

THE AUGUST WILSON CENTER FOR AFRICAN AMERICAN CULTURE

PITTSBURGH, PENNSYLVANIA



MICHAEL P. ROYER

**TECHNICAL REPORT TWO:
ELECTRICAL SYSTEMS**

NOVEMBER 2, 2007

LIGHTING / ELECTRICAL OPTION

ADVISOR: PROFESSOR TED DANNERETH

ELECTRICAL SYSTEMS EXISTING CONDITION AND BUILDING LOAD SUMMARY

EXECUTIVE SUMMARY

This report details the electrical distribution system of the August Wilson Center for African American Culture in Pittsburgh Pennsylvania. This system is a radial system with two entrance points from the Duquesne Light Co. network. The 208Y/120V 3P 4W system runs throughout the building. The emergency power is supplied by a 200kW diesel powered generator.

The system becomes complex due to the increased needs of the theater. Dimming systems are used throughout the theater and in some of the auxiliary spaces as well. Other elements in the system include a UPS, elevators, mechanical equipment, and isolation transformers.

The analysis of loads was made difficult due to the current progress of the project documents. The project is just beginning construction and drawings are still being modified. Where information was unable to be accurately attained, assumptions were made with an attempt to be as accurate as possible.

The service entrance sizing methods show that all methods are comparable, but would require slightly different equipment. Due to approximated information, even the actual loading method is not completely accurate.

This report is available in electronic format at:
<http://www.engr.psu.edu/ae/thesis/portfolios/2008/mpr184>

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SECTION ONE: Power Systems

General Description of Distribution System:

The overall building electrical system is a radial system with a two adjacent service entrances in the south corner of the building. A backup diesel generator provides emergency power. Two Duquesne Light transformers provide power to two main switchboards. The first main switchboard (MSB1) is 3000A, 208/120V, 3PH, 4W with 65kAIC breakers. This panel board supplies all equipment loads including air handling units, elevators, the orchestra lift (future), café kitchen loads, both automatic transfer switches and their subsequent loads, and a couple panel boards. The second main switchboard (MSB2) is a dimmer switchboard with 3000A capacity. It runs at 208/120V with 3PH, 4W, 65kAIC breakers, and a 6000A neutral. Panel MSB2 provides power for all the theatrical lighting and audio systems as well as the majority of the building's general lighting and receptacle loads.

Service Entrance:

The service entrance is located at the south corner of the building and consists of two electrical vaults and one collection bus vault. The service provider, Duquesne Light, is responsible for the replacing the transformers, protectors, installing conduit to the property line and connections from the transformers to the protectors. The contractor is responsible for the remainder of work to be performed including construction of the vaults and connections to the equipment.

Voltage Systems:

The entire building electrical system is a 208Y/120V system and is predominantly 3PH/4W. An orchestra pit lift that will be added in the future requires a 240/480V 3PH connection but provisions for voltage conversion are not provided in the current design. Several methods could be used to accommodate this equipment in the future.

Transformers:

The building has two transformers from the electrical service provider, Duquesne Light CO, as well as two isolation transformers to protect the theatrical equipment. The transformers are as follows:

INDIVIDUAL TRANSFORMER SCHEDULE								
TAG	PRIMARY V	SECONDARY V	SIZE (kVA)	TYPE	TEMP. RISE	TAPS	MOUNTING	REMARKS
D.L.CO	D.L.CO System	208/120V,3PH,4W	750	N/A	N/A	N/A	PAD BY D.L.CO	
D.L.CO	D.L.CO System	208/120V,3PH,4W	750	N/A	N/A	N/A	PAD BY D.L.CO	
1T1	208V,3PH,3W.	208Y/120V,3PH,4W	45	DRY TYPE*	115 C*	(4) 2%	PAD ON FLOOR	K-13 Rated, Iso. Gnd
1T2	208V,3PH,3W.	208Y/120V,3PH,4W	500	DRY TYPE*	115 C*	(4) 2%	PAD ON FLOOR	K-13 Rated

NOTES:
1. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS * Assumed, information is not included in drawings or specifications.

KEY:
A/N=AS NOTED

Emergency Power System:

Emergency power is provided by a 200kW, 250kVA, .8PF, 208/120V, 3PH, 4W, 60Hz AC diesel powered generator. The generator is pad-mounted on ground level next to the loading docks. Two automatic transfer switches are used which are protected by 225A (ATS EM1 225A 4P) and 600A (ATS ST1 600A 4P) breakers. Each automatic transfer switch also has an individually mounted fused disconnect switch. ATS EM1 provides power to panel board BE1 (225A) while ATS ST1 provides power to panel BS1 (600A). Panel BE1 handles life safety systems (first and second floor emergency lighting and theatre house emergency lighting). Panel BS1 provides power equipment loads such including two smoke hatches, AHU-3, pumps HHWP-1 and HHWP-2, and a 10kVA UPS with batteries supplying 208Y/120V at 0.9 PF. The emergency power panels are listed on sheet [E7.02](#).

Over-current Devices:

Over-current protection is provided by circuit breakers throughout the building. Included with the service entrance equipment are two new 2500A wall-mounted protectors. The two main distribution panels are each protected by a 3000A circuit breaker. All panel boards except UPS1 (125A MCB) are main lugs only. A detailed listing can be found on sheet [E7.02](#).

Locations of Switchgear:

MAJOR EQUIPMENT LOCATION SCHEDULE						
Tag	Type of Equipment	Description	Floor Level	Room No.	Room Name	Drawings
MSB1	Switchboard	3000A 208Y/120V 3PH., 4W, 65kAIC	Basement	B013	Electrical	E3.01, E5.01
MSB2	Switchboard	3000A 208Y/120V 3PH., 4W, 65kAIC	Basement	B013	Electrical	E3.01, E5.01
G	Generator	200kW, 250kVA, .8PF, 208/120V, 3PH, 4W, 50Hz AC	Ext. On Grade	NA	Trash Area	E3.02
1T1	Transformer	45kVA 208Y/120V Isolation	First Floor	Unkown	Unkown	E3.02
1T2	Transformer	45kVA 208Y/120V Isolation	Basement	B013	Electrical	E5.01
BNDP1	Distribution Panel	208/120V 3PH 4W, 1200A MLO	Basement	B013	Electrical	E3.01, E5.01
BNDP2	Distribution Panel	208/120V 3PH 4W, 400A MLO	Basement	B013	Electrical	E3.01, E5.01
BNDP3	Distribution Panel	208/120V 3PH 4W, 1200A MLO	Basement	B013	Electrical	E3.01, E5.01
1NDP1	Distribution Panel	208/120V 3PH 4W, 1200A MLO	First Floor	112	Electrical	E3.02
LTSDP1	Distribution Panel	208/120V 3PH 4W, 1200A MLO	First Floor	112	Electrical	E3.02
BS1	Emergency Dist. Panel	208/120V 3PH 4W, 600A MLO	Basement	NA	Storage	E3.01, E5.01
BE1	Emergency Dist. Panel	208/120V 3PH 4W, 225A MLO	Basement	NA	Storage	E3.01, E5.01
ATS-EM1	Automatic Transfer Switch		Basement	NA	Storage	E3.01, E5.01
ATS-ST1	Automatic Transfer Switch		Basement	NA	Storage	E3.01, E5.01

LIGHTING AND APPLIANCE PANEL BOARD LOCATIONS						
Tag	Voltage	Main Size	Floor	Room Number	Room Name	Drawings
BN1	208/120V 3PH 4W	125A M.L.O.	Basement	B013	Electrical	E3.01, E5.01
BN2	208/120V 3PH 4W	225A M.L.O.	Basement	B013	Electrical	E3.01, E5.01
1N1	208/120V 3PH 4W	225A M.L.O.	First Floor	112	Electrical	E3.02, E5.01
1N2	208/120V 3PH 4W	225A M.L.O.	First Floor	112	Electrical	E3.02, E5.01
1N3	208/120V 3PH 4W	225A M.L.O.	First Floor	112	Electrical	E3.02, E5.01
1N4	208/120V 3PH 4W	225A M.L.O.	First Floor	112	Electrical	E3.02, E5.01
LTS1	208/120V 3PH 4W	225A M.L.O.	First Floor	112	Electrical	E3.02, E5.01
LTS2	208/120V 3PH 4W	225A M.L.O.	First Floor	112	Electrical	E3.02, E5.01
LTS3	208/120V 3PH 4W	225A M.L.O.	First Floor	112	Electrical	E3.02, E5.01
LTS4	208/120V 3PH 4W	125A M.L.O.	First Floor	112	Electrical	E3.02, E5.01
UPS1	208/120V 3PH 4W	125A 3P M.C.B.	First Floor	112	Electrical	E3.02, E5.01
1TN1	208/120V 3PH 4W	225A M.L.O.	First Floor	112	Electrical	E3.02, E5.01
1TN2	208/120V 3PH 4W	125A M.L.O.	First Floor	112	Electrical	E3.02, E5.01
1KN1	208/120V 3PH 4W	400A M.L.O.	First Floor	140	Kitchen	E3.02
1KN2	208/120V 3PH 4W	225A M.L.O.	First Floor	140	Kitchen	E3.02
SC-1A	208/120V 3PH 4W	225A M.L.O.	First Floor	151	Control Booth	E3.02
SC-1B	208/120V 3PH 4W	225A M.L.O.	First Floor	151	Control Booth	E3.02
2N1	208/120V 3PH 4W	225A M.L.O.	Second Floor	212	Electrical	E3.03, E5.01
2N2	208/120V 3PH 4W	225A M.L.O.	Second Floor	212	Electrical	E3.03, E5.01
2N3	208/120V 3PH 4W	225A M.L.O.	Second Floor	212	Electrical	E3.03, E5.01
2MN1	208/120V 3PH 4W	225A M.L.O.	Second Floor	247	Multi Purpose	E3.03
2P1	208/120V 3PH 4W	225A M.L.O.	Second Floor	212	Electrical	E3.03, E5.01
1E1	208/120V 3PH 4W	225A M.L.O.	First Floor	112	Electrical	E3.02, E5.01
2E1	208/120V 3PH 4W	225A M.L.O.	Second Floor	212	Electrical	E3.03, E5.01
MS1	208/120V 3PH 4W	225A M.L.O.	Basement	B013	Electrical	E3.01, E5.01
1S1	208/120V 3PH 4W	225A M.L.O.	First Floor	112	Electrical	E3.02, E5.01
2S1	208/120V 3PH 4W	225A M.L.O.	Second Floor	212	Electrical	E3.03, E5.01

Drawings (DWF) are available at the following links: [E3.01](#) | [E3.02](#) | [E3.03](#) | [E5.01](#)

Power Factor Correction:

This building does not utilize any power factor correct systems.

Design Issues:

The building itself is fairly small and requires only standard systems. The most unique elements in the electrical design include the extensive use of dimming (theatrical control) as well as the orchestra pit lift, although this is only a future consideration. Another issue that had to be addressed was the existing conditions, as this site was previously occupied. This was mainly a concern for the service entrance.

Lighting Loads:

The lighting loads are divided into two main groups: general lighting and theatrical lighting. For the general lighting system, the luminaires predominantly utilize fluorescent lamps. However, there are many halogen sources used for displays and exhibits that require the improved color rendering and control of a halogen lamp. The design utilizes a diverse range of fixtures due to the diverse needs of the spaces. The design also incorporates some neon and LED fixtures. The theatrical lighting loads will vary and therefore the outlets provided are listed and used for calculation purposes.

[See Appendix A for lighting load information]

The design uses occupancy sensors to shut off lighting fixtures where required by ASHRAE/IESNA 90.1. The details of these sensors are not provided. It is assumed that these would be provided by shop drawings.

Mechanical and Other Loads:

[See Appendix B for mechanical load information]

The mechanically loads were listed as accurately as is possible. Certain information was not available, such as the size of the motors for the mechanical doors.

Service Entrance Size:

Service Entrance Size: SUMMARY TABLE				
<i>METHOD</i>	<i>kVA</i>	<i>AMPS @208V</i>	<i>TRANSFORMER</i>	<i>MAIN BREAKER SIZE</i>
Square Footage Method	551	1531	750 kVA	2000 A
NEC Loading Method	619	1719	750 kVA	2000 A
Actual (Approximated) Loading Method	2331	6469	2 @ 1500 kVA	2 @ 4000 A
Currently Designed Equipment	-	-	2 @ 750 kVA	2 @ 3000 A

The results of the three service sizing methods show a large variation in necessary equipment sizes. The two methods that are largely based on square footage show a need for much smaller

equipment. This is likely because these methods do little to account for the complexity of a certain system. The system for the August Wilson Center involves a great number of lighting and receptacle panels as well as dimming systems and full theatre lighting and audio systems. Numbers were used that attempted to address these complexities, but it was likely not enough.

The actual loading method results in higher kVA and amps than the currently designed system could carry. This is likely because of the approximations that were necessary due to a lack of information provided in drawings. All lighting and receptacle panels are considered at the size of the bus when some would not be this large. Furthermore, it is impossible to distinguish between lighting and receptacle loads. Since receptacles have a demand factor of .5 after the first 10kVA, the contribution from each of the light and receptacles would likely be significantly less if actual loading was considered. I used a demand factor of .8 (continuous load) as a conservative approximation for each panel. This is then multiplied by another .8 factor to account for the max loading a panel can accept relative to its rating.

The breakdown of the three methods can be seen below:

Service Entrance Size: SQUARE FOOT METHOD			
<i>LEVEL</i>	<i>SQ. FT.</i>	<i>VA/SQ. FT.</i>	<i>VA</i>
Basement	11800	8	94400
Theater	9526	10	95260
First Floor	22087	8	176696
Second Floor	23137	8	185096
Total kVA:			551
Total Amperage @ 208V:			1531
Service Entrance Size			2000 A

Service Entrance Size: NEC LOADING				
<i>TYPE OF LOAD</i>	<i>SQ. FT.</i>	<i>VA/SQ. FT.</i>	<i>DEMAND FACTOR</i>	<i>VA</i>
Lighting Loads ¹	66550	3	1.0	199650
Receptacle Loads		1	10000 kVA @ 1.0, .5	38275
Mechanical		7	1.0	237925
Fans/Pumps		2	1.0	71550
Kitchen ²				0.8
Total (kVA):				619
Total Amperage @ 208V:				1719
Service Entrance Size				2000 A

¹NEC 212.12 - Combination of Office Building (3.5) & Assembly Halls and Auditoriums (1)

²400A Kitchen Panel * 208 V

Service Entrance Size: ACTUAL LOADS			
LOAD DESCRIPTION	DEMAND FACTORS	LOAD	DEMAND LOAD (VA)
Mechanical Equipment ¹	0.8	538 kW	430400
Plumbing Equipment ¹	0.8	12 kW	9600
Architectural Equipment ¹	0.8	171 kW	136800
Kitchen Equipment*		0 (Within 1KN1)	
Space on Main Switchboards	.8 * .8 = .64	5000 A	665600
DIMMER RACK 110/210	.8 * .8 = .64	100 A	13312
DIMMER RACK 147	.8 * .8 = .64	100 A	13312
DIMMER RACK 201	.8 * .8 = .64	100 A	13312
DIMMER RACK 202/207	.8 * .8 = .64	100 A	13312
DIMMER RACK ALDR1	.8 * .8 = .64	600 A	79872
DIMMER RACK ALDR2	.8 * .8 = .64	600 A	79872
DIMMER RACK ALDR3	.8 * .8 = .64	600 A	79872
DIMMER RACK ALDR4	.8 * .8 = .64	600 A	79872
DIMMER RACK ALDR5	.8 * .8 = .64	300 A	39936
DIMMER RACK ELDR1	.8 * .8 = .64	150 A	19968
PANEL BN1*	.8 * .8 = .64	125 A	16640
PANEL BN2*	.8 * .8 = .64	225 A	29952
PANEL 1N1*	.8 * .8 = .64	225 A	29952
PANEL 1N2*	.8 * .8 = .64	225 A	29952
PANEL 1N3*	.8 * .8 = .64	225 A	29952
PANEL 1N4*	.8 * .8 = .64	225 A	29952
PANEL LTS1*	.8 * .8 = .64	225 A	29952
PANEL LTS2*	.8 * .8 = .64	225 A	29952
PANEL LTS3*	.8 * .8 = .64	225 A	29952
PANEL LTS4*	.8 * .8 = .64	125 A	16640
PANEL UPS1*	.8 * .8 = .64	125 A	16640
PANEL 1TN1*	.8 * .8 = .64	225 A	29952
PANEL 1TN2*		0 (Within 1TN1)	
PANEL 1KN1*	0.8	400 A	66560
PANEL 1KN2*		0 (Within 1KN1)	
PANEL SC-1A*	.8 * .8 = .64	225 A	29952
PANEL SC-1B*		0 (Split with SC-1A)	
PANEL 2N1*	.8 * .8 = .64	225 A	29952
PANEL 2N2*	.8 * .8 = .64	225 A	29952
PANEL 2N3*	.8 * .8 = .64	225 A	29952
PANEL 2MN1*	.8 * .8 = .64	225 A	29952
PANEL 2P1*	.8 * .8 = .64	225 A	29952
PANEL 1E1*	.8 * .8 = .64	225 A	29952
PANEL 2E1*		0 (Within 1E1)	
PANEL MS1*	.8 * .8 = .64	225 A	29952
PANEL 1S1*	.8 * .8 = .64	225 A	29952
PANEL 1S2*		0 (Within 1S1)	
Total (kVA):			2330.656
Total Amperage @ 208V:			6469
Service Entrance Size			2 @ 4000A

¹ See Load Calculations for Breakdown

* Estimated by panel sizing due to lack of information

Utility Company Information:

The utility company is:

Duquesne Light Company
411 Seventh Avenue (16-4)
Pittsburgh, PA 15219
1-888-393-7100
<http://www.duquesnelight.com/>

The utility rate is based on the following [Tariff Schedule](#):

The service will start as a 'GM' service but will be switched to a 'GL' once the building is up and running. The rate structure is based on distribution, transmission and generation. Generation can be purchased from a separate supplier if desired. Charges are as follows:

Distribution

– Demand Charges:

First 300 KW: \$2,120

Additional KW: \$6.45 per KW

- Energy Charges:

All kWh: .1236 cents per kWh

Generation:

- Rider No. 9 Hourly Price Service (Equations can be found in [Tariff](#) document)

SECTION TWO: Communication Systems

Summary Description:

The building communication systems consist of standard ethernet and phone systems with a few items related to projectors and audio systems. The theater has a complex audio system, while smaller systems exist for the rest of the building. The main control and distribution panels are located in room 111 on the south side of the building. This is where service from Verizon enters the building below grade from the street. A secondary control station, room 211, is located directly above room 111. The audio is mainly controlled from the theater control booth.

Voice/Data:

The voice and data network runs throughout the building. This system will provide internet connectivity as well as phone lines to the various building spaces. This is especially relevant for the open office area. Various types of outlet boxes are used depending on the constraints of mounting locations. Everything from wall to floor to ceiling boxes are used, with various numbers of both voice and data jacks mounted together.

Audio/Video:

The general audio and video system includes a regular array of speakers located through the lobbies of the building. Separate audio systems are in place for the café, education/lecture room, and meeting room. Audio system control for the lobbies is provided by an AV rack in the gift shop. Video projection systems are used in the café, gift shop, and education and lecture room, with two projectors in each space. The theater has its own complex audio system with dedicated panels.

Security:

The security system consists of cameras located throughout the buildings lobbies and hallways. These are mostly in the first level of the main lobby with a few on the second level and some at the building entrances. Many of the building's doors are operated with electronic card swipes. Some also have audio alarms.

Fire Alarm:

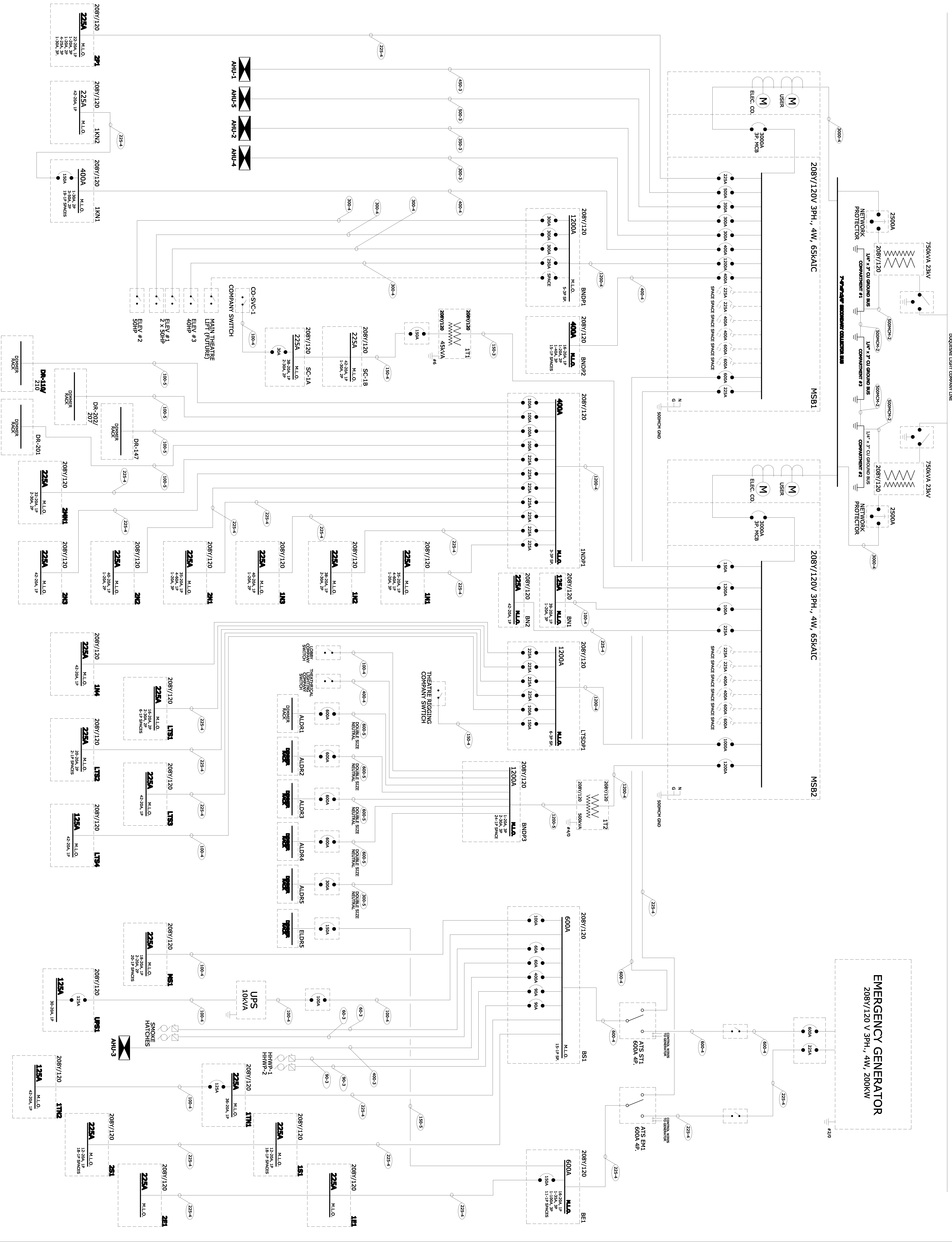
A fire alarm system designed for the entire building. Various types of signal devices are placed throughout the building where applicable.

SECTION THREE: Appendices

Appendix A: Lighting Loads

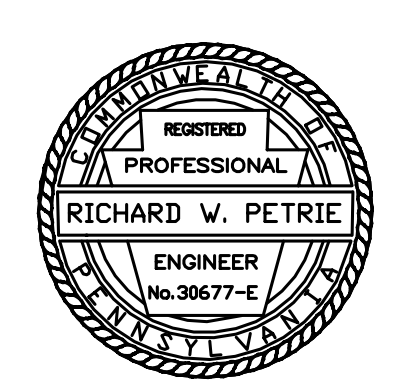
Appendix B: Equipment Loads

Appendix C: Single Line Diagram



EMERGENCY GENERATOR
208Y/120 V 3PH, 4W, 200KW

INFORMATION FROM DRAWINGS E7.01, E7.02, E9.05, L0.10
E7.02 PANEL BOARD SCHEDULE TAKEN AS MOST ACCURATE



Revisions

NO.	ISSUE	DATE

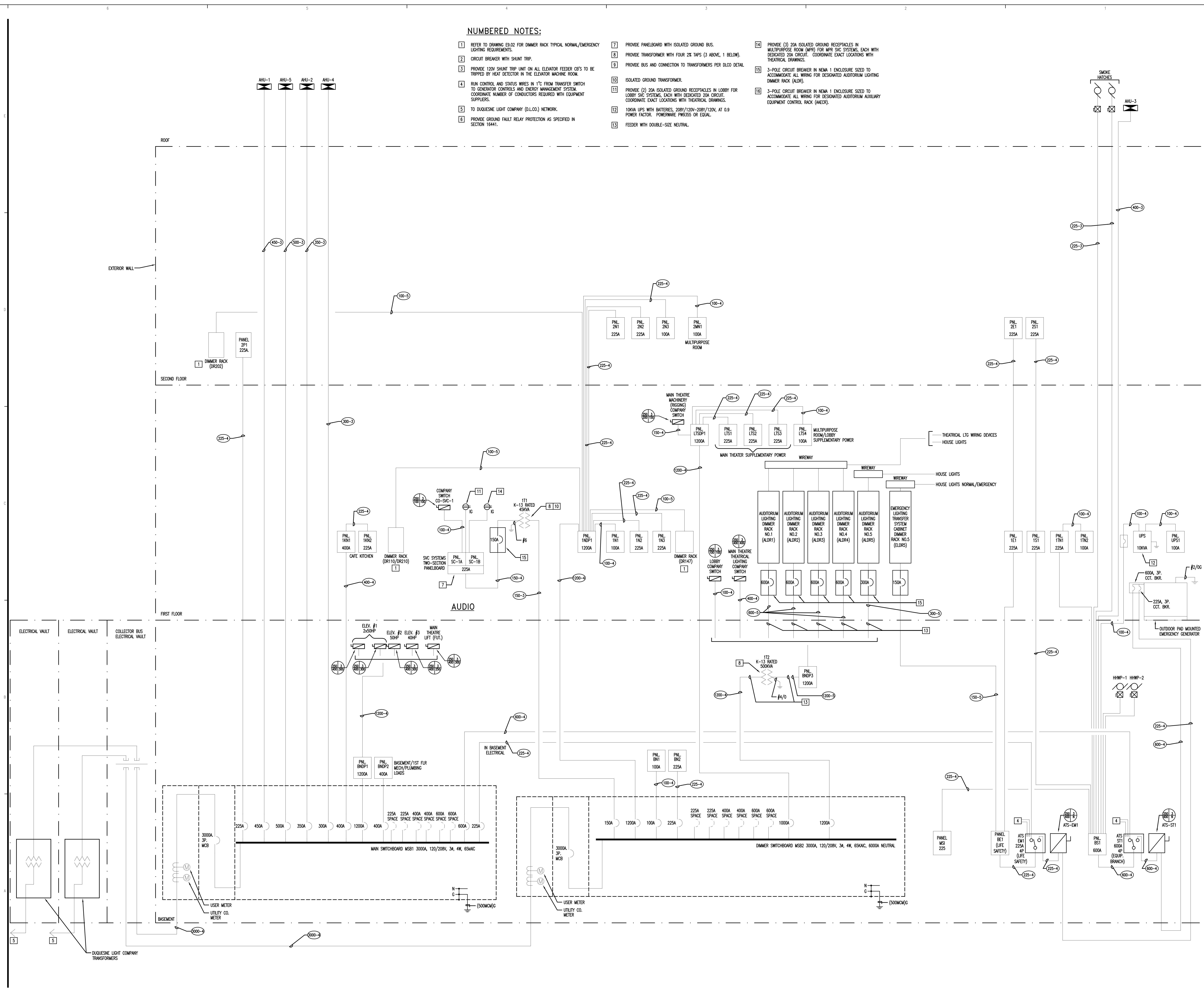
Sheet Information

Date	Permit	Submital	10.01.07
Job Number	075900.00		
Drawn	JB		
Checked	PB		
Approved	PB		
Title			

**ELECTRICAL
SINGLE LINE
DIAGRAM**

NUMBERED NOTES:

- 1 REFER TO DRAWING E9.02 FOR DIMMER RACK TYPICAL NORMAL/EMERGENCY LIGHTING REQUIREMENTS.
- 2 CIRCUIT BREAKER WITH SHUNT TRIP.
- 3 PROVIDE 120V SHUNT TRIP UNIT ON ALL ELEVATOR FEEDER CPS TO BE TRIPPED BY HEAT DETECTOR IN THE ELEVATOR MACHINE ROOM.
- 4 RUN CONTROL AND STATUS WIRES IN 1" C FROM TRANSFER SWITCH TO GENERATOR CONTROLS AND ENERGY MANAGEMENT SYSTEM. COORDINATE NUMBER OF CONDUCTORS REQUIRED WITH EQUIPMENT SUPPLIERS.
- 5 TO DUQUESNE LIGHT COMPANY (D.L.CO.) NETWORK.
- 6 PROVIDE GROUND FAULT RELAY PROTECTION AS SPECIFIED IN SECTION 16441.
- 7 PROVIDE PANELBOARD WITH ISOLATED GROUND BUS.
- 8 PROVIDE TRANSFORMER WITH FOUR 2% TAPS (3 ABOVE, 1 BELOW).
- 9 PROVIDE BUS AND CONNECTION TO TRANSFORMERS PER DLCO DETAIL.
- 10 ISOLATED GROUND TRANSFORMER.
- 11 PROVIDE (2) 20A ISOLATED GROUND RECEPTACLES IN LOBBY FOR LOBBY SVC SYSTEMS, EACH WITH DEDICATED 20A CIRCUIT. COORDINATE EXACT LOCATIONS WITH THEATRICAL DRAWINGS.
- 12 10KVA UPS WITH BATTERIES, 208Y/120V-208Y/120V, AT 0.9 POWER FACTOR. POWERWARE PW5335 OR EQUAL.
- 13 FEEDER WITH DOUBLE-SIZE NEUTRAL.
- 14 PROVIDE (3) 20A ISOLATED GROUND RECEPTACLES IN MULTIPURPOSE ROOM (MPR) FOR MPR SVC SYSTEMS, EACH WITH DEDICATED 20A CIRCUIT. COORDINATE EXACT LOCATIONS WITH THEATRICAL DRAWINGS.
- 15 3-POLE CIRCUIT BREAKER IN NEMA 1 ENCLOSURE SIZED TO ACCOMMODATE ALL WIRING FOR DESIGNATED AUDITORIUM LIGHTING DIMMER RACK (ALDR).
- 16 3-POLE CIRCUIT BREAKER IN NEMA 1 ENCLOSURE SIZED TO ACCOMMODATE ALL WIRING FOR DESIGNATED AUDITORIUM AUXILIARY EQUIPMENT CONTROL RACK (AECR).



Sep 28, 2007 - 4:17pm
 03/26/08-08-05 Perml Submission SR 10-1-07/17E701.dwg
 E7.01.dwg

0 = 1/2" = 1"

OWNER:
 THE AUGUST WILSON CENTER FOR AFRICAN AMERICAN CULTURE
 Regional Enterprise Tower
 425 Sixth Avenue, #2880
 Pittsburgh, PA 15219
 PHONE: 412.258.2700. FAX: 412.258.2701

OWNER'S REP:
 OXFORD DEVELOPMENT
 One Oxford Center
 Suite 4500
 Pittsburgh, PA 15219
 PHONE: 412.281.1300. FAX: 412.642.7543

ARCHITECT:
 PERKINS+WILL
 185 Berry Street, Suite 5100
 San Francisco, California 94107
 PHONE: 415.856.0800. FAX: 415.856.3015

CONSTRUCTION MANAGER:
 TURNER CONSTRUCTION COMPANY
 Two PNC Plaza 27th Floor
 620 Liberty Avenue
 Pittsburgh, PA 15222-2719
 PHONE: 412.255.5400. FAX: 412.255.0210

STERLING CONTRACTING, LLC
 904 McClure Street
 Homestead, PA 15120
 PHONE: 412.326.0031. FAX: 412.326.0039

EBONY DEVELOPMENT
 1901 15 Centre Avenue, Suite 203
 Pittsburgh, PA 15219-4378
 PHONE: 412.434.6571 x 224.
 FAX: 412.434.6570

STRUCTURAL:
 MIDDLEBROOK + LOUIE
 One Bush Street
 Suite 250
 San Francisco, CA 94104
 PHONE: 415.477.9000. FAX: 415.477.9099

CIVIL:
 ATS CHESTER ENGINEERS
 Airside Business Park
 260 Airside Drive
 Moon Township, PA 15108
 PHONE: 412.809.6625. FAX: 412.809.6611

MECHANICAL/PLUMBING:
 TIMOTHY ENGINEERING
 2 West Main Street, Suite 717
 Uniontown, PA 15401
 PHONE: 724.438.6858. FAX: 724.438.6667

ELECTRICAL:
 HORNFECK ENGINEERING, INC.
 1020 North Canal Street
 Pittsburgh, PA 15215
 PHONE: 412.781.1500. FAX: 412.781.5593

LIGHTING DESIGN:
 the studio | company
 3414 Babcock Boulevard
 Pittsburgh, PA 15237
 PHONE: 412.980.4088

SECURITY, TELECOM, AV:
 THE SEKTANT GROUP, INC. |
 Riverside Center for Innovation
 730 River Avenue, Suite 600
 Pittsburgh, PA 15212
 PH: 412.323.8580. FX: 412.323.8538

THEATER:
 AUERBACH POLLOCK FRIEDLANDER
 225 Green Street
 San Francisco, CA 94111
 PHONE: 415.392.7528. FAX: 415.392.7530

DISTRIBUTION PANELBOARD SCHEDULE										
PANEL DESIGNATION	ROOM LOCATION	MOUNTING	MANS		SIZE OF BUS	TOTAL NO. OF POLES	VOLTAGE	BRANCH CIRCUIT BREAKERS	INTERRUPTING RATING	REMARKS
			M.L.O. OR M.C.B.	LOCATION						
BNDP1	ELECTRICAL ROOM 8013	SURFACE	1200A M.L.O.	TOP	1200A	30	208/120V, 3ø 4W	3-300A 3P; 1-250A 3P; 6-3P SPACES	42,000	
BNDP2	ELECTRICAL ROOM 8013	SURFACE	400A M.L.O.	TOP	400A	36	208/120V, 3ø 4W	16-20A 1P; 1-20A 2P; 1-40A 3P; 15-1P SPACES	42,000	
BNDP3	ELECTRICAL ROOM 8013	SURFACE	1200A M.L.O.	TOP	1200A	36	208/120V, 3ø 4W	1-20A 3P; 2-30A 3P; 24-1P SPACES	42,000	
1NDP1	ELECTRICAL ROOM 112	SURFACE	1200A M.L.O.	TOP	1200A	42	208/120V, 3ø 4W	7-225A 3P; 4-100A 3P; 3-3P SPACES	42,000	
LTSDP1	ELECTRICAL ROOM 112	SURFACE	1200A M.L.O.	TOP	1200A	36	208/120V, 3ø 4W	1-100A 3P; 1-150A 3P; 4-225A 3P; 6-3P SPACES	42,000	

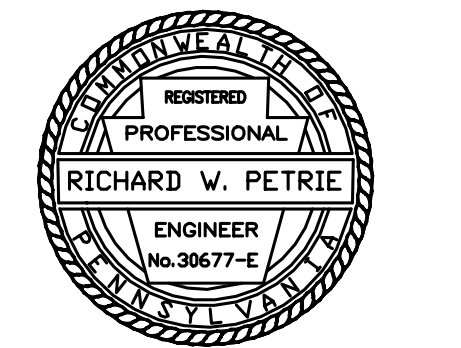
BRANCH CIRCUIT PANELBOARD SCHEDULE										
PANEL DESIGNATION	ROOM LOCATION	MOUNTING	MANS		SIZE OF BUS	TOTAL NO. OF POLES	VOLTAGE	BRANCH CIRCUIT BREAKERS	INTERRUPTING RATING	REMARKS
			M.L.O. OR M.C.B.	LOCATION						
BN1	ELECTRICAL ROOM 8013	SURFACE	125A M.L.O.	BOTTOM	125A	42	208/120V, 3ø 4W	38-20A 1P; 1-20A 3P	22,000	◊
BN2	ELECTRICAL ROOM 8013	SURFACE	225A M.L.O.	BOTTOM	225A	42	208/120V, 3ø 4W	42-20A 1P	22,000	
1N4	ELECTRICAL ROOM 112	SURFACE	225A M.L.O.	BOTTOM	225A	42	208/120V, 3ø 4W	42-20A 1P	22,000	◊
1N1	ELECTRICAL ROOM 112	SURFACE	225A M.L.O.	BOTTOM	225A	42	208/120V, 3ø 4W	35-20A 1P; 4-60A 1P; 1-20A 3P	22,000	
1N2	ELECTRICAL ROOM 112	SURFACE	225A M.L.O.	BOTTOM	225A	42	208/120V, 3ø 4W	38-20A 1P; 2-30A 2P	22,000	
1N3	ELECTRICAL ROOM 112	SURFACE	225A M.L.O.	BOTTOM	225A	42	208/120V, 3ø 4W	40-20A 1P; 1-20A 2P	22,000	
LTS1	ELECTRICAL ROOM 112	SURFACE	225A M.L.O.	BOTTOM	225A	42	208/120V, 3ø 4W	16-20A 2P; 2-30A 2P; 6-1P SPACES	22,000	
LTS2	ELECTRICAL ROOM 112	SURFACE	225A M.L.O.	BOTTOM	225A	42	208/120V, 3ø 4W	20-20A 2P; 2-1P SPACES	22,000	◊
LTS3	ELECTRICAL ROOM 112	SURFACE	225A M.L.O.	BOTTOM	225A	42	208/120V, 3ø 4W	42-20A 1P	22,000	
LTS4	ELECTRICAL ROOM 112	SURFACE	125A M.L.O.	BOTTOM	125A	42	208/120V, 3ø 4W	42-20A 1P	22,000	
UPS1	ELECTRICAL ROOM 112	SURFACE	125A 3P M.C.B.	BOTTOM	125A	30	208/120V, 3ø 4W	30-20A 1P	22,000	
1TN1	ELECTRICAL ROOM 112	SURFACE	225A M.L.O.	BOTTOM	225A	42	208/120V, 3ø 4W	36-20A 1P; 1-125A 3P	22,000	◊
1TN2	ELECTRICAL ROOM 112	SURFACE	125A M.L.O.	BOTTOM	125A	42	208/120V, 3ø 4W	42-20A 1P	22,000	
1KN1	KITCHEN 140	SURFACE	400A M.L.O.	BOTTOM	400A	30	208/120V, 3ø 4W	1-30A 2P; 3-50A 2P; 1-150A 3P; 19-1P SPACES	42,000	
1KN2	KITCHEN 140	SURFACE	225A M.L.O.	BOTTOM	225A	42	208/120V, 3ø 4W	42-20A 1P	42,000	
SC-1A SECTION 1	CONTROL BOOTH 151	RECESSED	225A M.L.O.	BOTTOM	225A	42	208/120V, 3ø 4W	38-20A 1P; 2-30A 2P	42,000	
SC-1B SECTION 2	CONTROL BOOTH 151	RECESSED	225A M.L.O.	BOTTOM	225A	42	208/120V, 3ø 4W	42-20A 1P; 1-30A 2P	42,000	
2N1	ELECTRICAL ROOM 212	SURFACE	225A M.L.O.	BOTTOM	225A	42	208/120V, 3ø 4W	35-20A 1P; 4-60A 1P; 1-20A 3P	22,000	
2N2	ELECTRICAL ROOM 212	SURFACE	225A M.L.O.	BOTTOM	225A	42	208/120V, 3ø 4W	40-20A 1P; 1-20A 2P	22,000	◊
2N3	ELECTRICAL ROOM 212	SURFACE	225A M.L.O.	BOTTOM	225A	42	208/120V, 3ø 4W	42-20A 1P	22,000	
2MN1	MULTI-PURPOSE ROOM 247	RECESSED	225A M.L.O.	BOTTOM	225A	36	208/120V, 3ø 4W	32-20A 1P; 2-30 2P	22,000	
2P1	ELECTRICAL ROOM 212	SURFACE	225A M.L.O.	BOTTOM	225A	42	208/120V, 3ø 4W	22-20A 1P; 1-20A 3P; 1-20A 2P; 4-25A 3P; 1-30A 3P	22,000	

NORMAL EMERGENCY DISTRIBUTION PANELBOARD SCHEDULE										
PANEL DESIGNATION	ROOM LOCATION	MOUNTING	MANS		SIZE OF BUS	TOTAL NO. OF POLES	VOLTAGE	BRANCH CIRCUIT BREAKERS	INTERRUPTING RATING	REMARKS
			M.L.O. OR M.C.B.	LOCATION						
BS1	ELECTRICAL / STORAGE	SURFACE	600A M.L.O.	BOTTOM	600A	36	208/120V, 3ø 4W	2-40A 3P; 2-60A 3P; 1-100A 3P; 1-400A 3P; 15-1P SPACES	42,000	◊
BE1	ELECTRICAL / STORAGE	SURFACE	225A M.L.O.	BOTTOM	225A	36	208/120V, 3ø 4W	16-20A 1P; 1-100A 3P; 1-150A 3P; 1-30A 3P; 11-1P SPACES	42,000	◊

TRANSFORMER SCHEDULE					
TRANSFORMER DESIGNATION	SIZE KVA	PRIMARY		SECONDARY	
		VOLTS	TYPE MOUNTED	VOLTS	TYPE MOUNTED
1T1	45.0	208V, 3ø, 3W	PAD MOUNTED	208/120V, 3ø, 4W	K-13
1T2	500.0	208V, 3ø, 3W	PAD MOUNTED	208/120V, 3ø, 4W	K-13

- NUMBERED NOTES:**
- ◊ PROVIDE 200K NEUTRAL BUS AND LUGS.
 - ◊ PANEL SHALL BE EQUIPPED WITH LUGS AND SUB-LUGS FOR INSTALLATION OF SUBFEED TO ADDITIONAL PANELBOARD(S) AS INDICATED ON RISER DIAGRAM.
 - ◊ PROVIDE FEED THRU LUGS FOR TWO SECTION PANELBOARD CONSTRUCTION.
 - ◊ NORMAL/EMERGENCY - EQUIPMENT BRANCH
 - ◊ NORMAL/EMERGENCY - LIFE SAFETY
 - ◊ NOT USED
 - ◊ NOT USED
 - ◊ PANELBOARD WITH INTEGRAL TVSS UNIT. SEE SPECIFICATIONS.
 - ◊ E.C. SHALL PROVIDE ADDITIONAL LUGS PER PHASE ON THE PANELBOARDS REQUIRING PARALLEL RUNS OF CONDUCTORS ASSOCIATED WITH VOLTAGE DROP CONSIDERATIONS.
 - ◊ PANEL SHALL BE EQUIPPED WITH LUGS AND SUB-LUGS OR FEED THROUGH LUGS FOR INSTALLATION OF SUBFEED TO ADDITIONAL PANELBOARD(S) AS INDICATED ON RISER DIAGRAM.

NORMAL EMERGENCY BRANCH CIRCUIT PANELBOARD SCHEDULE										
PANEL DESIGNATION	ROOM LOCATION	MOUNTING	MANS		SIZE OF BUS	TOTAL NO. OF POLES	VOLTAGE	BRANCH CIRCUIT BREAKERS	INTERRUPTING RATING	REMARKS
			M.L.O. OR M.C.B.	LOCATION						
1E1	ELECTRICAL ROOM 112	SURFACE	225A M.L.O.	BOTTOM	225A	30	208/120V, 3ø 4W	30-20A 1P	22,000	◊
2E1	ELECTRICAL ROOM 212	SURFACE	225A M.L.O.	BOTTOM	225A	30	208/120V, 3ø 4W	30-20A 3P	22,000	◊
MS1	ELECTRICAL ROOM 8013	SURFACE	225A M.L.O.	BOTTOM	225A	42	208/120V, 3ø 4W	18-20A 1P; 2-20A 3P; 20-1P SPACES	22,000	◊
1S1	ELECTRICAL ROOM 112	SURFACE	225A M.L.O.	BOTTOM	225A	30	208/120V, 3ø 4W	12-20A 1P; 18-1P SPACES	22,000	◊
2S1	ELECTRICAL ROOM 212	SURFACE	225A M.L.O.	BOTTOM	225A	30	208/120V, 3ø 4W	12-20A 1P; 18-1P SPACES	22,000	◊



Revisions

NO.	ISSUE	DATE

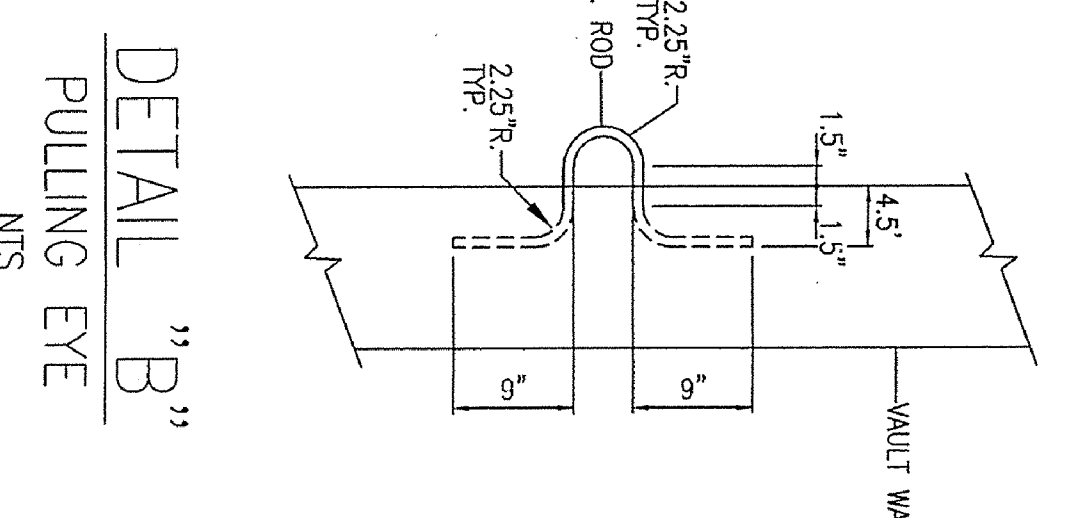
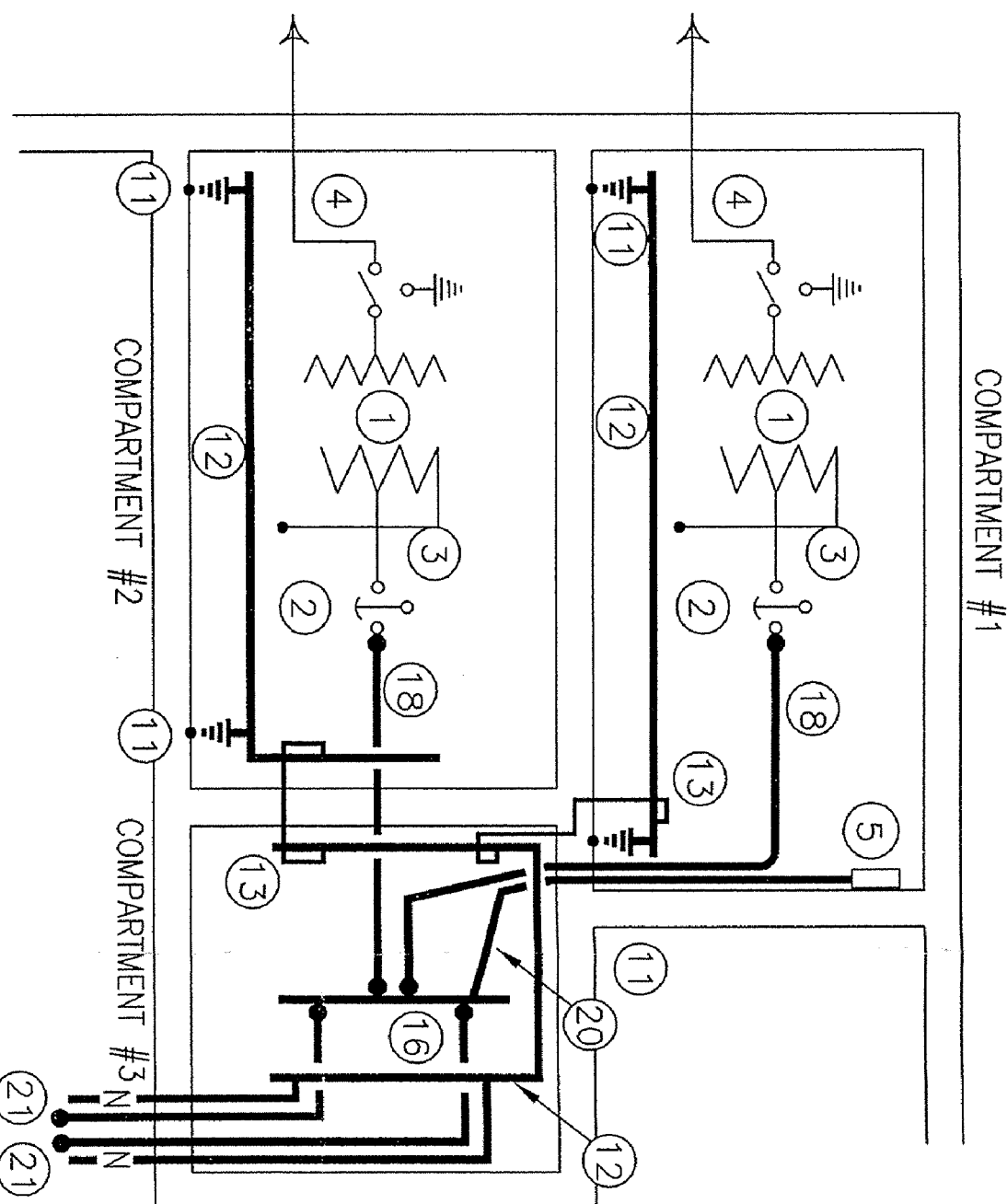
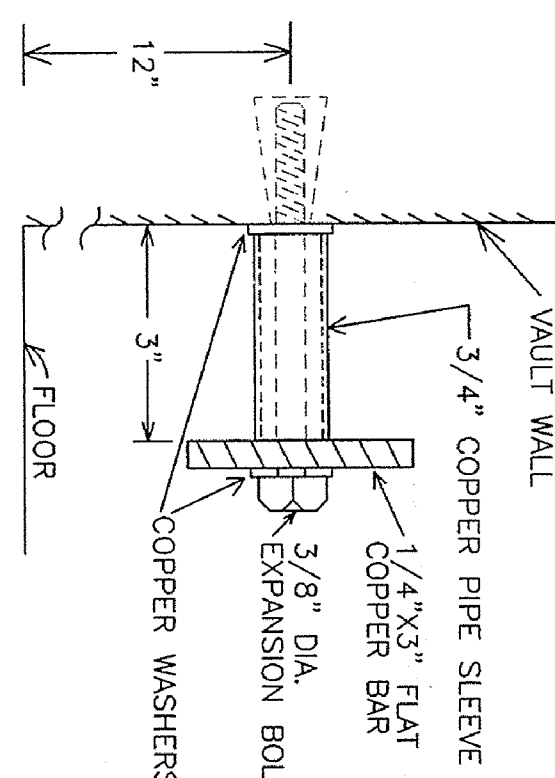
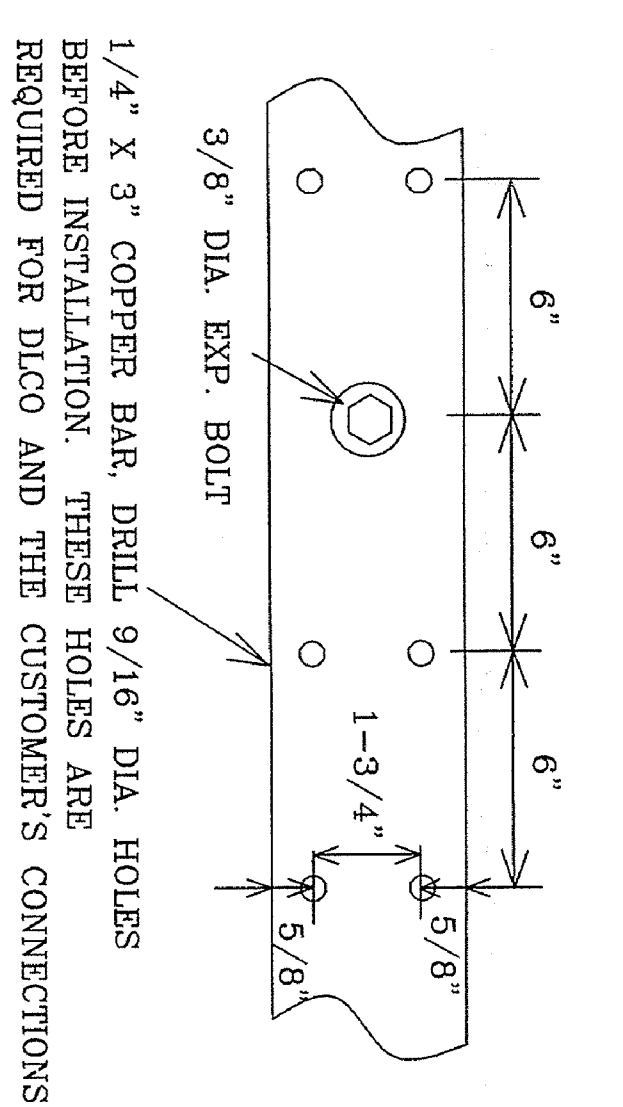
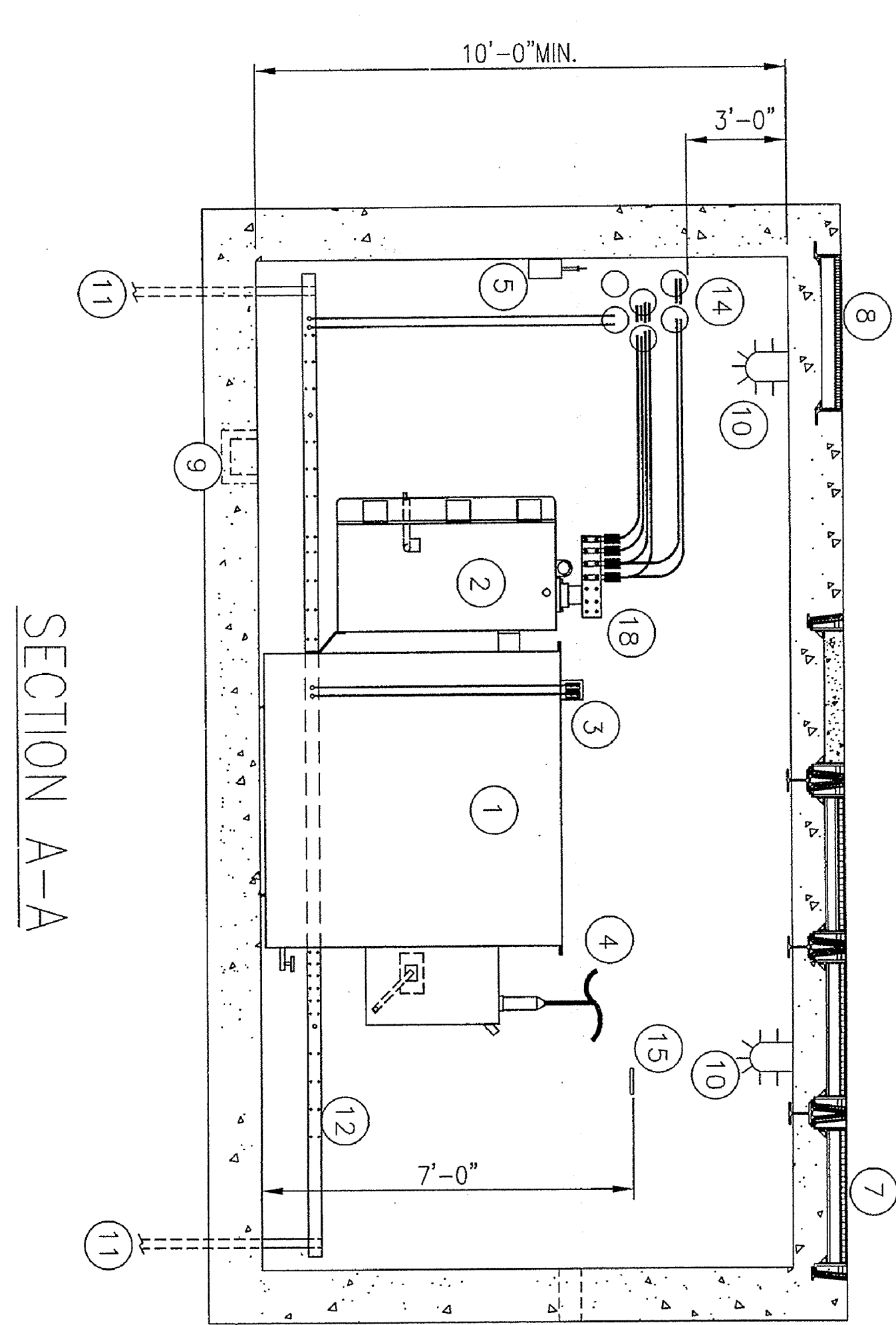
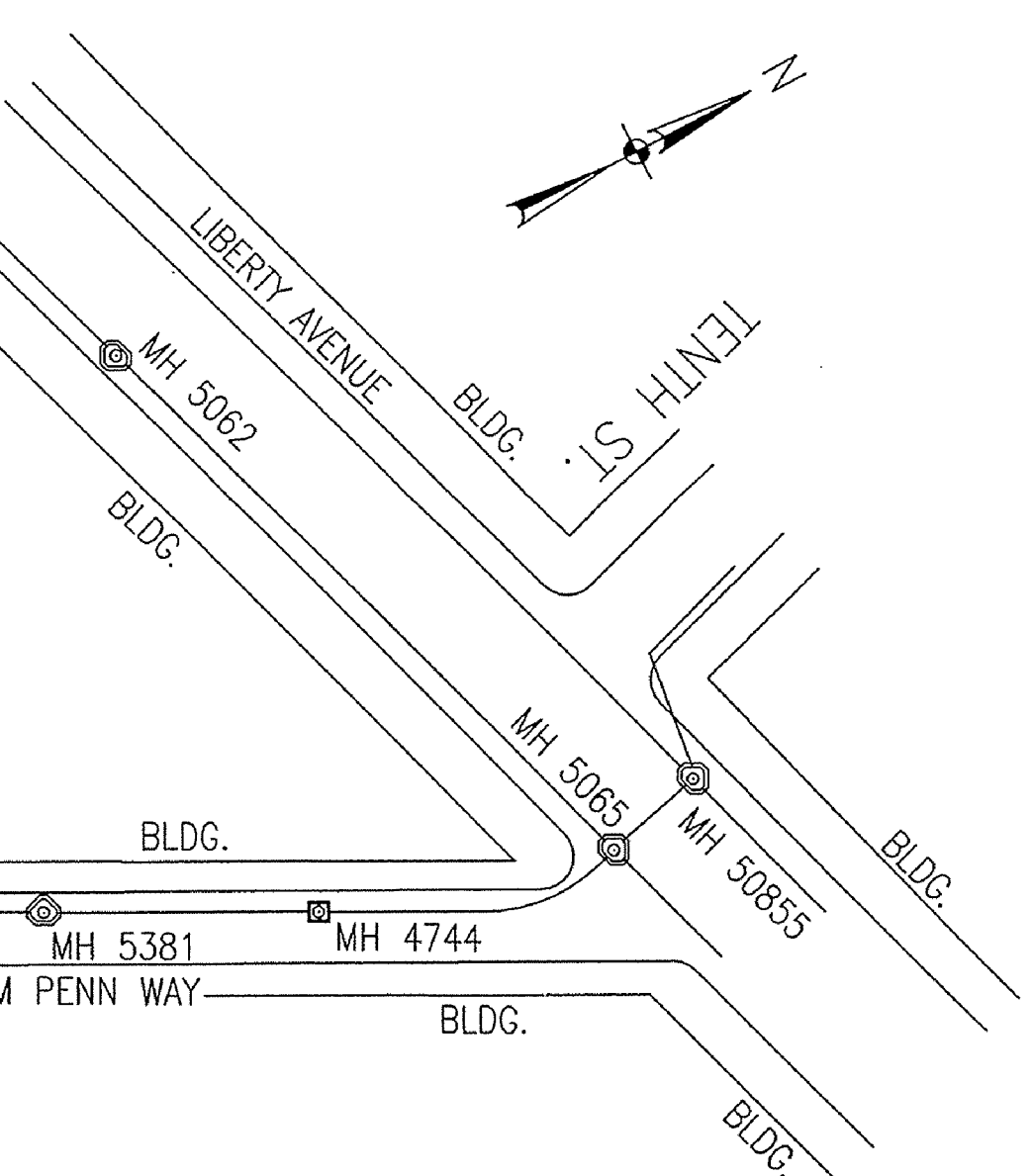
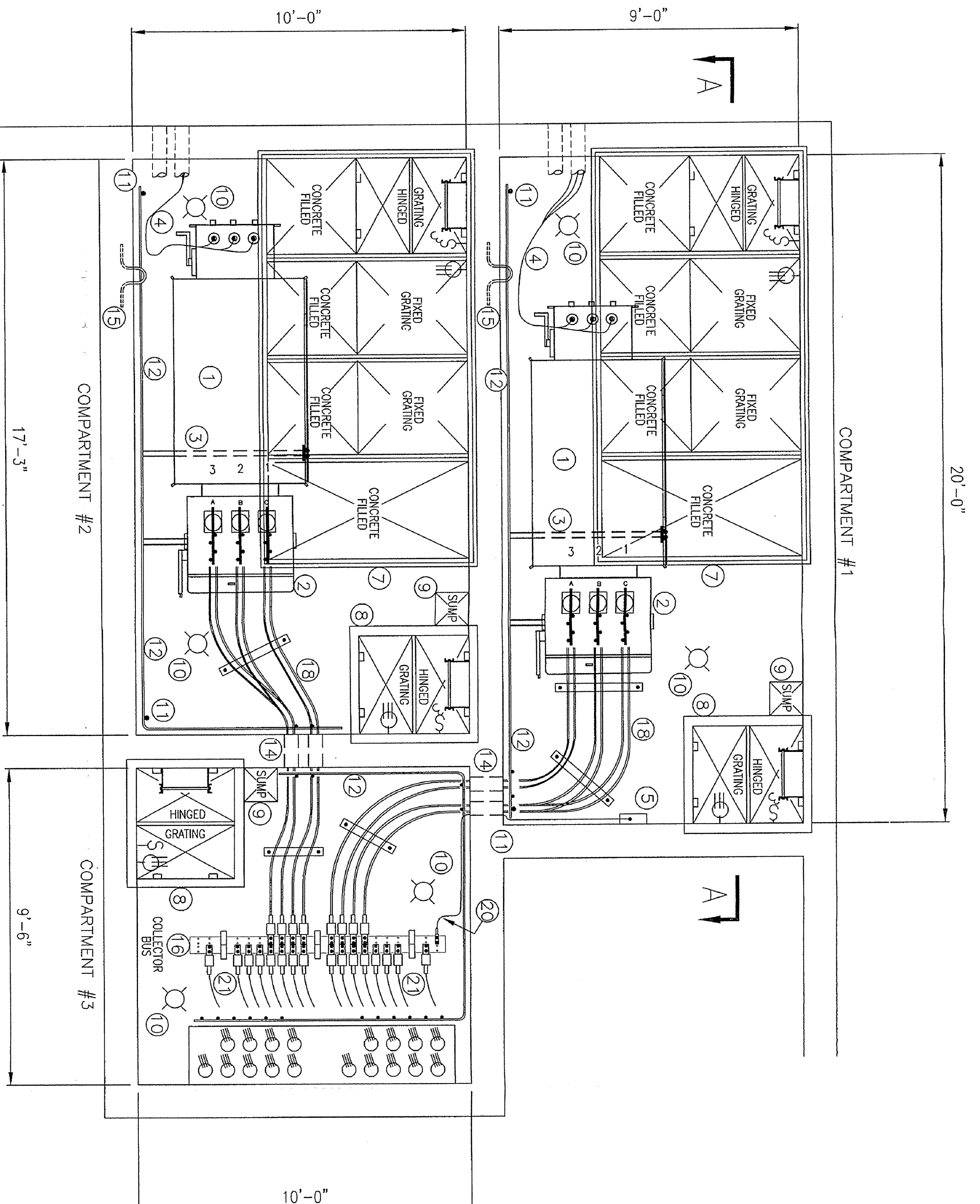
Sheet Information

Date	Permit Submittal	10.01.07
Job Number		075900.00
Drawn		JB
Checked		PB
Approved		

Title

Sept. 28, 2007 - 4:17pm
 C:\paw\08-05 Permits Submission Set - 10-1-07\107E702.dwg
 E7.02_P1

No. 277493-11



DUQUESNE LIGHT COMPANY WORK

1. FINISH INSTALL & CONNECT 2-700 KVA TRANS, 120/208 V, SIEMENS TYPE OR FIELD
2. FINISH INSTALL & CONNECT 2-500 AMP, 120/208 V, SIEMENS TRANSFORMER
3. FINISH INSTALL & CONNECT 2-250 AMP, 120/208 V, SIEMENS TRANSFORMER
4. FINISH INSTALL & CONNECT 2-250 AMP, 120/208 V, SIEMENS TRANSFORMER
5. FINISH INSTALL & CONNECT 2-250 AMP, 120/208 V, SIEMENS TRANSFORMER
6. FINISH INSTALL & CONNECT 2-250 AMP, 120/208 V, SIEMENS TRANSFORMER
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13. FINISH INSTALL & CONNECT 2-250 AMP, 120/208 V, SIEMENS TRANSFORMER
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15. FINISH INSTALL & CONNECT 2-250 AMP, 120/208 V, SIEMENS TRANSFORMER
16. FINISH INSTALL & CONNECT 2-250 AMP, 120/208 V, SIEMENS TRANSFORMER
17. FINISH INSTALL & CONNECT 2-250 AMP, 120/208 V, SIEMENS TRANSFORMER
18. FINISH INSTALL & CONNECT 2-250 AMP, 120/208 V, SIEMENS TRANSFORMER
19. FINISH INSTALL & CONNECT 2-250 AMP, 120/208 V, SIEMENS TRANSFORMER
20. FINISH INSTALL & CONNECT 2-250 AMP, 120/208 V, SIEMENS TRANSFORMER

CUSTOMER'S WORK

1. CONVEYOR & TRANSFORMER (TRANSFORMER-SCHEMATIC) W/IT WITH NECESSARY ACCESS
2. CONVEYOR & TRANSFORMER (TRANSFORMER-SCHEMATIC) W/IT WITH NECESSARY ACCESS
3. CONVEYOR & TRANSFORMER (TRANSFORMER-SCHEMATIC) W/IT WITH NECESSARY ACCESS
4. CONVEYOR & TRANSFORMER (TRANSFORMER-SCHEMATIC) W/IT WITH NECESSARY ACCESS
5. CONVEYOR & TRANSFORMER (TRANSFORMER-SCHEMATIC) W/IT WITH NECESSARY ACCESS
6. CONVEYOR & TRANSFORMER (TRANSFORMER-SCHEMATIC) W/IT WITH NECESSARY ACCESS
7. CONVEYOR & TRANSFORMER (TRANSFORMER-SCHEMATIC) W/IT WITH NECESSARY ACCESS
8. CONVEYOR & TRANSFORMER (TRANSFORMER-SCHEMATIC) W/IT WITH NECESSARY ACCESS
9. CONVEYOR & TRANSFORMER (TRANSFORMER-SCHEMATIC) W/IT WITH NECESSARY ACCESS
10. CONVEYOR & TRANSFORMER (TRANSFORMER-SCHEMATIC) W/IT WITH NECESSARY ACCESS
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12. CONVEYOR & TRANSFORMER (TRANSFORMER-SCHEMATIC) W/IT WITH NECESSARY ACCESS
13. CONVEYOR & TRANSFORMER (TRANSFORMER-SCHEMATIC) W/IT WITH NECESSARY ACCESS
14. CONVEYOR & TRANSFORMER (TRANSFORMER-SCHEMATIC) W/IT WITH NECESSARY ACCESS
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20. CONVEYOR & TRANSFORMER (TRANSFORMER-SCHEMATIC) W/IT WITH NECESSARY ACCESS

GENERAL NOTES

1. ALL ELECTRICAL WORK IS SUBJECT TO INSPECTION AND APPROVAL BY DUCQUESNE LIGHT CO.
2. INSTALLATION SHALL INCLUDE ALL METAL CASES, SUPPORTS AND MOUNTINGS TO THE GRADE BY USING
3. A MINIMUM OF 1" X 1/2" COPPER BAR OR #16 GALV. STEEL. MINIMUM USE CONDUCTORS
4. HAVE A MINIMUM OF TWO CONDUCTORS OVER EACH WIRE AND CONNECTED TO THE BUS WITH
5. TWO SLIGHT BRONZE OR STAINLESS STEEL BOLTS.
6. ALL BOLTS SHALL BE GALVANIZED IN ACCORDANCE WITH LATEST ASTM SPECIFICATION FOR HOT DIP GALVANIZING.
7. ALL BOLTS SHALL BE GALVANIZED IN ACCORDANCE WITH LATEST ASTM SPECIFICATION FOR HOT DIP GALVANIZING.
8. ALL BOLTS SHALL BE GALVANIZED IN ACCORDANCE WITH LATEST ASTM SPECIFICATION FOR HOT DIP GALVANIZING.
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RELATED DRAWINGS

- 277493-12 DETAILS OF CUSTOMER'S 250/250 VOLT COLLECTION BUS
- 277493-13 W/IT UNDER FEEDER & TAPPED PORTION OF CIRCUITS
- AA 41719 REV. STRUCTURAL DESIGN & DETAILS (SFD) FOR SHEET MOUNT (1998 DESIGN)
- AA 41719 STRUCTURAL DESIGN AND DETAIL OF 6312 VOLT
- AA 41719 STRUCTURAL DESIGN AND DETAIL OF 6312 VOLT
- AA 41719 STRUCTURAL DESIGN AND DETAIL OF 6312 VOLT
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- AA 41719 STRUCTURAL DESIGN AND DETAIL OF 6312 VOLT
- AA 41719 STRUCTURAL DESIGN AND DETAIL OF 6312 VOLT

REVISIONS

1		
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PRODUCT

DATE	9/19/07
DESIGN	JMB
PROJECT	CORV1275803

Duquesne Light
 Our Energy...Your Power

WILLIAM PENN - 725 VAULT - NEW BUSINESS
 WM. PENN. PLACE
 2ND WARD, CITY OF PGH
 ELECTRICAL EQUIPMENT LAYOUT OF CUSTOMERS
 120V/208V NETWORK VAULTS
 277493-11

REVISIONS

NO.	ISSUE	DATE
1		

NOTE:
 DRAWING INFORMATION TO BE USED FOR
 REFERENCE ONLY. PRODUCT SPECIFIC
 INFORMATION BE PROVIDED BY THE
 MANUFACTURER.

TRANSFORMER
 VAULT - PLAN
 SECTION & NOTES



The August Wilson
 Center for African
 American Culture
 Pittsburgh, PA

- OWNER: THE AUGUST WILSON CENTER FOR AFRICAN AMERICAN CULTURE
- OWNER REPRESENTATIVE: REYNOLD EMMERT, OWNER
- OWNER REPRESENTATIVE: 425 Sixth Avenue, #2800
- OWNER REPRESENTATIVE: PITTSBURGH, PA 15219
- OWNER REPRESENTATIVE: PHONE: 412/382-2700, FAX: 412/382-2701
- OWNER REPRESENTATIVE: CHIEF OF CONSTRUCTION
- OWNER REPRESENTATIVE: ONE OAK CENTER
- OWNER REPRESENTATIVE: PITTSBURGH, PA 15219
- OWNER REPRESENTATIVE: PHONE: 412/261-1500, FAX: 412/262-7549
- ARCHITECT: PERKINS + WILL
- ARCHITECT: 165 Bent Street, Suite 5100
- ARCHITECT: San Francisco, California 94107
- ARCHITECT: PHONE: 415/865-0800, FAX: 415/865-2015
- CONSTRUCTION MANAGER: TURNER CONSTRUCTION COMPANY
- CONSTRUCTION MANAGER: TWO SQUIBBO ROADS PER MANUFACTURING CAMPUS
- CONSTRUCTION MANAGER: 820 Lehigh Avenue
- CONSTRUCTION MANAGER: PITTSBURGH, PA 15222-2719
- CONSTRUCTION MANAGER: PHONE: 412/255-5400, FAX: 412/255-0210
- STERLING CONTRACTING LLC
- STERLING CONTRACTING LLC: 901 McClellan Street
- STERLING CONTRACTING LLC: HONOLULU, HI 15200
- STERLING CONTRACTING LLC: PHONE: 412/262-0301, FAX: 412/262-0309
- OWNER REPRESENTATIVE: EBONY DEVELOPMENT
- OWNER REPRESENTATIVE: 1901-15 Centre Avenue, Suite 203
- OWNER REPRESENTATIVE: PITTSBURGH, PA 15219-4318
- OWNER REPRESENTATIVE: PHONE: 412/264-6711, FAX: 412/264-6724
- OWNER REPRESENTATIVE: STRUCTURAL: MIDDELBROOK & DOLLE
- OWNER REPRESENTATIVE: ONE BERRY STREET
- OWNER REPRESENTATIVE: SUITE 200, CLAYTON
- OWNER REPRESENTATIVE: PITTSBURGH, PA 15203
- OWNER REPRESENTATIVE: PHONE: 415/272-0001, FAX: 415/272-2899
- OWNER REPRESENTATIVE: CHESTER ENGINEERS
- OWNER REPRESENTATIVE: ARDRE BUSINESS PARK
- OWNER REPRESENTATIVE: 280 Ardre Drive
- OWNER REPRESENTATIVE: MOON TOWNSHIP, PA 15108
- OWNER REPRESENTATIVE: PHONE: 412/209-6625, FAX: 412/209-6611
- OWNER REPRESENTATIVE: MECHANICAL/ELECTRICAL/PLUMBING (M/E/P) ENGINEERING
- OWNER REPRESENTATIVE: 2 West Liberty Street, Suite 717
- OWNER REPRESENTATIVE: DUMFRIES, PA 15611
- OWNER REPRESENTATIVE: PHONE: 724/438-8858, FAX: 724/438-8667
- OWNER REPRESENTATIVE: ELECTRICAL: HORNBECK ENGINEERING, INC.
- OWNER REPRESENTATIVE: 4250 Lehigh Avenue
- OWNER REPRESENTATIVE: PITTSBURGH, PA 15215
- OWNER REPRESENTATIVE: PHONE: 412/781-1501, FAX: 412/781-5583
- OWNER REPRESENTATIVE: LIGHTING DESIGN: THE STUDIO COMPANY
- OWNER REPRESENTATIVE: 3414 Babcock Boulevard
- OWNER REPRESENTATIVE: PITTSBURGH, PA 15227
- OWNER REPRESENTATIVE: PHONE: 412/380-4688
- OWNER REPRESENTATIVE: SECURITY: TELECOM, INC.
- OWNER REPRESENTATIVE: THE SERVICE GROUP, INC.
- OWNER REPRESENTATIVE: HARRISBURG CENTER FOR INNOVATION
- OWNER REPRESENTATIVE: 201 River Avenue, Suite 800
- OWNER REPRESENTATIVE: HARRISBURG, PA 17102
- OWNER REPRESENTATIVE: PHONE: 717/253-8800, FAX: 717/253-8839
- OWNER REPRESENTATIVE: ELECTRICAL/ELECTRICAL/ELECTRICAL (E/E/E) ENGINEER: WELCH ENGINEERING, P.C.
- OWNER REPRESENTATIVE: 225 Green Street
- OWNER REPRESENTATIVE: SEAFORD, DE 19380
- OWNER REPRESENTATIVE: PHONE: 415/392-7208, FAX: 415/392-7250

