current	Open Circuit Voltage	Drop Out Voltage	Power factor	Min.starting temperature	Fuse rating	UL bench top rise
M57	1	120	205.0	1.75A	1	0.854			300V	66V	0.9	-22.0°F	5	
M57	1	277	205.0	0.75A	1	0.854			300V	152V	0.9	-22.0°F	3	
H39	1	120	205.0	1.75A	1	0.854			300V	66V	0.9	-22.0°F	5	
H39	1	277	205.0	0.75A	1	0.854			300V	152V	0.9	-22.0°F	3	

CAUTIONS & WARNINGS

Warning

- Risk of Electric Shock
  - Properly ground ballast and fixture.
  - Turn power off before servicing--see instructions.

NOTES

- Anchor bracket / Tab provided for splice box (SB-4 Not included)

WARRANTY INFORMATION

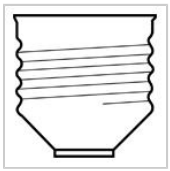
GE Lighting warrants to the purchaser that each ballast will be free from defects in material or workmanship for period as defined in the attached documents from the date of manufacture when properly installed and under normal conditions of use.

GE Lighting

31070 - CMH70CU830MED/O

GE Protected ConstantColor® PulseArc® CMH® Ceramic Metal Halide ED17

a product of ecomagination



CAUTIONS & WARNINGS

R- WARNING: This lamp can cause serious skin burn and eye inflammation from shortwave ultraviolet radiation if outer envelope of the lamp is broken or punctured, and the arc tube continues to operate. Do not use where people will remain for more than a few minutes unless adequate shielding or other safety precautions are used. Certain types of lamps that will automatically extinguish when the outer envelope is broken or punctured are commercially available. Visit the FDA website for more information: http://www.fda.gov/cdrh/radhealth/products/urburns.html

Caution

- Lamp may shatter and cause injury if broken
  - Dispose of lamp in a closed container.
  - Do not use excessive force when installing lamp.
  - Do not use lamp if outer glass is scratched or broken.

Warning

- A damaged lamp emits UV radiation which may cause eye/skin injury
  - Turn power off if glass bulb is broken. Remove and dispose of lamp.
- Risk of Burn
  - Allow lamp to cool before handling.
  - Do not turn on lamp until fully installed.
- Risk of Electric Shock
  - Do not use where directly exposed to water or outdoors without an enclosed fixture.
  - Turn power off before inspection, installation or removal.
- Risk of Fire
  - Keep combustible materials away from lamp.
  - Use in fixture rated for this product.
- Unexpected lamp rupture may cause injury, fire, or property damage
  - Do not exceed rated voltage.
  - Do not store flammable materials near/below lamp.
  - Do not turn on lamp until fully installed.
  - Do not use beyond rated life.
  - Do not use lamp if outer glass is scratched or broken.
  - Do not use where directly exposed to water or outdoors without an enclosed fixture.
  - Operate lamp only in specified position.
  - Use only properly rated ballast.

GENERAL CHARACTERISTICS

Lamp Type	High Intensity Discharge - Ceramic Metal Halide
Bulb	ED17
Base	Medium Screw (E26)
Bulb Finish	Coated
Wattage	70
Rated Life	15000 hrs
Bulb Material	Hard glass
Lamp Enclosure Type (LET)	Open or enclosed fixtures
LEED-EB MR Credit	94 picograms Hg per mean lumen hour

PHOTOMETRIC CHARACTERISTICS

Initial Lumens	5700
Mean Lumens	4100
Nominal Initial Lumens per Watt	81
Color Temperature	3000 K
Color Rendering Index (CRI)	80
Effective Arc Length	0.28125 cm

ELECTRICAL CHARACTERISTICS

Burn Position	Universal burning position
Warm Up Time to 90% (MIN)	2 min
Warm Up Time to 90% (MAX)	5 min
Hot Restart Time to 90%	15 min
Hot Restart Time to 90% (MAX)	15 min

DIMENSIONS

Maximum Overall Length (MOL)	5.4300 in(137.9 mm)
Nominal Length	5.430 in(137.9 mm)
Bulb Diameter (DIA)	2.125 in(54.0 mm)
Bulb Diameter (DIA) (MAX)	2.125 in(54.0 mm)
Light Center Length (LCL)	3.370 in(85.6 mm)

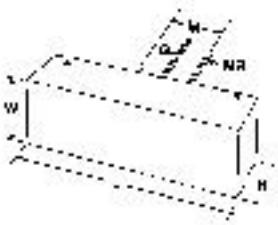
PRODUCT INFORMATION

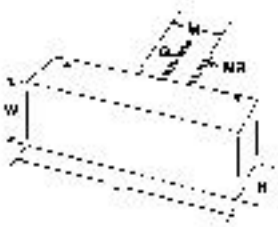
Product Code	31070
Description	CMH70CU830MED/O
ANSI Code	C98/M143/M98
Standard Package	Case
Standard Package GTIN	10043168310700
Standard Package Quantity	6
Sales Unit	Unit
No Of Items Per Sales Unit	1
No Of Items Per Standard Package	6
UPC	043168310703

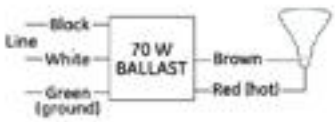
GE Lighting

87546 - GEMH70-SLJ-MV

GE HID UltraMax™ eHID Electronic Low Frequency Ballast







GENERAL CHARACTERISTICS

Category	High Intensity Discharge
Ballast Type	Electronic - Low Frequency
Line Voltage Regulation (+/-)	10 %
Ambient Temperature (MAX)	55 °C(13 °C)
Case Temperature	90 °C(194 °F)
Ballast Factor	Normal
Sound Rating	A (20-24 decibels)
Enclosure Type	Metal
Distance to Lamp	8 ft
Additional Info	End of Life Protection (EOL)/ Thermally protected

PRODUCT INFORMATION

Product Code	87546
Description	GEMH70-SLJ-MV
Standard Package	Case
Standard Package GTIN	10043168875469
Standard Package Quantity	10
Sales Unit	Case
No Of Items Per Sales Unit	1
No Of Items Per Standard Package	10
UPC	043168875462

DIMENSIONS

Case dimensions			
Length (L)		7.3 in(184.91 mm)	
Width (W)		2.6 in(65.53 mm)	
Height (H)		2.2 in(55.88 mm)	
Mounting dimensions			
Mount Length (M)		0.4 in(10.92 mm)	
Weight		0.38 lb	
Exit Type		Bottom Leads with Studs	
Remote Mounting Distance to Lamp		8 ft	
Remote Mounting Wire Gauge		18 AWG	
Lead lengths	Qty	Exit	Length (± 1 in.)
Black	1	Left	10.0 (254mm)
Brown	1	Right	10.0 (254mm)
Red	1	Right	10.0 (254mm)
White	1	Left	10.0 (254mm)

ELECTRICAL CHARACTERISTICS

Lamp Operating Frequency	130 Hz

SAFETY & PERFORMANCE

- ANSI - C62.41
- cUL Listed
- FCC - CLASS A Non-Consumer
- UL Type 1 Outdoor
- RoHs Compliant
- UL 1029 Listed
- Suitable for recessed use

SPECIFICATIONS BY LAMP & LINE VOLTAGE

Lamp	# of Lamps	Specifications by Line Voltage	System Wattage	Nominal Current	Ballast Factor	Ballast Efficiency	Max.Input Current	Starting Current	Open Circuit Voltage	Drop Out Voltage	Power factor	Min.starting temperature	Fuse rating	UL bench top rise
M98	1	120	77.0	0.66A	1	0.909				96V	0.99	20.0°F	3	
M98	1	277	77.0	0.3A	1	0.909				96V	0.97	20.0°F	3	
M143	1	120	77.0	0.66A	1	0.909				96V	0.99	0.0°F	3	
M143	1	277	77.0	0.3A	1	0.909				96V	0.97	0.0°F	3	
C143	1	120	77.0	0.66A	1	0.909				96V	0.99	0.0°F	3	
C143	1	277	77.0	0.3A	1					96V	0.97	0.0°F	3	

NOTES

- 200C rated lead wires
- Do not connect brown or red wires to ground

WARRANTY INFORMATION

GE Lighting warrants to the purchaser that each ballast will be free from defects in material or workmanship for period as defined in the attached documents from the date of manufacture when properly installed and under normal conditions of use.