UNIVERSITY OF PENNSYLVANIA NEURAL AND BEHAVIORAL SCIENCES BUILDING

415 University Ave, Philadelphia, PA 19104

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Advisor | Shawn Good + Leslie Beahm

Technical Report Part II
10.14.13

EXECUTIVE SUMMARY

In the following report, an analysis of the existing electrical system in University of Pennsylvania's Neural and Behavioral Sciences building is presented. The analysis provides appropriate criteria regarding emergency power, building utilization voltage, special occupancies, and power distribution in accordance to ASHRAE, NEC, and IBC. This report also defines the scope of work and design priorities. Load calculations at various stages of design is performed and compared.

Overall, the electrical system is robust and reliable. Since the NBS building is a laboratory, larger equipment loads and added redundancy require a larger electrical system despite costs. Supplied medium voltage is distributed through the building at 480/277V by a double-ended substation, transformers, distribution panels, bus ducts, and panelboards. The building has an actual calculated load of 1168A. The project is slated to achieve LEED Silver primarily through daylighting, lighting controls, and HVAC specifications. With any building, room for improvement still exists and is explained later in this report.

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BUILDING OVERVIEW

Name | University of Pennsylvania Neural and Behavioral Sciences Building
Location | 415 University Ave, Philadelphia, PA 19104
Occupant Name | University of Pennsylvania faculty, staff and students
Occupant Type | Business (B), Assembly (A-3), and Storage (S-1)
Size | 77,100 SF total
Number of Stories | Five stories and a basement below grade
Construction Dates | January 2014 – March 2016
Estimated Building Cost | $49,300,000
Project Delivery Method | Guaranteed Maximum Price (GMP)

PROJECT TEAM

Architecture & Engineering | SmithGroupJJR, Inc.
- Project Manager: Mark Potter
- Architect: Sven Shockey
- Structural Engineer: ZY Liu + Liliana Blackson
- Mechanical Engineer: Dan Mather + Liz Kaminsky
- Electrical Engineer: Joe Trusk + Andrew Verilone
- Lighting Designer: Matt Alleman + Leland Curtis
- Interior Designer: Lori James
- Sustainability: Chris Heine

Owner | University of Pennsylvania
Construction Manager | P. Anges
Landscape Architecture | Christopher Allen
Civil Engineering | Pennoni Associates, Inc.
Audio, Visual, Telecomm, Acoustics | Shen Milsom & Wilke, LLC
Signage | InkSpot DESIGN Inc.

PART I DEVELOP ELECTRICAL SYSTEM CRITERIA AND SCOPE

UTILITY COMPANY INFORMATION

Medium voltage power is supplied through the University of Pennsylvania campus power distribution system. In this regard, the utilities are paid for by UPenn and utilities costs are not directly calculated for the NBS building here, per thesis electrical advisor comments.

BUILDING UTILIZATION VOLTAGE

The building utilization voltage should be 408/277V, 3PH so that lighting is 277V, receptacles use 120V, and mechanical systems can be on either 208V or 480V, 3PH. Information technology, A/V equipment, refrigerators, freezers, fume hoods, and incubators typically use 208/120V.

EMERGENCY POWER REQUIREMENTS

According to IBC, emergency power shall be designed and constructed to the code as described below:

2702.2.1 Group A occupancies

Emergency power shall be provided for emergency voice/alarm communication systems in Group A occupancies in accordance with Section 907.5.2.2.4.

2702.2.2 Smoke control systems

Standby power shall be provided for smoke control systems in accordance with Section 909.11.

2702.2.3 Exit signs

Emergency power shall be provided for *exit* signs in accordance with Section 1011.5.3.

2702.2.4 Means of egress illumination

Emergency power shall be provided for *means of egress* illumination in accordance with Section 1006.3.

2702.2.5 Accessible means of egress elevators

Standby power shall be provided for elevators that are part of an *accessible means of egress* in accordance with Section 1007.4.

2702.2.6 Accessible means of egress platform lifts
Standby power in accordance with this section or ASME A 18.1 shall be provided for platform lifts that are part of an *accessible means of egress* in accordance with Section 1007.5.

2702.2.7 Horizontal sliding doors
Standby power shall be provided for horizontal sliding doors in accordance with Section 1008.1.4.3.

2702.2.10 Hazardous materials
Emergency or standby power shall be provided in occupancies with hazardous materials in accordance with Section 414.5.4.

2702.2.19 Elevators
Standby power for elevators shall be provided as set forth in Sections 3003.1, 3007.7 and 3008.15.

2702.2.20 Smokeproof enclosures
Standby power shall be provided for smokeproof enclosures as required by Section 909.20.6.2.

SPECIAL OCCUPANCY REQUIREMENTS
Referencing NEC 2011 Chapter 5, section [500] "Hazardous Locations" is viable given NBS is a laboratory building; there is a greater risk of toxic or flammable elements.

SPECIAL EQUIPMENT
NEC Chapter 6 outlines potential special equipment to be used in the building:

[600] Electric Signs and Outline Lighting
[620] Elevators
[640] Audio Signal Processing and Amplification
[645] Information Technology Equipment
[685] Integrated Electrical Systems
[695] Fire pumps

DESIGN PRIORITY ASSESSMENT
The list below prioritizes the design criteria that drive the electrical solution. All of the following categories are essential but here, relative importance is considered.

Reliability – High
Power Quality – Medium
Redundancy – High
Initial Cost (low initial cost) – Low
Long Term Ownership Cost – Medium
Flexibility – Low

SPECIAL/COMMUNICATIONS SYSTEMS

Below, potential special/communications systems are listed:

Telephone/data
Fire Alarm
CATV
Access Control
Security

Fire Alarm IBC Requirements

907.2 Where required-new buildings and structures

An *approved* fire alarm system installed in accordance with the provisions of this code and NFPA 72 shall be provided in new buildings and structures in accordance with Sections 907.2.1 through 907.2.23 and provide occupant notification in accordance with Section 907.5, unless other requirements are provided by another section of this code.

A minimum of one manual fire alarm box shall be provided in an *approved* location to initiate a fire alarm signal for fire alarm systems employing automatic fire detectors or waterflow detection devices. Where other sections of this code allow elimination of fire alarm boxes due to sprinklers, a single fire alarm box shall be installed.

907.2.1 Group A

A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group A occupancies having an *occupant load* of 300 or more.

Manual fire alarm boxes are not required where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 and the occupant notification appliances will activate throughout the notification zones upon sprinkler waterflow.

907.5 Occupant notification systems

A fire alarm system shall annunciate at the panel and shall initiate occupant notification upon activation, in accordance with Sections 907.5.1 through 907.5.2.3.4. Where a fire alarm system is required by another section of this code, it shall be activated by:

1. Automatic fire detectors.
2. Sprinkler waterflow devices.
3. Manual fire alarm boxes.
4. Automatic fire-extinguishing systems.

907.5.1 Presignal feature

A presignal feature shall not be installed unless *approved* by the fire code official and the fire department. Where a presignal feature is provided, a signal shall be annunciated at a *constantly attended location approved* by the fire department, in order that occupant notification can be activated in the event of fire or other emergency.

OTHER BUILDING SERVICES

Other building services are listed:

Telephone
Data
CATV

MAJOR EQUIPMENT

Typical for many campus buildings, the NBS building will potentially utilize a main switchgear and corresponding main entrance transformer to distribute power to various switchboards or distribution panels. Step-down transformers, a generator, and automatic transfer switches are likely and require space in the building.

PART II UNDERSTAND THE CURRENT ELECTRICAL SYSTEM

SUMMARY OF ELECTRICAL DISTRIBUTION SYSTEM

As designed, the existing electrical system utilizes a building voltage of 480/277V. Power is supplied at medium voltage through UPenn's campus distribution. A 15kV main switchgear located in the penthouse receives this power at the building service entrance. The power is then connected to a double-ended 480V, 3PH, 4W substation where integral 1500 kVA transformers step-down the power from 13.2 kV to 480Y/277V. A 1200A tie in conjunction with the double-ended substation ensures redundancy for the laboratory building.

Substation 1A services the fire pump, a mechanical distribution panel, legally required loads, and optional standby loads. Substation 1B services the fire pump, life safety loads, and the bus duct. Several lighting and mechanical loads are powered through emergency panels. The central bus duct passes vertically through the NBS building. The 480/277V bus duct provides power for lighting loads through remotely operated circuit breaker panelboards. On every floor, a step-down transformer connected to the bus supplies power to various receptacle and small equipment loads.

A diesel generator located on the roof of the NBS building provides emergency power for the fire pump and a switchboard. This switchboard distributes power to various distribution panels and panelboards. The system is conservative and relatively expensive. The initial cost, however, can be justified given the lab work which requires adequate power in case of an emergency. A laboratory inherently requires more power because of larger pieces of mechanical and other equipment.

UTILITY COMPANY INFORMATION

Same as Part I of this report.

SERVICE ENTRANCE

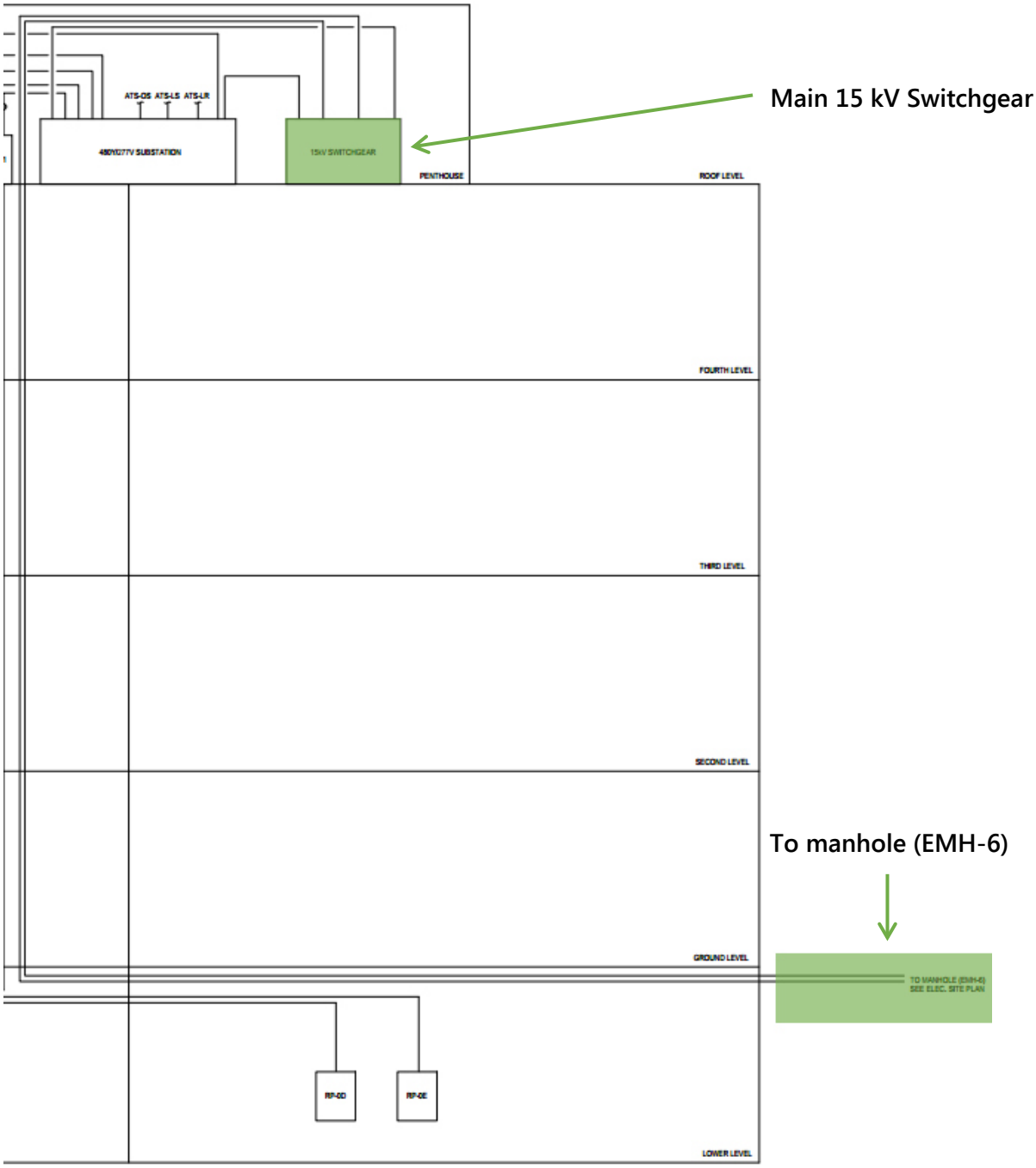
The electrical system is redundant and robust. Two lines of power in rigid conduit at medium voltage (13.2 kV, 3PH, 3W) enter the building on the lower floor, providing power to a 15kV switchgear (18,000 AIC) in the penthouse. The switchgear has a normally open 1200A tie for extra redundancy. Each side of the switchgear has a 1200A draw-out circuit breaker.

Power is then delivered to a double-ended substation. A 1500AA/2000FA kVA dry-type transformer steps the primary 13.2 kVA voltage down to 480Y/277V, 3PH, 4W secondary power to service the substation. Substations 1A and 1B buses are both sized as

480/277V, 3200A, 65,000 AIC units. For added redundancy, a 2500A tie is located between substations 1A and 1B. Both substations have the required primary switch and fuse (125A) and main draw-out 2500A circuit breaker on the secondary side of the transformer. The substation has various-sized fixed molded-case breakers that service equipment and lighting.

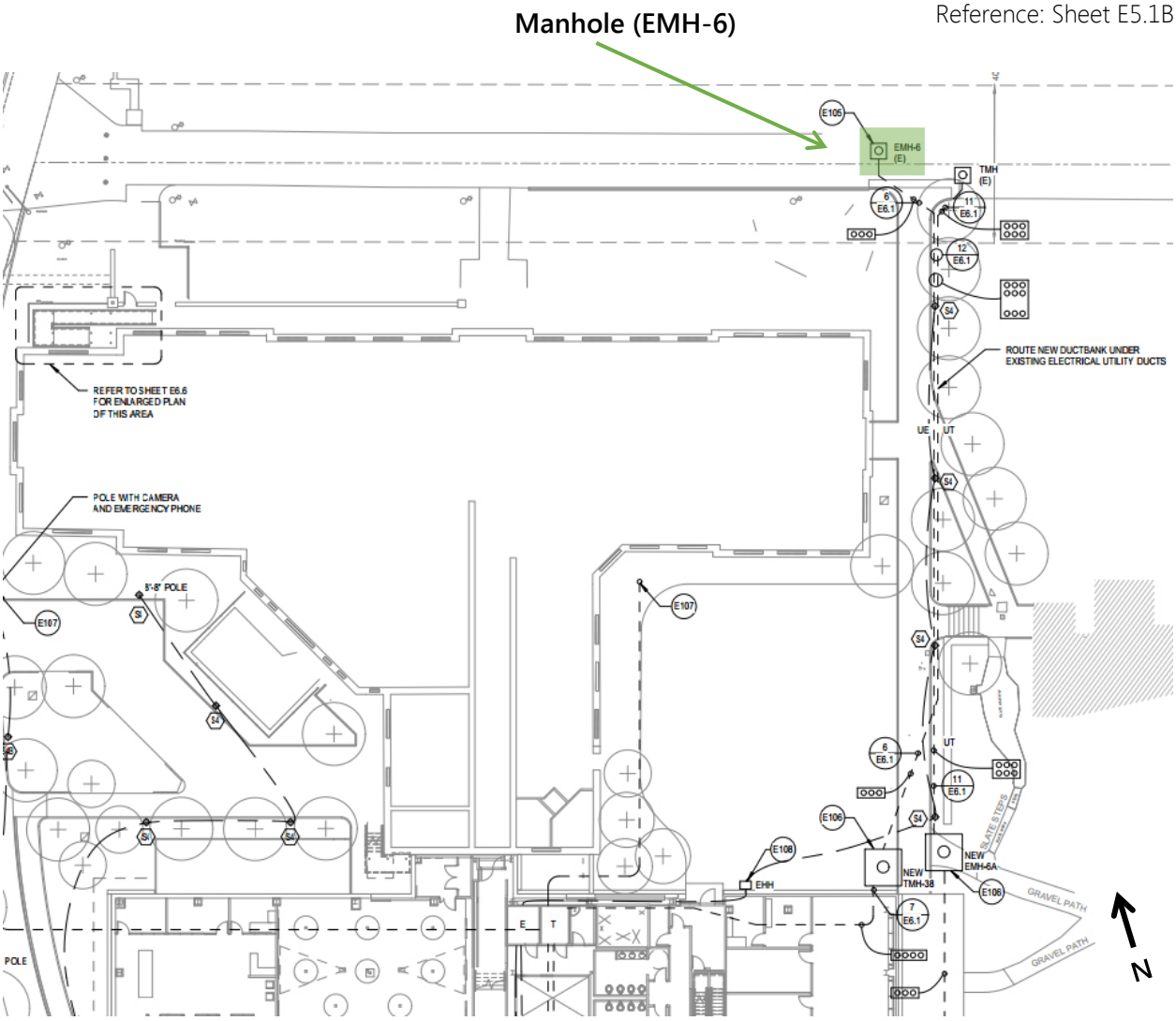
From the substations, power is supplied to the main bus duct, fire pumps, lighting, receptacles, and mechanical equipment. The main switchgear and substations are located in the penthouse of the NBS building.

Enlarged Electrical Riser Diagram



Enlarged Electrical Site Plan

Reference: Sheet E5.1B



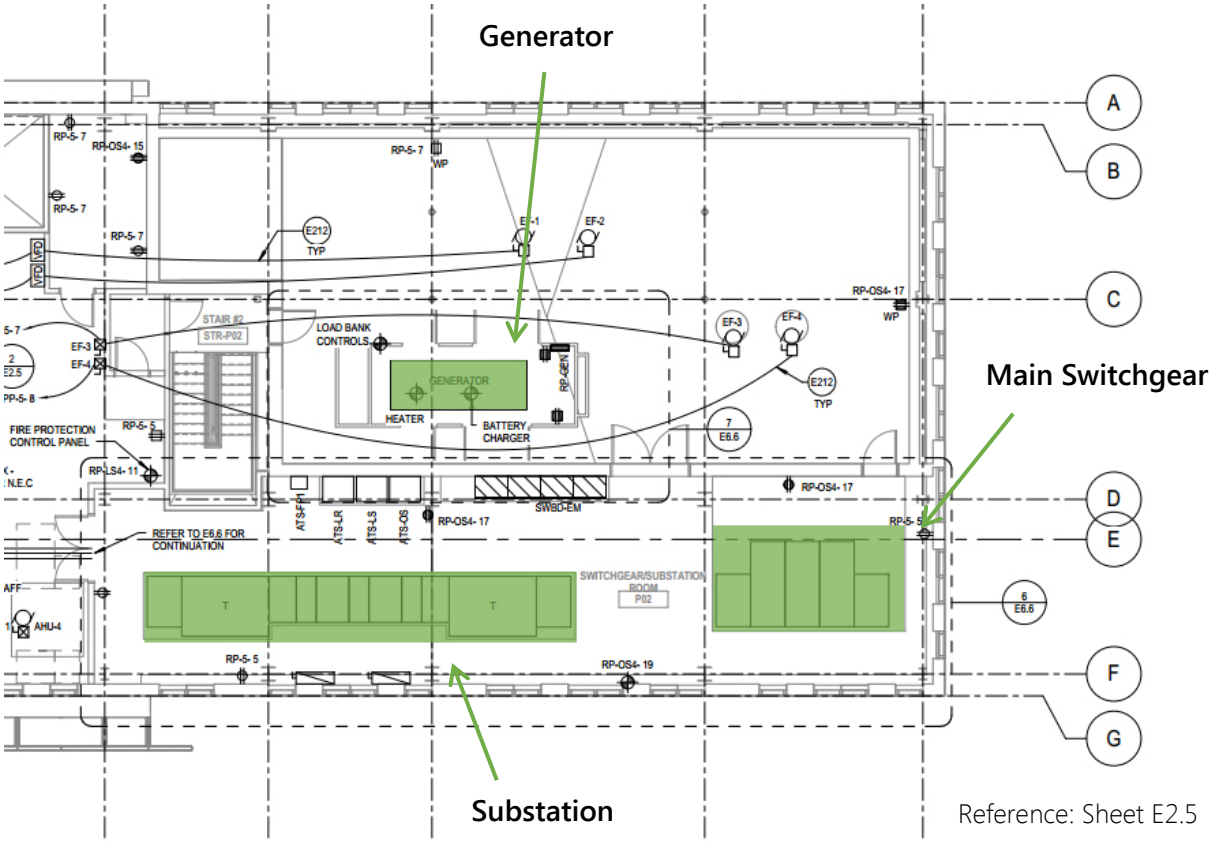
Reference: Sheet E1.0

LOCATION OF MAJOR ELECTRICAL EQUIPMENT

The main switchgear and substations are located in the penthouse of the NBS building. A diesel generator and connected panelboard is located on the northwest end of the roof. The 800A switchboard connected to the generator is also located in the penthouse. Distribution panelboards, panelboards, and automatic transfer switches are located throughout the building in dedicated electrical rooms to the north of each floor plan. A bus duct, thus, runs vertically through these aligned spaces.

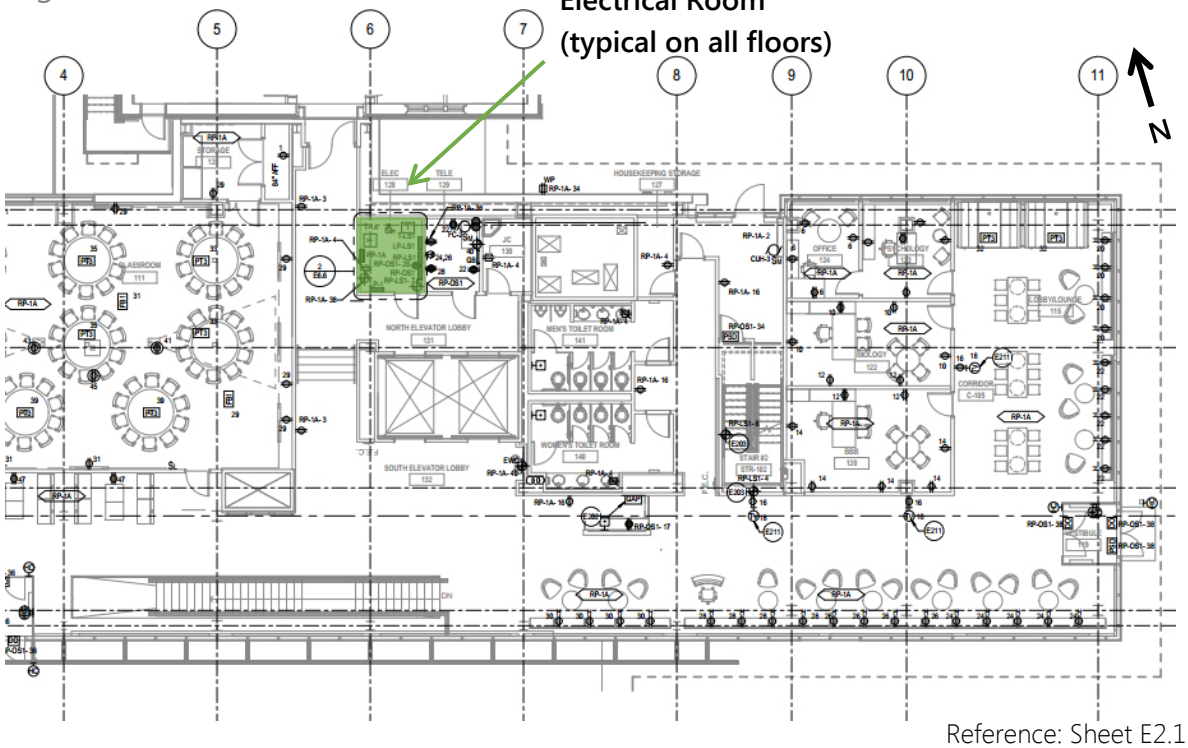
The electrical room in the penthouse is approximately 1450 SF while the electrical rooms on each floor are typically 85 SF (425 SF across all floors). This coincides to 2.4% of the overall building area.

Enlarged Power Plan (Penthouse)



Reference: Sheet E2.5

Enlarged Power Plan (Ground Level)



Reference: Sheet E2.1

BUILDING UTILIZATION VOLTAGE

Currently, power is distributed by the penthouse substation; the NBS building utilizes primarily 480Y/277V power. The lighting is on a 277V, 3PH, 4W system. An emergency battery lighting unit is on the 120V system, correlating to its connection to emergency power. Most of the mechanical equipment is on the 480Y/277V, 3PH, 4W system; some mechanical equipment like fuel oil pumps, fan coils, and unit heaters are power by 208/120V, 3PH, 4W panelboards. Special equipment as described later are predominately operating on 208/120V, 3PH. The current system is appropriate for the recommended usage:

Lighting – 277V
Receptacle – 120V
Mechanical – 120V and 480V
Special Equipment – 208/120V

EMERGENCY POWER SYSTEM

The present emergency power is supplied by a 500kW diesel generator. This generator supplies power to a 480Y/277V 800A switchboard, central load bank, and 25 HP fire pump (ATS-FP2).

Three automatic transfer switches are used in conjunction with the switchboard. Emergency power is supplied to ATS-LS (life safety), ATS-LR (legally required), and ATS-OS (optional standby). Life safety includes fire protection equipment, emergency lighting, and fire shutters. Legally required power is distributed through a distribution panel which delivers power to a jockey pump, both elevators, machine rooms, and elevator lights. See below for information about optional standby.

A summary of the emergency power devices are listed below:

(1) Emergency Power Switchboard
480/277V, 3PH, 4W, 35,000AIC

(1) Legally Required Distribution Panel
480/277V, 3PH, 4W, 35,000AIC

(1) Optional Standby Distribution Panel
480/277V, 3PH, 4W, 35,000AIC

(2) Life Safety LP panelboards
480/277V, 3PH, 4W, 14,000AIC

480/277V, 3PH, 4W, 35,000AIC

(2) Life Safety RP panelboards
208/120V, 3PH, 4W, 10,000AIC
208/120V, 3PH, 4W, 10,000AIC

(1) Legally Required RP panelboard
208/120V, 3PH, 4W, 10,000AIC

(2) Optional Standby RP panelboards
208/120V, 3PH, 4W, 10,000AIC
208/120V, 3PH, 4W, 10,000AIC

The emergency power system supplies some emergency power to the neighboring Leidy building distribution panel.

See Appendix A drawing E5.2 for layout of emergency power system. See Appendix A Drawings E7.3 to E7.6 for panelboard schedules.

SPECIAL OCCUPANCY REQUIREMENTS

As noted on drawing G2.1.1 (Appendix A), there is the potential for hazardous material. Corresponding to IBC section 414, this requires control areas. Referencing NEC 2011 Chapter 5, section [500] "Hazardous Locations" does relate to the NBS laboratory building; there is a greater risk of toxic or flammable elements.

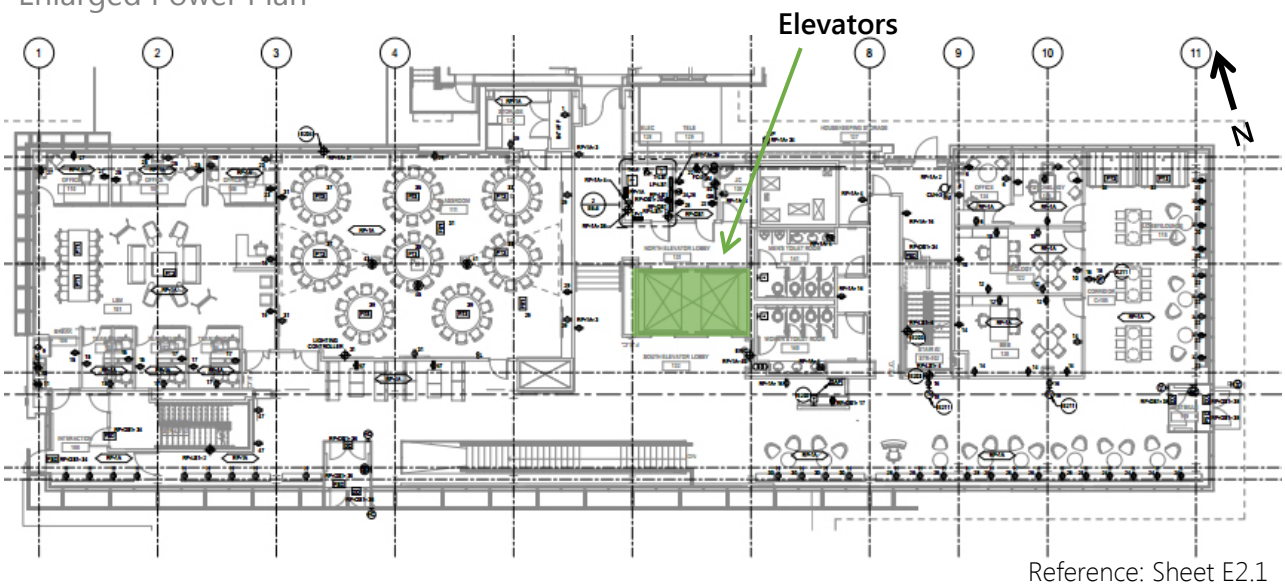
SPECIAL EQUIPMENT

Two main elevators are used in the NBS building. In general, laboratory spaces require lab desks, sinks, and safety equipment.

Special equipment is installed in the lower level of the NBS building. This includes chromatography refrigerators, regular lab refrigerators and freezers, -80°F freezers, incubators, and sterilizers. Biosafety cabinets and fume hoods are also used in lower laboratories. Dry labs require safe storage in cabinets.

Reference Appendix D drawing AQ1.1.2 for equipment schedule.

Enlarged Power Plan



Reference: Sheet E2.1

OPTIONAL BACK-UP POWER

Optional back-up power is supplied by a 480Y/277V, 800A, 3PH, 4W, 65000 AIC switchboard (in penthouse) and controlled by a 400A automatic transfer switch. The switchboard is powered by a 500kW back-up generator located on the roof.

Panelboards RP-OS4 and RP-OS1 as well as exhaust and supply fans are considered for optional power. The panelboards power -80°F freezers, refrigerators, standby lighting, several receptacles, and smoke dampers.

SPECIAL/COMMUNICATIONS SYSTEMS

The NBS building has the following special/communications systems:

- Telephone/data
- Fire Alarm
- CATV
- Access Control
- Security
- Lighting Controls

OTHER BUILDING SERVICES

Likewise, NBS has the following building services:

- Telephone
- Data

CATV

ELECTRICAL SYSTEM EQUIPMENT

Table 1: Major Electrical Equipment

Tag	Type	Floor	Room #	Room Name	Sheet #
Switchgear	Main Switchgear	Penthouse	P02	Switchgear/Substation Room	E2.5
1A	Substation	Penthouse	P02	Switchgear/Substation Room	E2.5
2B	Substation	Penthouse	P02	Switchgear/Substation Room	E2.5
T-0A	Transformer	Lower	L18	Electrical Room	E2.0A
T-1A	Transformer	Ground	128	Electrical Room	E2.1
T-2A	Transformer	Second	228	Electrical Room	E2.2
T-3A	Transformer	Third	328	Electrical Room	E2.3
T-4A	Transformer	Fourth	428	Electrical Room	E2.4
T-5	Transformer	Penthouse	PO1	Mechanical Equipment	E2.5
T-LS1	Transformer	Ground	128	Electrical Room	E2.1
T-LS4	Transformer	Fourth	428	Electrical Room	E2.4
T-LR	Transformer	Penthouse	PO1	Mechanical Equipment	E2.5
T-OS	Transformer	Penthouse	PO1	Mechanical Equipment	E2.5
G	Generator	Roof	N/A	N/A	E2.5
SWBD-EM	Switchboard	Penthouse	P02	Switchgear/Substation Room	E2.5
ATS-FP2	Automatic Transfer Switch	Lower	L18	Electrical Room	E2.0A
ATS-FP1	Automatic Transfer Switch	Penthouse	P02	Switchgear/Substation Room	E2.5
ATS-LS	Automatic Transfer Switch	Penthouse	P02	Switchgear/Substation Room	E2.5
ATS-LR	Automatic Transfer Switch	Penthouse	P02	Switchgear/Substation Room	E2.5
ATS-OS	Automatic Transfer Switch	Penthouse	P02	Switchgear/Substation Room	E2.5

Switchgear
A 15kV (18,000 AIC) main switchgear is located in the penthouse. See "Service Entrance" section of this document for detailed explanation of equipment.

Substation/Transformers
Main substations (480Y/270V, 3200A bus, 65,000 AIC) and integral 1500kVA step-down transformers located in penthouse. Each substation has a 2500A circuit breaker. See "Service Entrance" section of this document for detailed explanation of equipment.

Generator
A 500kW/625 kVA diesel generator is located on the northeastern end of the roof. The generator contains three breakers (800A, 400A, 80A). It services the fire pump, the central load bank, and switchboard which distributes power for life safety, legally required, and optional stand-by equipment.

Bus Duct
A central copper 600A, 35,000 AIC bus duct runs the height of the NBS building. Operating at 480/277V, the duct provides power to remotely operated circuit breaker panelboards on every floor. Additionally, various sized step-down transformers provide 208/120V power to panelboards with receptacle and equipment loads.

Step-down Transformers
Low-voltage transformers are ventilated, NEMA 250, Type 2. Transformers located on every floor to supply 208/120V power to RP panels and 208/120V mechanical/other equipment.

Table 2: Transformer Schedule

Tag	Primary Voltage	Secondary Voltage	Size	Type	Temp. Rise	Taps	Mounting
TR-1A*	13,200 V 3PH, 4W	480Y/277V 3PH, 4W	--	Dry	115° C	(4) 2.5%	Pad
TR-1B*	13,200 V 3PH, 4W	480Y/277V 3PH, 4W	--	Dry	115° C	(4) 2.5%	Pad
T-0A	480Y/277V 3PH, 4W	208Y/120V 3PH, 4W	112kVA	Dry	115° C	(4) 2.5%	Pad
T-1A	480Y/277V 3PH, 4W	208Y/120V 3PH, 4W	45kVA	Dry	115° C	(4) 2.5%	Pad
T-2A	480Y/277V 3PH, 4W	208Y/120V 3PH, 4W	75kVA	Dry	115° C	(4) 2.5%	Pad
T-3A	480Y/277V 3PH, 4W	208Y/120V 3PH, 4W	75kVA	Dry	115° C	(4) 2.5%	Pad
T-4A	480Y/277V	208Y/120V	75kVA	Dry	115° C	(4) 2.5%	Pad

	3PH, 4W	3PH, 4W					
T-5	480Y/277V 3PH, 4W	208Y/120V 3PH, 4W	15kVA	Dry	115° C	(2) 5.0%	Pad
T-LS1	480Y/277V 3PH, 4W	208Y/120V 3PH, 4W	15kVA	Dry	115° C	(2) 5.0%	Pad
T-LS4	480Y/277V 3PH, 4W	208Y/120V 3PH, 4W	15kVA	Dry	115° C	(2) 5.0%	Pad
T-LR	480Y/277V 3PH, 4W	208Y/120V 3PH, 4W	15kVA	Dry	115° C	(2) 5.0%	Pad
T-OS	480Y/277V 3PH, 4W	208Y/120V 3PH, 4W	45kVA	Dry	115° C	(4) 2.5%	Pad

*Transformers located in substation are integral to the unit.

Panelboards

The following table describes the existing distribution panels, bus duct, panelboards, associated loads, and locations. The NBS building utilizes a combination of panelboards with main lugs only or main circuit breakers. All panelboards have copper buses and are to be rated with NEMA 1 enclosures unless otherwise noted on drawings (i.e. NEMA 3R used for wet locations).

Table 3: Panelboards

Tag	Voltage System	Main size	Main Type	Floor	Room #	Room Name	Sheet #
1A	480/277V, 3PH, 4W	3200A	MCB	Penthouse	P02	Switchgear/Substation Room	E7.6
1B	480/277V, 3PH, 4W	3200A	MCB	Penthouse	P02	Switchgear/Substation Room	E7.6
SWBD-EM	480/277V, 3PH, 4W	800A	MLO	Penthouse	P02	Switchgear/Substation Room	E7.6
PP-5	480/277V, 3PH, 4W	600A	MLO	Penthouse	P01	Mechanical Equipment	E7.6
RP-5	208/120V, 3PH, 4W	100A	MCB	Penthouse	P01	Mechanical Equipment	E7.6
PP-LR	480/277V, 3PH, 4W	250A	MLO	Penthouse	P01	Mechanical Equipment	E7.6
PP-OS	480/277V, 3PH, 4W	400A	MLO	Penthouse	P01	Mechanical Equipment	E7.6
RP-LR	208/120V, 3PH, 4W	60A	MCB	Penthouse	N/A	Not provided	E7.6
LP-0	480/277V, 3PH, 4W	100A	MLO	Lower	L18	Electrical Room	E7.3
PP-0A	480/277V, 3PH, 4W	200A	MLO	Lower	L18	Electrical Room	E7.3
PP-0B	480/277V, 3PH, 4W	100A	MCB	Lower	L08	Meter/Domestic Water Pump Room	E7.3

RDP-0	208/120V, 3PH, 4W	400A	MCB	Lower	L18	Electrical Room	E7.3
RP-0A	208/120V, 3PH, 4W	225A	MLO	Lower	L18	Electrical Room	E7.3
RP-0B	208/120V, 3PH, 4W	100A	MCB	Lower	L12	Molecular Biology	E7.3
RP-0C	208/120V, 3PH, 4W	100A	MCB	Lower	L11	Molecular Biology	E7.3
RP-0D	208/120V, 3PH, 4W	100A	MCB	Lower	L06A	Instructional Class Lab Prep Space	E7.3
RP-0E	208/120V, 3PH, 4W	225A	MCB	Lower	L06B	Instructional Class Lab Prep Space	E7.3
LP-1	480/277V, 3PH, 4W	100A	MLO	Ground	128	Electrical Room	E7.4
LP-LS1	480/277V, 3PH, 4W	100A	MCB	Ground	128	Electrical Room	E7.4
RP-LS1	208/120V, 3PH, 4W	100A	MCB	Ground	128	Electrical Room	E7.4
RP-OS1	208/120V, 3PH, 4W	100A	MCB	Ground	128	Electrical Room	E7.4
RP-1A	208/120V, 3PH, 4W	225A	MCB	Ground	128	Electrical Room	E7.4
LP-2	480/277V, 3PH, 4W	100A	MLO	Second	228	Electrical Room	E7.4
RP-2A	208/120V, 3PH, 4W	225A	MCB	Second	228	Electrical Room	E7.4
RP-2B	208/120V, 3PH, 4W	225A	MCB	Second	228	Electrical Room	E7.4
LP-3	480/277V, 3PH, 4W	100A	MLO	Third	328	Electrical Room	E7.5
RP-3A	208/120V, 3PH, 4W	225A	MCB	Third	328	Electrical Room	E7.5
RP-3B	208/120V, 3PH, 4W	225A	MCB	Third	328	Electrical Room	E7.5
LP-4	480/277V, 3PH, 4W	100A	MLO	Fourth	428	Electrical Room	E7.5
LP-LS4	480/277V, 3PH, 4W	100A	MCB	Fourth	428	Electrical Room	E7.5
RP-LS4	208/120V, 3PH, 4W	100A	MCB	Fourth	428	Electrical Room	E7.5
RP-OS4	208/120V, 3PH, 4W	225A	MCB	Fourth	428	Electrical Room	E7.5
RP-4A	208/120V, 3PH, 4W	225A	MCB	Fourth	428	Electrical Room	E7.5
RP-4B	208/120V, 3PH, 4W	225A	MCB	Fourth	428	Electrical Room	E7.5

Bus Duct*	480/277V, 3PH, 4W	600A	N/A	N/A	N/A	N/A	E7.6

Overcurrent Protection Devices

Panelboards include a variety of breakers, both MLO and MCB. The NBS building utilizes a variety of sizes as small as 100A and as large as 3200A main breakers on the penthouse substation. The generator has three breakers: an 80A breaker is used in conjunction with ATS-FP2 (fire pump), 400A for the load bank, and 800A for the switchboard distributing life safety, legally required, and optional stand-by power.

Thermal-magnetic circuit molded-case breakers have an inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip settings are available for circuit-breaker frames sizes 250A and larger.

Grounding

To provide acceptable grounding, equipment is connected to the grounding busbar in lower level electrical room with #4/0 conductors. All conductors are standard copper with green insulation unless otherwise noted. Equipment in telecom room L19, penthouse electrical room, lower level electrical room, structural steel electrode, cold water pipe electrode, and sprinkler and gas pipe are all connected to the grounding loop.

Grounding is shown in Appendix A drawing E6.1.

Main Risers and Feeders

The service entrance uses THHN-THWN single conductors in raceway. Exposed feeders and branch circuits use THHN-THWN conductors.

Conductors

Copper conductors used throughout the building are THHN wire.

Conduit

The NBS building uses various types of conduits such as electrical metallic tubing (EMT) and intermediate metal conduit (RMC). Type MC is used for final connections to light fixtures and receptacles.

Receptacles

Receptacles are heavy-duty duplex specification grade rated at 20A, 125V. They comply with NEMA WD1, NEMA WD6 configuration 5-20R, and UL 498.

Switch and Receptacle Faceplates

Snap switches are heavy-duty construction, totally enclosed, thermoset material with a quiet toggle handle rated at 120-277V AC and 20A. They comply with NEMA WD1 and UL 20.

Wall plates (both single and combination types) are to match corresponding wiring devices. Satin-finish stainless steel covers are to be used in finished spaces. Unfinished spaces will use galvanized steel while thermoplastic materials with spring-loaded lift covers will be used in damp locations.

Motor Starters

Motors are provided with variable speed drives and are premium-efficiency.

Uninterruptible Power Supply (UPS)

Existing electrical solution contains no universal power supply.

Special Equipment

Two main elevators are used in the NBS building. In general, laboratory spaces require lab desks, sinks, and safety equipment.

Special equipment is installed in the lower level of the NBS building. This includes chromatography refrigerators, regular lab refrigerators and freezers, -80°F freezers, incubators, and sterilizers. Biosafety cabinets and fume hoods are also used in lower laboratories. Dry labs require safe storage in cabinets.

LIGHTING LOADS

See Appendix B below for lighting fixture schedule.

MECHANICAL AND OTHER LOADS

See Appendix C below for mechanical equipment loads.

SINGLE LINE DIAGRAM/DRAWINGS

Drawings in Appendix A were used to locate and size the electrical and mechanical equipment. Please refer to Appendix A, drawings E5.2 and E5.1. Sheet E5.2 shows the riser diagram. Sheets E5.4 shows the fire protection system diagram.

SUMMARY OF SPECIAL/COMMUNICATIONS SERVICES

Below the special/communications services are presented:

Telephone/data
Each floor has a telecom room located to the north. Phone and data is available in every room. Several Wireless Access Points (WAP) are located in the lecture hall, several larger classrooms, and labs.

Fire Alarm
The NBS building is fully sprinkled. Smoke detectors are in all transition spaces, electrical rooms, and telecom rooms. Every room has at least one strobe. The main corridor implements strobes with speakers. Heat detectors are located in the lower mechanical room and penthouse.

CATV
CATV cable runs throughout the building for use in several media displays.

Access Control
Main entrance doors require card access. Access to the building is limited to graduate students and facility in the evening. Each entrance door and some rooms such as storage or lockers have electronic monitoring hardware (ELM) and Request for Exit sensors (RX).

Security
Several CCTV cameras monitor building entrances and public corridors on the ground floor. There is a security guard located at the southern lobby on the ground floor.

Lighting Controls
Lighting is controlled using a variety of protocols. Some spaces use simple 0-10V dimming while others require ELV dimming such as in the lecture all. Master controls are used in large spaces for easy scene control. Occupancy sensors are installed in many offices for energy savings; photocells are utilized in public daylit spaces. Corridor, façade, and decorative lighting are on time-control schemes (drawing E7.1).

Reference Appendix A, drawings E6.4 and E6.5 for lighting control diagrams.

Fire Alarm
Wet stand-pipes in the stairwell supply water to the sprinklers. One 25 HP fire pump on the lower level supplies water through 6" sprinkler lines near the bottom of the building. Towards to the higher floors, the pipe reduces to 4" in diameter. This is possible using a 25HP fire pump. Visual and audible strobes, heat detectors, manual-pull stations, and emergency panels ensure the safety of occupants in the NBS building.

Security/Access Control

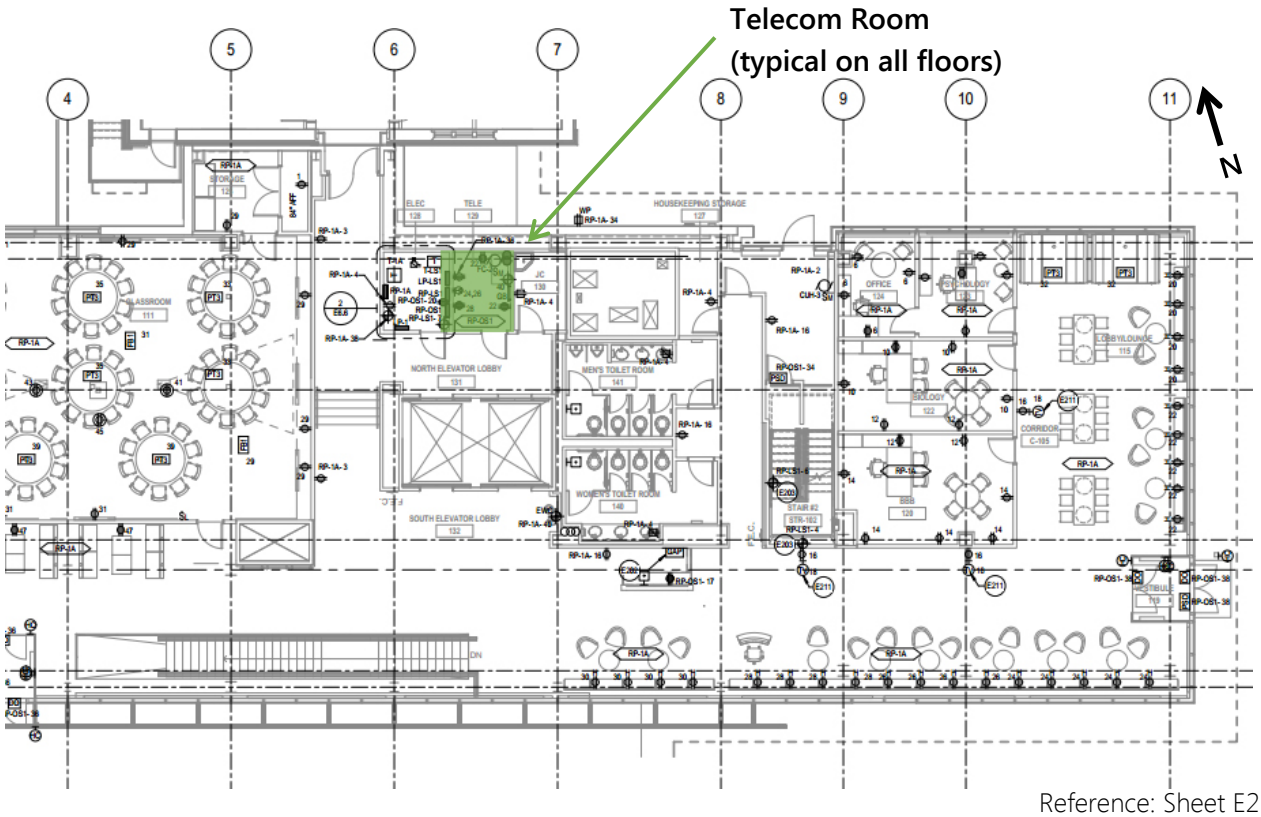
Access control using cards and keypads keep the facility safe from intruders. Major doors have monitoring hardware and request for exit sensors to monitor the flow of traffic in and out of the building. Surveillance cameras with swiveling capabilities monitor major entrances and transition spaces.

Telecommunications and A/V Equipment

78 SF (390 SF (0.5%) across whole building) of each floor is dedicated to a north telecom room. The telecom racks are connected to the existing building to the North and South—lines enter the building on the lower level; lines then travel through risers up the floors. The racks in the telecom rooms are connected to the appropriate panelboards.

A/V equipment includes projectors, televisions, and speakers.

Special Equipment/Communications Plan



Reference: Sheet E2.1

ENERGY EFFICIENT DESIGN

UPenn aims to have the NBS building be LEED Silver certified. In order to do so, lighting is effectively controlled by time-programming, occupancy sensors, and photocell sensors. Daylight is a large part of reduced lighting loads. Load shedding is implemented in the existing electrical design as seen on drawing E5.2 (Appendix A).

The HVAC system is sized to work in tandem with operable windows to optimize thermal comfort through natural ventilation. The building will be powered by 100% green power through Renewable Energy Certificates (RECs) purchased by the university.

PART III EVALUATE AS-DESIGNED SYSTEM + IMPROVEMENTS

SERVICE ENTRANCE SIZE

There are several methods for calculating the electrical load for the NBS building. The first method (square foot method) is a rough approximation; the second method (estimated loads method) is more accurate to the actual design, and the last method (actual equipment loads method) accurately describes the present system.

Receptacles have a 100% demand factor for the first 10kVA then a 50% demand factor for the remaining receptacles. Mechanical loads are assumed to have a 100% demand factor; this changes for the actual design as seen below. Part II utilizes 25 VA/SF load for lab equipment. Large refrigerators, incubators, fume hoods, and other lab equipment justify this load. Major laboratory spaces are on the lower level.

All the phases of design—and consequently, this technical report—are summarized here:

Square Foot Method – Schematic Design
Estimated Loads Method – Design Development
Actual Equipment Loads Method – Construction Documents

PART I | Schematic Design

Table 4: Square Foot Method

Building Type	Area (SF)	VA/SF	kVA
Classroom Building/Lab	77,100	15	1157
		Total KVA	1157
		Load (Amps) @ 408V	1394
		Service Entrance Size	**2000A**

Predicted lighting and mechanical load is 15 VA/SF. This number is based on experience and electrical thesis consultation—primarily due to large HVAC and laboratory equipment and related loads.

PART II | Design Development

Table 5: Estimated Loads Method				
Load Type	Area (SF)	VA/SF	Demand Factor	kVA
Lighting	77,100	3.0	1.0	231
Receptacles	10,000	1.0	1.0	10
Receptacles	67,100	1.0	0.5	67
Mechanical Equipment	77,100	7.0	0.8	432
Lab Equipment	4,500	25.0	0.8	90
Elevators (2)	77,100	1.1	0.95	80
			Total KVA	910
			Load (Amps) @ 408V	1096
			Service Entrance Size	**1500A**

PART III | Construction Documents

Table 6: Actual Equipment Loads Method				
Service Equipment	Load type	Connected Load (VA)	Demand Factor	Demand Load (kVA)
Substation 1A	Elevator	86424	0.95	82.1
	Lighting	3617	1.0	3.6
	Power	2650	1.0	2.7
	Receptacles	12060	0.92	11.1
	Mech. Equipment	371854	0.80	297.5
	Other Equipment	17850	1.0	17.9
Substation 1B	Appliance	3500	1.0	3.5
	Lighting	64787	1.0	64.8
	Power	4350	1.0	4.4
	Receptacles	262420	0.52	136.5
	Mech. Equipment	79430	0.80	63.5
	Other Equipment	120246	1.00	120.2
			Total KVA	807.7
			+20% Growth	969.24
			Load (Amps) @ 408V	1167.8
			Service Entrance Size	**2000A**

Table 7: Summary and Comparison			
Phase	Voltage System	Load (kVA)	Load (Amps)
Schematic Design	480/277V	1157	1394A
Design Development	480/277V	910	1096A
Construction Documents	480/277V	969	1168A

Table 8: Actual Capacity			
Phase	Voltage System	Size (Amps)	Capacity (kVA)
Substation 1A	Medium Voltage	125A	3248
Substation 1B	Medium Voltage	125A	3248
		Total KVA	6496
		Summary VA/SF	84*

*The above service entrance capacity demonstrates two important details: first, the electrical system is conservatively designed and hence, oversized. Secondly, the existing electrical system is very robust and has plenty of redundancy in case something was to occur. Medium voltage used is equal to 13.2kV.

BUILDING UTILIZATION VOLTAGE

The implemented system corresponds to the suggested building utilization voltage. A 480/277V system mitigates voltage drops along long-runs across the building. Lighting is on 277V while some mechanical equipment is powered using 120V and others 480V. This makes the system flexible and reduces wire sizes and power consumption. Special equipment can thus be placed on either system.

EMERGENCY POWER SYSTEM

As it stands, the system is very robust. Large quantities of the lighting and special equipment are powered by the generator through a switchboard. As decided by the owner, special equipment including -80°F freezers, refrigerators, and lab equipment ensures that building productivity is not affected by an emergency.

Smoke detectors, heat sensors, fire alarms, and audible and visual strobes are specified to code. A 500kW generator is sufficient for the emergency loads this building requires.

This effectively meets IBC recommendations and promotes safety.

GENERAL EQUIPMENT

The building utilization voltage is appropriate for the building's equipment and purpose. The choice of indoor electrical equipment is compatible with UPenn's campus. Medium voltage power is used effectively to power the building. Being a lab, special consideration for redundancy and emergency power is warranted.

A double-ended substation, central load bank, and placement of electrical equipment are thus efficient but potentially expensive. As a cost of added redundancy, owner costs are higher than typical campus buildings. This could be warrantied given the purpose of the building and the equipment.

OPTIONAL BACK-UP POWER

As mentioned above, the added costs of a robust system is warrantied at the owner's discretion. Several pieces of equipment and occupant safety calls for a more reliable system. This is reflected in the over-sizing of major electrical equipment.

Higher initial costs means less problems in the future if an emergency were to occur. The owner can maintain productivity and save on equipment costs long term.

SPECIAL/COMMUNICATIONS SYSTEMS

Access control, security, and distributed telecom and data systems are practical. The building is easily operated and guarantees appropriate use of the space. Lighting controls meet ASHRAE 90.1 Standards which provides for an energy efficient space.

IMPROVED COST OF OWNERSHIP

Most notably, a less redundant system would dramatically lower the initial costs and cost of ownership. Having such robust pieces of equipment is expensive and once reduced in size will perhaps still provide enough power. This would inversely mean that less equipment is to be placed on emergency power which could disrupt productivity of the laboratory if power were to go out. A closer study of laboratory equipment is required.

By reducing the substation and feeder sizes and increasing the generator size, critical pieces of equipment can remain operational but one can reduce the cost due to large substations, breakers, panels, and wire. These suggestions require an economical evaluation of product costs and life-cycle trends.

Finally, a monetary evaluation could inform the owner of the advantages and disadvantages of removing the central copper bus duct and instead implementing a more traditional method of electrical distribution. This would be based on wire and conduit size, number of panelboards/distribution panels, breakers, etc.

IMPROVED ENERGY EFFICIENT DESIGN

Currently, the building is designed for LEED Silver. Although good relative to energy efficiency, there is still room for improvement. For one, PV arrays should be considered. Perhaps these could be integral to the southern façade so that the PV arrays receive ample sunlight. Demand shifting is mentioned but not completely apparent in drawings. More focus on demand reduction and demand shifting will help to control peak load.

A more systems-integrated approach could be applied to the whole: this would yield increased energy savings and a more flexible space. Intelligent communication systems between the electrical and mechanical equipment provides opportunities for additional energy savings. BACnet works well with BMS and external lighting control protocols to potentially increase energy savings. A building management system that controls/monitors the whole building including shades, VAV boxes, lighting, etc. will allow the owner to effectively operate the building. This introduces a higher initial cost; evaluation of payback would need to be performed to justify this higher level control system.

Importantly, improved metering and sub-metering (expensive and labor intensive) could provide useful information about the operation of the building. This will allow the owner to monitor energy use throughout the year and later improve the efficiency of the building.

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"Chapter 27- Electrical." *International Code Council*. International Building Code 2009. Web. 9 Oct. 2013. <http://publicecodes.cyberregs.com/icod/ibc/2009/icod_ibc_2009_27_sec002.htm?bu=IC-P-2009-000001&bu2=IC-P-2009-000019>.

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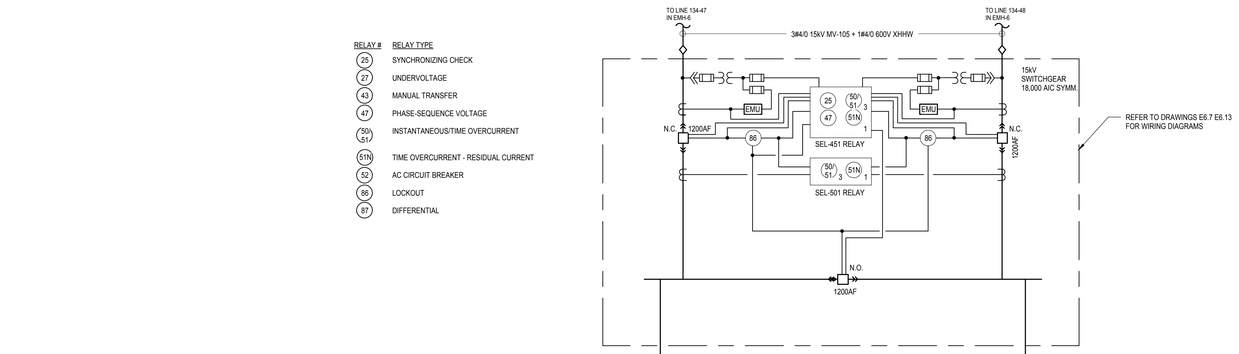
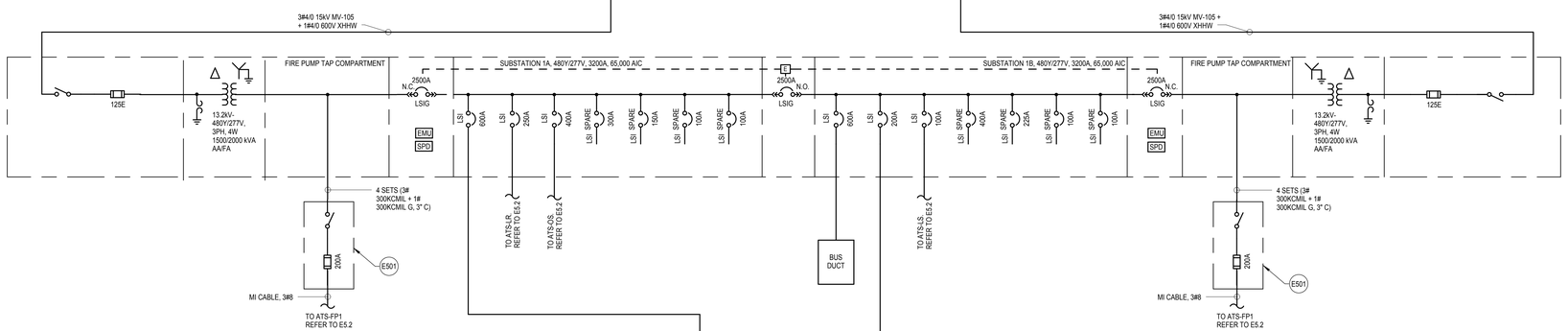
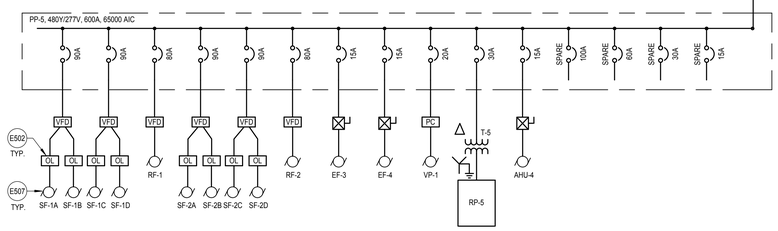
APPENDIX A **ELECTRICAL DRAWINGS**

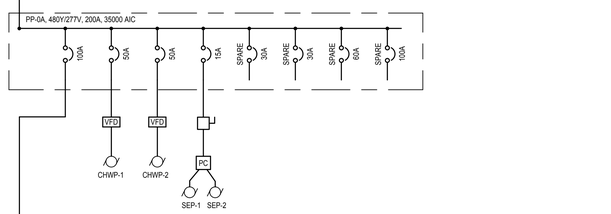
E5.1A | Electrical One-Line Diagram
E5.1B | Electrical Riser Diagram
E5.2 | Emergency Electrical One-Line/Riser Diagram
E5.3 | Electrical Systems Riser Diagram
E5.4 | Fire Alarm Diagrams
E6.1 | Electrical Details
E6.4 | Lighting Control Diagram
E6.5 | Lighting Control Diagram
E7.3 | Lower Level Panelboard Schedules
E7.4 | Ground and Second Level Panelboard Schedules
E7.5 | Third and Forth Level Panelboard Schedules
E7.6 | Penthouse Level Panelboard Schedules

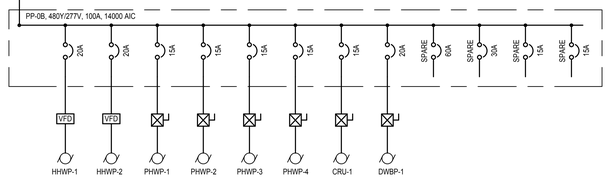
RELAY #	RELAY TYPE
25	SYNCHRONIZING CHECK
27	UNDERVOLTAGE
43	MANUAL TRANSFER
47	PHASE-SEQUENCE VOLTAGE
50/51	INSTANTANEOUS/TIME OVERCURRENT
51N	TIME OVERCURRENT - RESIDUAL CURRENT
52	AC CIRCUIT BREAKER
86	LOCKOUT
87	DIFFERENTIAL











SHEET NOTES

A. REFER TO SHEET E7.2 FOR MOTOR HORSEPOWERS, VFD INPUT CURRENTS, DISCONNECT AND STARTER SIZES, WIRE SIZES, AND CONDUIT SIZES.

KEYED NOTES

E501	PROVIDE FIRE PUMP DISCONNECTING MEANS WHICH COMPLIES WITH NEC 695.4. DISCONNECTING MEANS SHALL BE IDENTIFIED AS SUITABLE FOR USE AS SERVICE EQUIPMENT, LOCKABLE IN THE CLOSED POSITION, AND SHALL BE IDENTIFIED AS "FIRE PUMP DISCONNECTING MEANS" IN LETTERS AT LEAST 1" HIGH. PROVIDE DISCONNECT SWITCH WITH ADEQUATE QUANTITY AND SIZE LUGS TO ACCOMMODATE INCOMING CONDUCTORS.
E502	FOR VFDS CONTROLLING MORE THAN ONE MOTOR, PROVIDE SEPARATE OVERLOAD PROTECTION FOR EACH MOTOR.
E507	REFER TO E7.2 FOR MOTOR HORSEPOWERS AND VFD INPUT CURRENT RATINGS.

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KEYPLAN

DRAWING TITLE

ELECTRICAL ONE-LINE DIAGRAM

SCALE 22668.000

PROJECT NUMBER

E5.1A

DRAWING NUMBER

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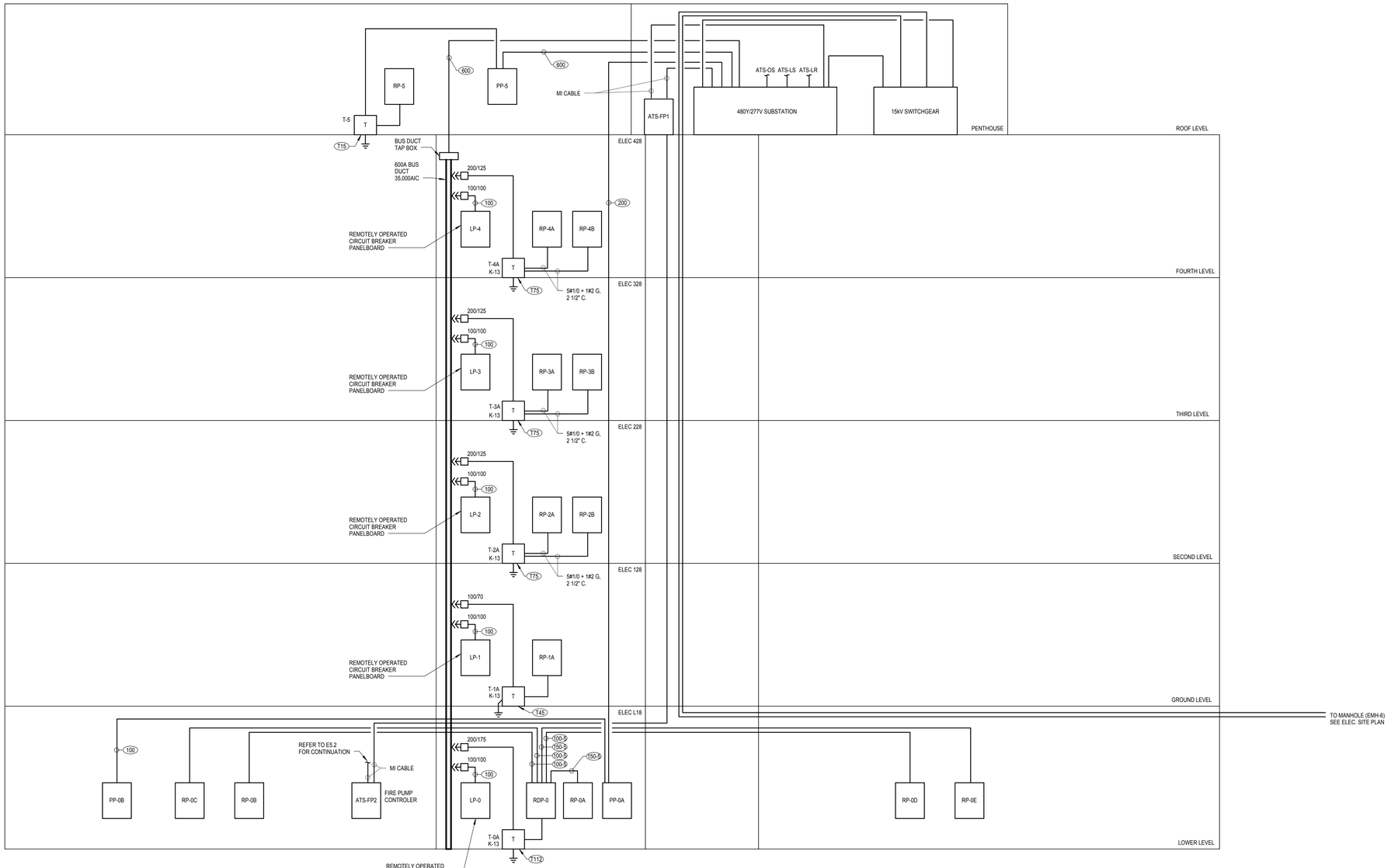

SHEET NOTES

KEYED NOTES

(X) FEEDER SCHEDULE

100	4#2 + 1#8 G, 1 1/2" C
100-5	5#2 + 1#8 G, 1 1/2" C
150-5	5#1/0 + 1#6 G, 2" C
200	4#3/0 + 1#6 G, 2" C
600	2 SETS OF 4#350KCMIL + 1#1 G, (2) 3" C
T15	15KVA TRANSFORMER, 480-208Y/120V, 3PH PRIMARY FEEDER: 3#10 + 1#10 G, 3/4" C SECONDARY FEEDER: 4#4 + 1#8 G, 1 1/4" C BONDING JUMPERS & GROUNDING ELECTRODE CONDUCTOR: #8
T45	45KVA TRANSFORMER, 480-208Y/120V, 3PH PRIMARY FEEDER: 3#4 + 1#8 G, 1" C SECONDARY FEEDER: 5#2/0 + 1#4 G, 2" C BONDING JUMPERS & GROUNDING ELECTRODE CONDUCTOR: #4
T75	75KVA TRANSFORMER, 480-208Y/120V, 3PH PRIMARY FEEDER: 3#1 + 1#6 G, 1 1/2" C SECONDARY FEEDER: 2 SETS OF 5#1/0 + 1#2 G, 2 1/2" C BONDING JUMPERS & GROUNDING ELECTRODE CONDUCTOR: #2
T112	112.5KVA TRANSFORMER, 480-208Y/120V, 3PH PRIMARY FEEDER: 3#2/0 + 1#6 G, 2" C SECONDARY FEEDER: 2 SETS OF 5#3/0 + 1#4 G, (2) 2 1/2" C BONDING JUMPERS & GROUNDING ELECTRODE CONDUCTOR: #1/0

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ELECTRICAL RISER DIAGRAM

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SCALE

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PROJECT NUMBER

E5.1B

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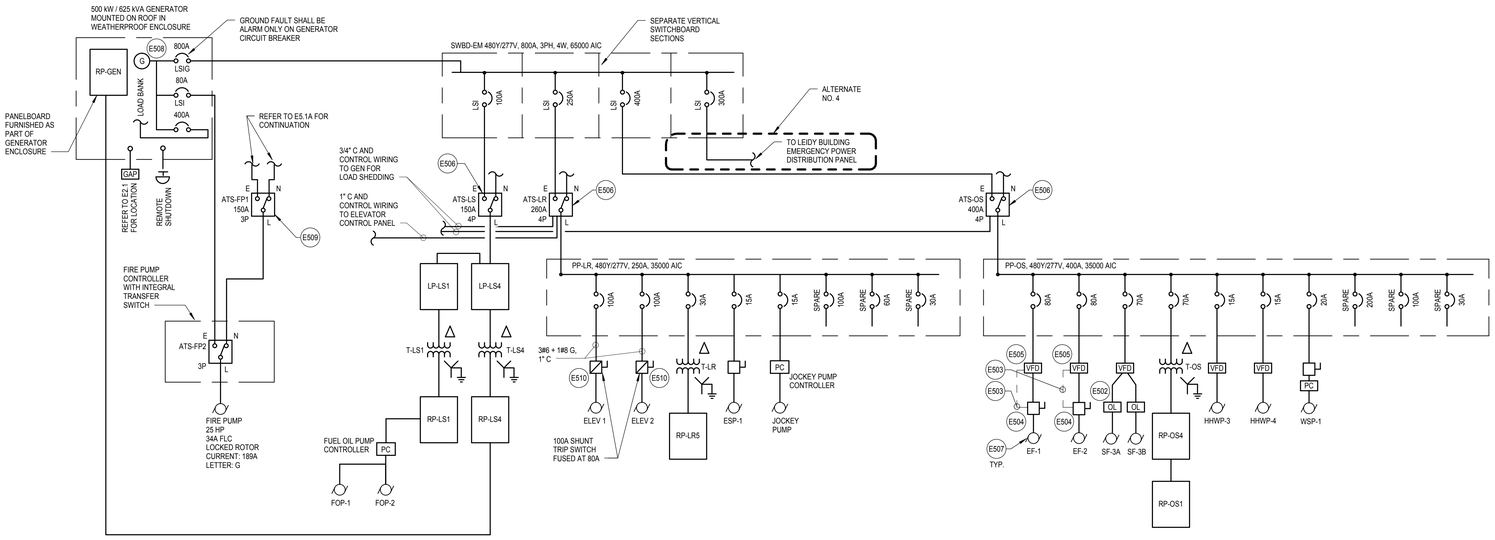

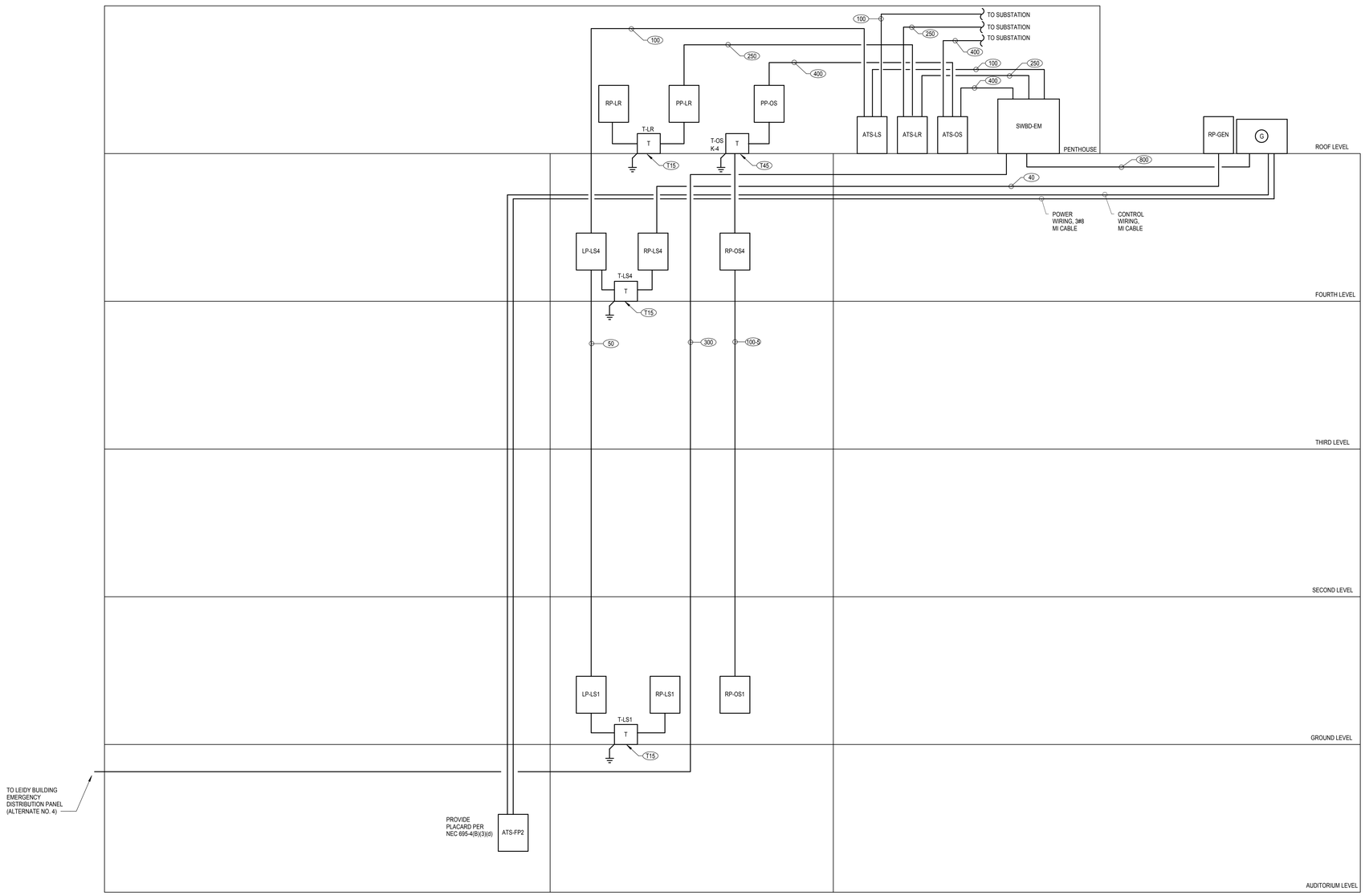

SHEET NOTES

A. REFER TO SHEET E7.2 FOR MOTOR HORSEPOWERS, VFD INPUT CURRENTS, DISCONNECT AND STARTER SIZES, WIRE SIZES, AND CONDUIT SIZES.

KEYED NOTES

E502	FOR VFDS CONTROLLING MORE THAN ONE MOTOR, PROVIDE SEPARATE OVERLOAD PROTECTION FOR EACH MOTOR.
E503	INTERLOCK EXTERIOR DISCONNECT SWITCH TO INTERIOR VFD SUCH THAT VFD CANNOT ENERGIZE LOAD CONDUCTORS WHEN DISCONNECT SWITCH IS IN THE OPEN POSITION.
E504	PROVIDE DISCONNECT SWITCH WITH AUXILLIARY CONTACTS WHICH CHANGE STATE WHEN SWITCH IS OPEN/CLOSED.
E505	PROVIDE LABEL WHICH READS THE FOLLOWING: "FAN MUST BE PROPERLY SHUT DOWN FROM THE VARIABLE FREQUENCY DRIVE LOCATED INSIDE PENTHOUSE BEFORE OPENING THIS DISCONNECT. DO NOT OPEN THIS DISCONNECT WHILE THE FAN IS RUNNING."
E506	PROVIDE BYPASS/ISOLATION TYPE TRANSFER SWITCH WITH MINIMUM 42,000 AIC WITHSTAND/CLOSING RATING.
E507	REFER TO E7.2 FOR MOTOR HORSEPOWERS AND VFD INPUT CURRENT RATINGS.
E508	GENERATOR LOAD SEQUENCE OF OPERATIONS SHALL BE AS FOLLOWS: STEP 1: TRANSFER ALL EMERGENCY LOADS (ATS-LS) AND FIRE PUMP (ATS-FP2) WITHIN 10 SECONDS. STEP 2: TRANSFER ALL LEGALLY REQUIRED LOADS (ATS-LR) WITHIN 30 SECONDS, AND ONLY AFTER SUCCESSFUL TRANSFER OF EMERGENCY LOADS. STEP 3: TRANSFER ALL OPTIONAL STANDBY LOADS (ATS-OS) WITHIN 60 SECONDS, AND ONLY AFTER SUCCESSFUL TRANSFER OF EMERGENCY AND LEGALLY REQUIRED LOADS. PROVIDE ALL CONTROL WIRING AND PROGRAMMING REQUIRED TO ACHIEVE THIS SEQUENCE OF OPERATIONS.
E509	PROVIDE TRANSFER SWITCH WITH MINIMUM 42,000 AIC WITHSTAND/CLOSING RATING. COORDINATE WITH ELEVATOR CONTRACTOR FOR CONTROL CONDUCTORS.
E510	COORDINATE FINAL FUSE SIZE WITH APPROVED ELEVATOR SHOP DRAWINGS.

FEEDER SCHEDULE

40	4#8 + 1#10 G, 1" C
50	4#6 + 1#10 G, 1" C
100	4#2 + 1#8 G, 1 1/2" C
100-5	5#2 + 1#6 G, 1 1/2" C
250	4#250KCMIL + 1#4G, 3"C
300	4#350KCMIL + 1#4 G, 3" C
400	2 SETS OF 4#3/0 + 1#3 G, (2) 2" C
800	3 SETS OF 4#300KCMIL + 1#1/0 G, (3) 3" C
T15	15KVA TRANSFORMER, 480-208Y/120V, 3PH PRIMARY FEEDER: 3#10 + 1#10 G, 3/4" C SECONDARY FEEDER: 4#4 + 1#8 G, 1 1/4" C BONDING JUMPERS & GROUNDING ELECTRODE CONDUCTOR: #8
T45	45KVA TRANSFORMER, 480-208Y/120V, 3PH PRIMARY FEEDER: 3#4 + 1#8 G, 1" C SECONDARY FEEDER: 5#2/0 + 1#4 G, 2" C BONDING JUMPERS & GROUNDING ELECTRODE CONDUCTOR: #4

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EMERGENCY ELECTRICAL ONE-LINE/RISER DIAGRAM

SCALE 22668.000

PROJECT NUMBER

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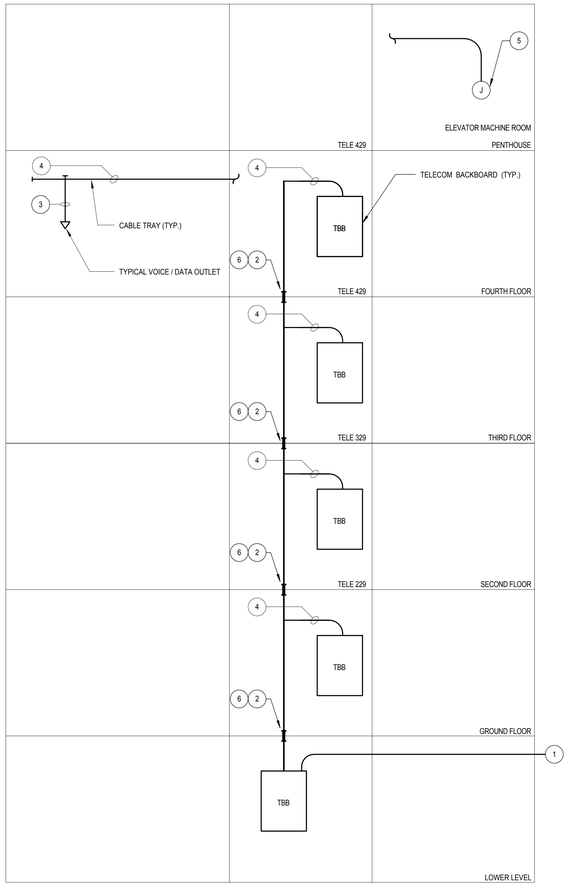

TELECOMMUNICATIONS PATHWAYS RISER DIAGRAM KEYED NOTES:

1. INCOMING SERVICE FROM TELECOMMUNICATIONS DUCTBANK. REFER TO SHEET E1.0 FOR CONTINUATION.
2. 2 -4" SLEEVES STUBBED UP 1" (MIN.) AFF.
3. CONDUIT FROM OUTLET
4. CABLING PROVIDED BY OWNER.
5. JUNCTION BOX FOR ELEVATOR TELEPHONE TYPICAL FOR EACH ELEVATOR.
6. FIRESTOP ALL OPENINGS AFTER CABLE INSTALLATION.

4 TELECOMMUNICATIONS PATHWAYS RISER DIAGRAM
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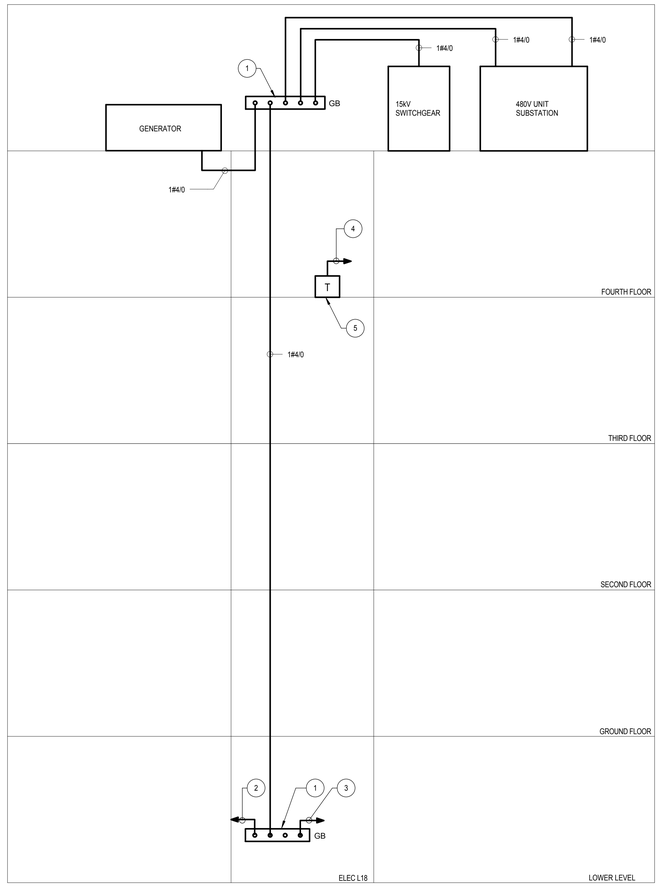
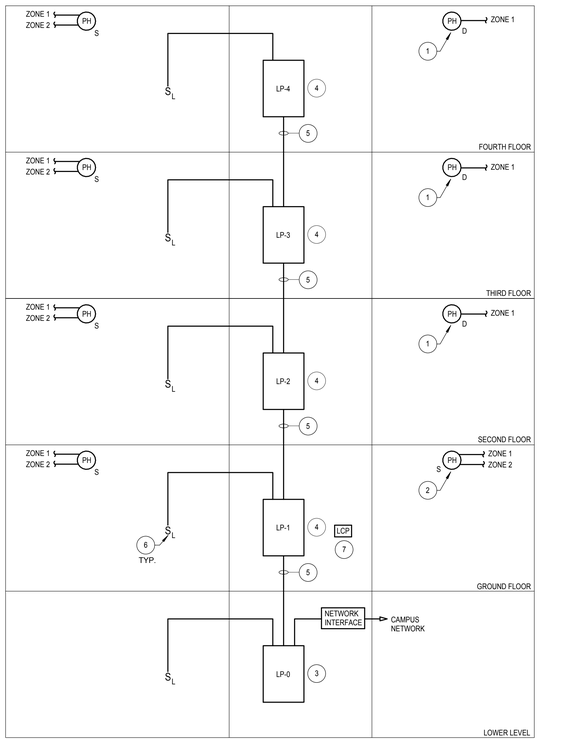


POWER SYSTEM GROUNDING GENERAL NOTES:

A. ALL CONDUCTORS SHALL BE INSULATED COPPER.

POWER SYSTEM GROUNDING KEYED NOTES:

1. GROUNDING BUSBAR (TMGB) WITH A MINIMUM OF 16 GROUND LUGS. 4" X 1/4" X 4'-0" ELECTRO-TIN PLATED COPPER BUS ON 2" ISOLATED STANDOFFS, MOUNTED AT 36" AFF. REFER TO GROUND BUS DETAIL ON DRAWING E6.1.
2. GROUNDING AND BONDING CONNECTIONS TO GROUNDING ELECTRODES AND PIPES. REFER TO DETAIL #2 ON SHEET E6.1.
3. 1#4/0 INSULATED COPPER CONDUCTOR TO MAIN TELECOMMUNICATIONS GROUNDING BUSBAR IN TELE L19.
4. PROVIDE GROUNDING ELECTRODE CONDUCTOR TO NEAREST STEEL COLUMN PER NEC ARTICLE 250. REFER TO E5 SERIES FOR GROUNDING ELECTRODE CONDUCTOR SIZES FOR INDIVIDUAL TRANSFORMERS.
5. TYPICAL 480-208Y/120V STEP DOWN TRANSFORMER. REFER TO FLOOR PLANS AND ONE-LINE DIAGRAM FOR ACTUAL QUANTITY, LOCATION, AND SIZE OF TRANSFORMERS.



GENERAL NOTES:

A. REFER TO SPECIFICATION SECTIONS 260923 AND 262416.16 FOR ADDITIONAL INFORMATION & REQUIREMENTS.

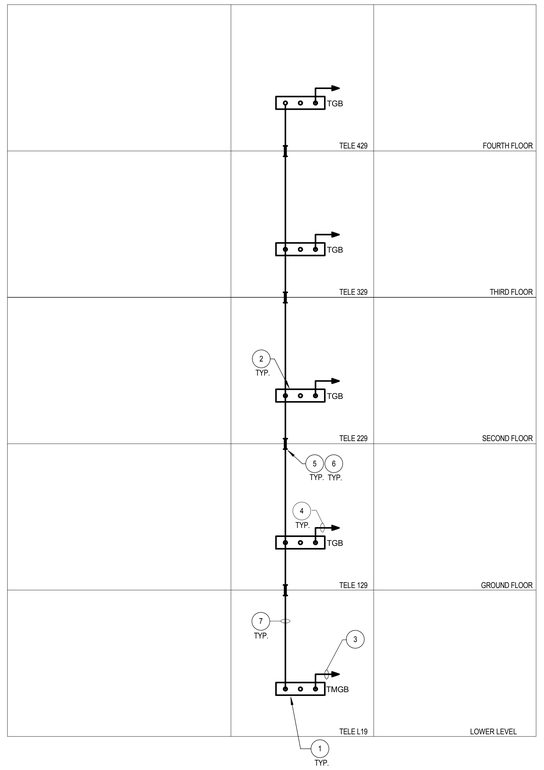
B. REFER TO LIGHTING CONTROL DIAGRAMS ON E6 SERIES FOR DESIGN INTENT FOR PHOTOCELLS WHICH CONTROL EMERGENCY LIGHT FIXTURES.

LIGHTING CONTROL RISER KEYED NOTES:

1. 0-10V DIMMING PHOTOCELL. REFER TO LIGHTING PLANS FOR ACTUAL PHOTOCELL QUANTITY AND ZONES CONTROLLED BY PHOTOCELLS.
2. DUAL ZONE ON/OFF LOW VOLTAGE PHOTOCELL. REFER TO LIGHTING PLANS FOR ACTUAL PHOTOCELL QUANTITY AND ZONES CONTROLLED FROM PHOTOCELLS.
3. LIGHTING PANELBOARD WITH MASTER CONTROLLER, ONE NORMAL BUS, AND ONE BREAKER CONTROL BUS.
4. LIGHTING PANELBOARD WITH ONE NORMAL BUS AND ONE BREAKER CONTROL BUS.
5. COMMUNICATIONS WIRING BETWEEN PANELBOARDS. REFER TO MANUFACTURER'S WIRING DIAGRAMS.
6. TYPICAL LOW VOLTAGE CONTROL STATION. REFER TO FLOOR PLANS & LTG CONTROL SCHEDULE FOR ACTUAL QUANTITY AND CONTROL ZONES.
7. CRESTRON iLUX 6 ZONE MODULAR DIMMING CONTROLLER FOR CONTROLLING EXTERIOR FACADE LIGHTING. REFER TO WIRING DIAGRAM ON SHEET E6.4.

3 LIGHTING CONTROL RISER DIAGRAM
SCALE: 12" = 1'-0"

2 POWER SYSTEM GROUNDING DIAGRAM
SCALE: 12" = 1'-0"



TELECOM GROUNDING KEYED NOTES:

1. TELECOMMUNICATIONS MAIN GROUND BUSBAR (TMGB) WITH A MINIMUM OF 16 GROUND LUGS. 4" X 1/4" X 4'-0" ELECTRO-TIN PLATED COPPER BUS ON 2" ISOLATED STANDOFFS, MOUNTED AT 36" AFF. REFER TO GROUND BUS DETAIL ON DRAWING E6.1.
2. TELECOMMUNICATIONS GROUNDING BUSBAR (TMGB) WITH A MINIMUM OF 8 GROUND LUGS 4" X 1/4" X 2'-0" ELECTRO TIN PLATED COPPER BUS ON 2" ISOLATED STANDOFFS, MOUNTED AT 24" AFF (TYP.). REFER TO GROUND BUS DETAIL ON DRAWING E6.1.
3. 1#4/0 AWG INSULATED COPPER CONDUCTOR TO MAIN ELECTRICAL GROUND BUS IN ELEC L18.
4. 1#6 AWG INSULATED COPPER CONDUCTOR TO DATA RACK PANEL GROUNDING BUSBAR. TERMINATE AT GROUND LUG.
5. PROVIDE DEDICATED 1 1/2" SLEEVE OPENING AT ALL PENETRATIONS FOR GROUNDING CONDUCTORS (TYP.).
6. FIRE STOP ALL PENETRATIONS (TYP.).
7. 1#4/0 AWG INSULATED COPPER CONDUCTOR.

1 TELECOMMUNICATIONS GROUNDING DIAGRAM
SCALE: 12" = 1'-0"

Plot Date: 7/16/2013 7:59:25 AM

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SEALS AND SIGNATURES

KEYPLAN

DRAWING TITLE

ELECTRICAL SYSTEMS RISER DIAGRAMS

SCALE 22668.000

PROJECT NUMBER

E5.3

DRAWING NUMBER

HEAT DETECTOR IN HOISTWAY	SMOKE DETECTOR IN HOISTWAY	WATER FLOW SWITCH ELEV. MACHINE ROOM	VALVE SUPERVISORY TAMPER SWITCH	WATER FLOW SWITCH	SUPPLY DUCT SMOKE DETECTOR	RETURN DUCT SMOKE DETECTOR	HEAT DETECTOR IN ELEV. MACHINE ROOM	SMOKE DETECTOR IN ANY SECONDARY ELEV. LOBBY	SMOKE DETECTOR IN PRIMARY ELEV. LOBBY	SMOKE DETECTOR IN ELEV. MACHINE ROOM	SPACE SMOKE DETECTOR	MANUAL PULL STATION	INITIATING DEVICE / ACTION INITIATED
X	X	X		X	X	X	X	X	X	X	X	X	INITIATES GENERAL ALARM THROUGHOUT THE BUILDING. VISUAL ALARM BY STROBES, AUDIBLE ALARM BY SPEAKERS.
A	A	A	T	A	A	A	A	A	A	A	A	A	ANNUNCIATES AT FACP AND REMOTE ANNUNCIATOR PANELS, CAMPUS OPERATIONS CONTROL CENTER (OCC) AND PENNCOMM MONITORING SYSTEM (4040 CHESTNUT).
	X							X		X			PROVIDES RELAY CONTACT CLOSURE TO ELEV. CONTROLLER TO INITIATE FIRE FIGHTERS SERVICE, SENDS CAR(S) TO PRIMARY LEVEL
									X				PROVIDES RELAY CONTACT CLOSURE TO ELEV. CONTROLLER TO INITIATE FIRE FIGHTERS SERVICE, SENDS CAR(S) TO ALTERNATE LEVEL
				X	X	X		X	X	X	X		INTERRUPTS POWER VIA RELAY CONTACTS TO RELEASE ELECTRICALLY LOCKED DOORS
				X	X	X		X	X		X		INTERRUPTS POWER VIA RELAY CONTACTS TO RELEASE MAGNETICALLY HELD DOORS
					X	X							STOPS RESPECTIVE SUPPLY FAN AND RETURN FAN
	X									X			PROVIDES RELAY CONTACT CLOSURE TO ELEVATOR CONTROLLER TO INITIATE RECALL
X		X					X						PROVIDES RELAY CONTACT CLOSURE TO SHUNT-TRIP SWITCH TO SHUT OFF POWER TO RESPECTIVE ELEVATOR EQUIPMENT

NOTE

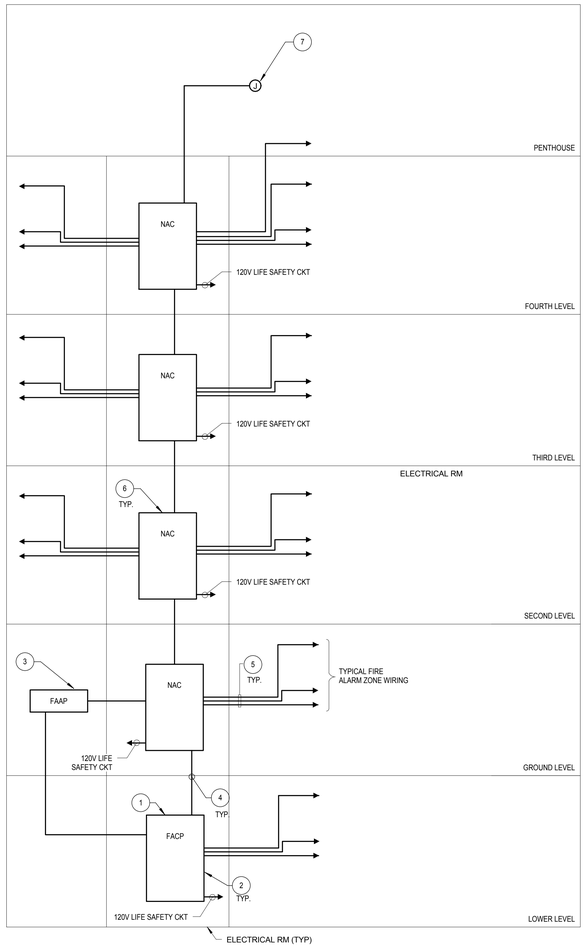
1. THE FIRE ALARM SYSTEM FUNCTIONAL MATRIX PROVIDES FUNCTIONAL REQUIREMENTS OF THE SYSTEM FOR TYPICAL INITIATING DEVICES AND THE RELATED ACTION(S) INITIATED. REFER TO SPECIFICATION SECTION 28 31 00 FOR ADDITIONAL FUNCTIONAL AND PERFORMANCE REQUIREMENTS.
2. REFER TO DOOR HARDWARE SCHEDULE FOR DOORS WHICH REQUIRE CONNECTION TO FIRE ALARM SYSTEM.

LEGEND

X = FUNCTION INITIATED
A = ALARM ANNUNCIATION
T = TROUBLE ANNUNCIATION

2 FIRE ALARM SYSTEM FUNCTIONAL MATRIX

SCALE: NO SCALE

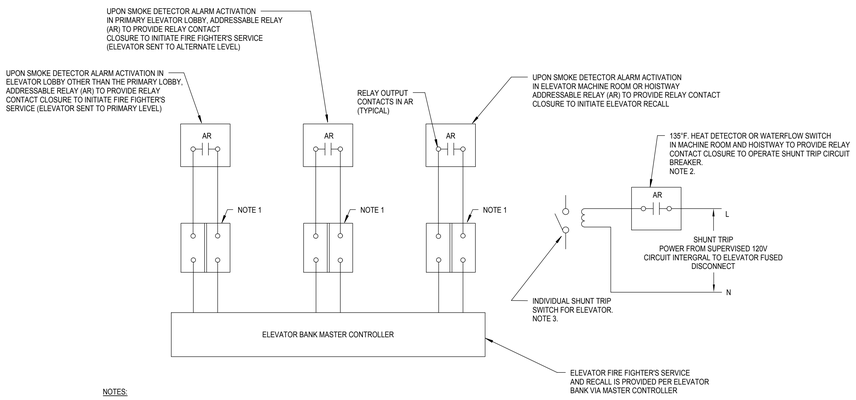


1 FIRE ALARM RISER DIAGRAM

SCALE: NO SCALE

KEYED NOTES:
FIRE ALARM RISER DIAGRAM

1. FIRE ALARM CONTROL PANEL (FACP).
2. FIRE ALARM NAC PANEL OR JUNCTION BOX.
3. REMOTE FIRE ALARM ANNUNICATOR PANEL.
4. FIRE ALARM VERTICAL RISER WIRING IS TO BE ROUTED BETWEEN THE ELECTRICAL ROOMS VIA CONDUIT AND JUNCTION BOXES. WIRING FOR WATER FLOW SWITCHES, AND SUPERVISORY SWITCHES MAY BE ROUTED WITHIN THE STAIRS SERVED.
5. FIRE ALARM HORIZONTAL WIRING IS TO BE ROUTED IN CONDUIT.
6. FIRE ALARM JUNCTION BOX OR NAC PANELS ARE TO BE LOCATED IN ELECTRICAL ROOMS FOR DISTRIBUTION OF VERTICAL AND HORIZONTAL FIRE ALARM WIRING. REFER TO TYPICAL FIRE ALARM ZONE WIRING AND DEVICE CONNECTIONS.
7. JUNCTION BOX FOR CONNECTION TO FIRE ALARM SPEAKER IN ELEVATOR CARS.

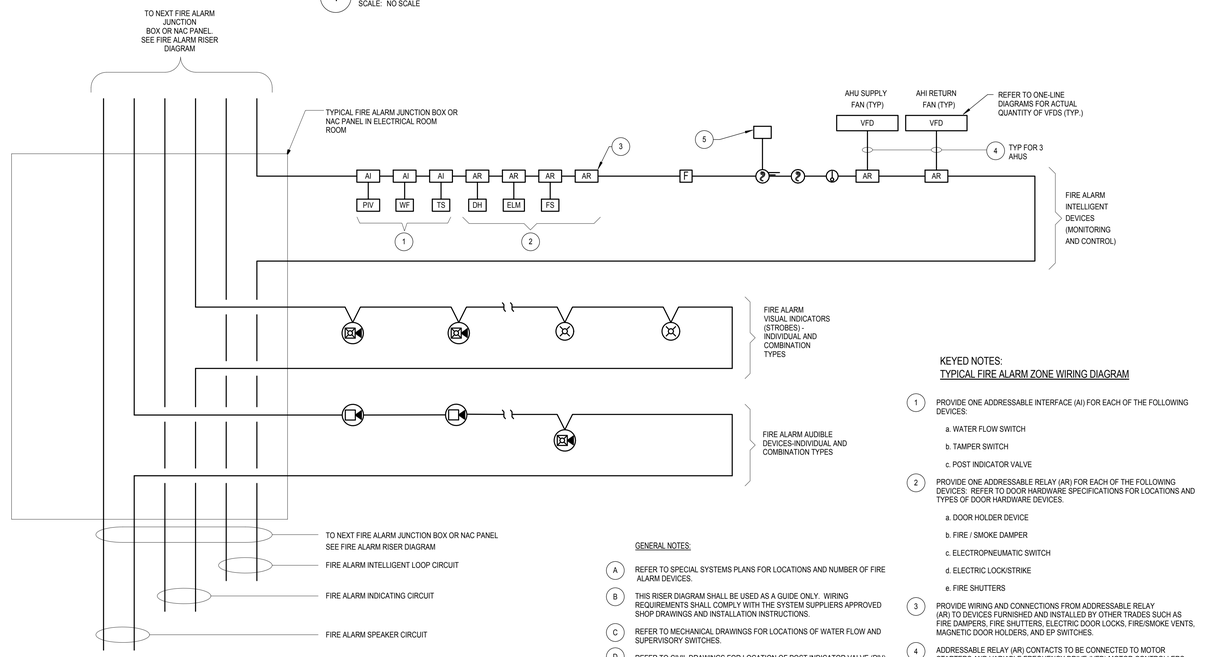


NOTES:

1. JUNCTION BOX WITH TERMINAL STRIP AT ELEVATOR BANK MASTER CONTROLLER OR WHERE REQUIRED BY ELEVATOR TRADES TO INITIATE FIRE FIGHTER'S SERVICE AND RECALL FUNCTIONS.
2. PROVIDE ADDITIONAL RELAY WITH NECESSARY RATINGS IF CURRENT DRAW OF SHUNT TRIP OPERATOR OR ELEVATOR SYSTEM SWITCHING REQUIREMENTS EXCEED CONTACT RATING OF AR.
3. WIRE SHUNT TRIP SWITCH PER MANUFACTURER'S INSTALLATION INSTRUCTIONS.

4 ELEVATOR/FIRE ALARM INTERFACE AND POWER SHUT-DOWN DIAGRAM

SCALE: NO SCALE



3 TYPICAL FIRE ALARM ZONE WIRING DIAGRAM

SCALE: NO SCALE

GENERAL NOTES:

A. REFER TO SPECIAL SYSTEMS PLANS FOR LOCATIONS AND NUMBER OF FIRE ALARM DEVICES.
B. THIS RISER DIAGRAM SHALL BE USED AS A GUIDE ONLY. WIRING REQUIREMENTS SHALL COMPLY WITH THE SYSTEM SUPPLIERS APPROVED SHOP DRAWINGS AND INSTALLATION INSTRUCTIONS.
C. REFER TO MECHANICAL DRAWINGS FOR LOCATIONS OF WATER FLOW AND SUPERVISORY SWITCHES.
D. REFER TO CIVIL DRAWINGS FOR LOCATION OF POST INDICATOR VALVE (PIV).

KEYED NOTES:
TYPICAL FIRE ALARM ZONE WIRING DIAGRAM

1. PROVIDE ONE ADDRESSABLE INTERFACE (AI) FOR EACH OF THE FOLLOWING DEVICES:
   a. WATER FLOW SWITCH
   b. TAMPER SWITCH
   c. POST INDICATOR VALVE
2. PROVIDE ONE ADDRESSABLE RELAY (AR) FOR EACH OF THE FOLLOWING DEVICES: REFER TO DOOR HARDWARE SPECIFICATIONS FOR LOCATIONS AND TYPES OF DOOR HARDWARE DEVICES.
   a. DOOR HOLDER DEVICE
   b. FIRE / SMOKE DAMPER
   c. ELECTROPNEUMATIC SWITCH
   d. ELECTRIC LOCK/STRIKE
   e. FIRE SHUTTERS
3. PROVIDE WIRING AND CONNECTIONS FROM ADDRESSABLE RELAY (AR) TO DEVICES FURNISHED AND INSTALLED BY OTHER TRADES SUCH AS FIRE DAMPERS, FIRE SHUTTERS, ELECTRIC DOOR LOCKS, FIRE/SMOKE VENTS, MAGNETIC DOOR HOLDERS, AND EP SWITCHES.
4. ADDRESSABLE RELAY (AR) CONTACTS TO BE CONNECTED TO MOTOR STARTERS AND VARIABLE FREQUENCY DRIVE (VFD) MOTOR CONTROLLERS FOR SUPPLY AND RETURN FANS IN RESPECTIVE AIR HANDLING UNITS.
5. PROVIDE REMOTE VISUAL INDICATOR FOR EACH DUCT SMOKE DETECTOR. LOCATE INDICATOR IN RESPECTIVE MECHANICAL ROOM OR RECESSED IN CORRIDOR CEILING TILE. COORDINATE WITH OTHER TRADES TO AVOID ANY INTERFERANCES

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SEALS AND SIGNATURES

KEYPLAN

DRAWING TITLE

FIRE ALARM DIAGRAMS

SCALE: As indicated

PROJECT NUMBER: 22668.000

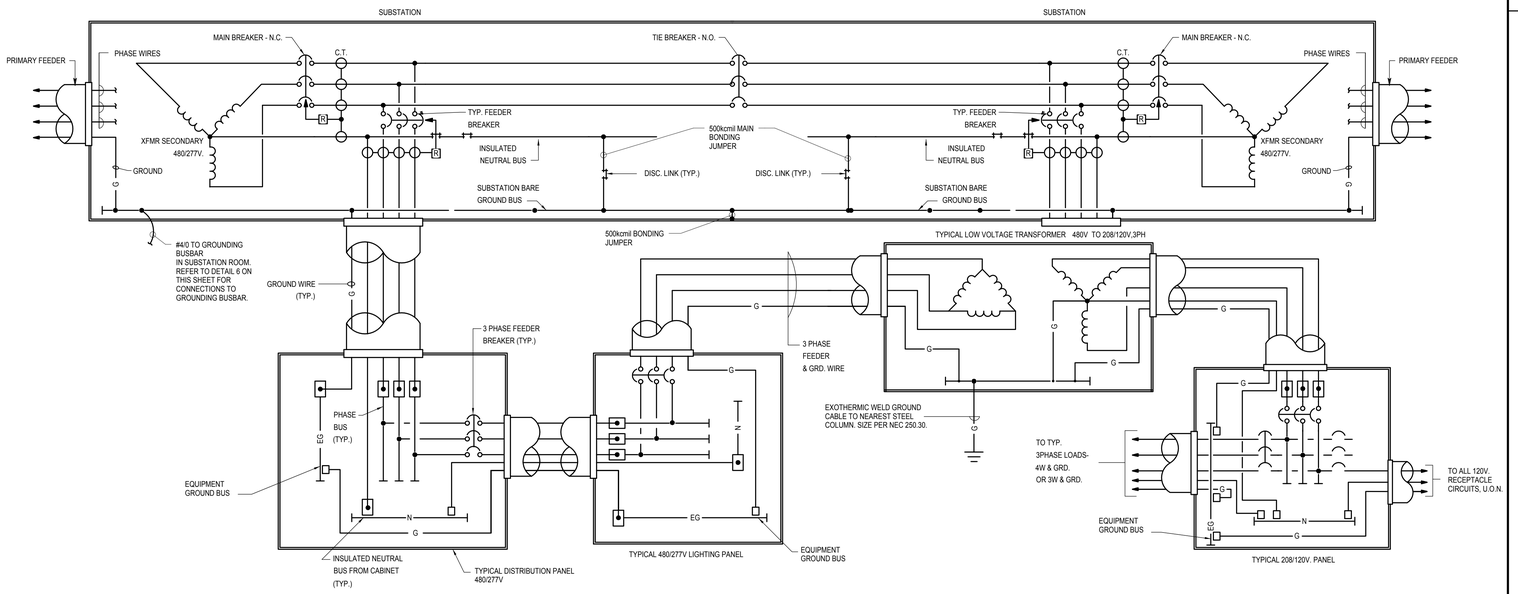
DRAWING NUMBER: E5.4

Plot Date: 7/16/2013 7:59:29 AM

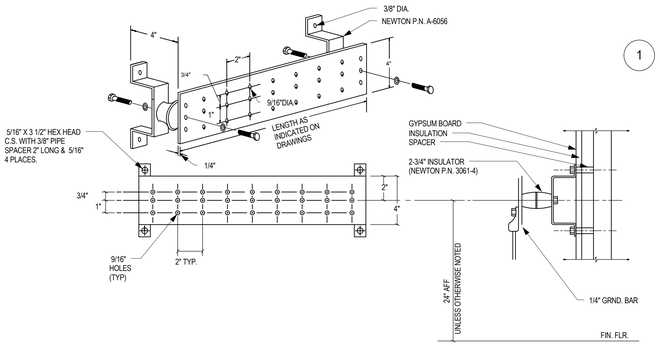
ELECTRICAL SYSTEM GROUNDING SCHEME

NOTES:

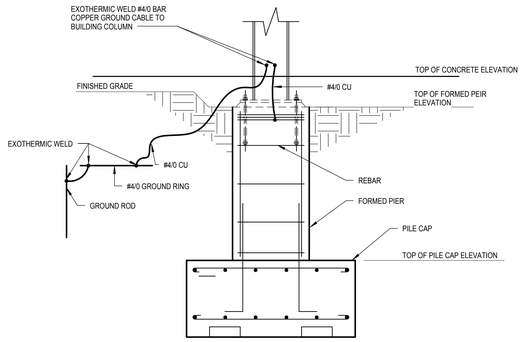
1. THIS DIAGRAM IS FOR BASIC GROUNDING DESIGN INTENT AND DOES NOT NECESSARILY REFLECT ALL CONDITIONS FOR POWER DISTRIBUTION ON THIS PROJECT. FOR POWER DISTRIBUTION DESIGN REFER TO ONE-LINE AND RISER DIAGRAM, E5 DRAWING SERIES. FOR ADDITIONAL GROUNDING REQUIREMENTS SEE TELECOMMUNICATIONS GROUNDING RISER DIAGRAM DRAWING E5.3.
2. FEEDER CONSISTING OF INSULATED PHASE, NEUTRAL AND GREEN INSULATED GROUNDING CONDUCTORS INSTALLED IN A COMMON CONDUIT.
3. BOND METAL WATER PIPING AND OTHER INTERIOR METAL PIPING THAT MAY BECOME ENERGIZED TO GROUNDING SYSTEM PER NEC.



1 ELECTRICAL SYSTEM GROUNDING SCHEME
SCALE: NO SCALE

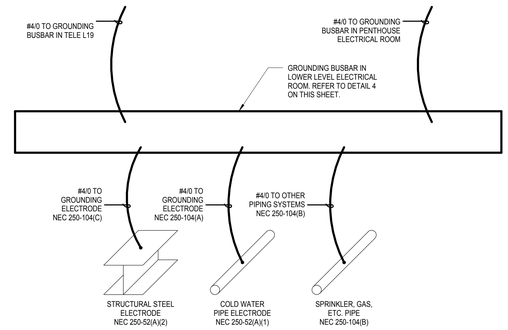


4 GROUNDING BUSBAR DETAIL
SCALE: NO SCALE



NOTE: REFER TO E1.1 FOR LOCATIONS OF COLUMNS TO BE CONNECTED TO GROUND RING

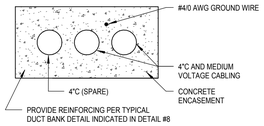
3 COLUMN GROUNDING
SCALE: NO SCALE



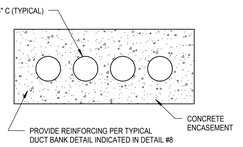
GENERAL NOTES - GROUNDING DETAIL:

1. ALL CONDUCTORS SHALL BE STRANDED COPPER WITH GREEN INSULATION UON.
2. NEC REFERENCES ARE FROM 2008 NATIONAL ELECTRICAL CODE.

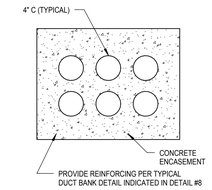
2 GROUNDING BUSBAR CONNECTIONS
SCALE: NO SCALE



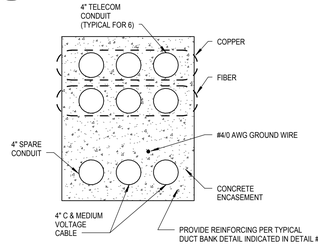
6 MEDIUM VOLTAGE DUCT BANK DETAIL
SCALE: N.T.S.



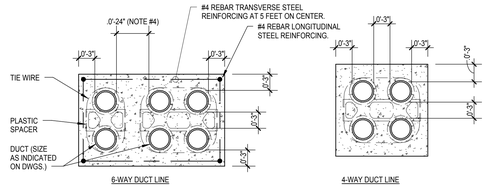
7 TELECOMMUNICATIONS DUCT BANK DETAIL
SCALE: N.T.S.



11 TELECOMMUNICATIONS DUCT BANK DETAIL
SCALE: N.T.S.



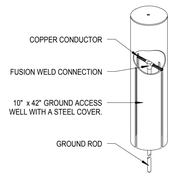
12 COMBINED MEDIUM VOLTAGE AND TELECOMMUNICATONS DUCK BANK
SCALE: N.T.S.



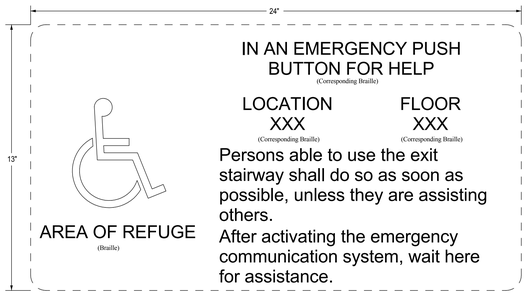
DUCT BANK NOTES:

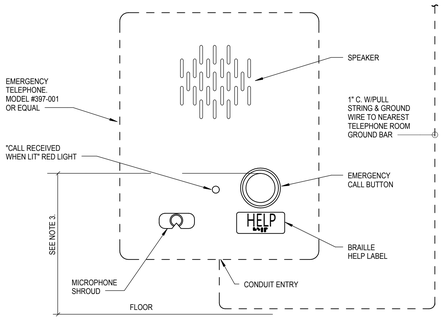
1. CONCRETE SHALL BE 2000 P.S.I. @ 28 DAYS, OR AS SPECIFIED.
2. PROVIDE REINFORCING WHEN CROSSING OR PLACED IN ROADWAYS.
3. DETAILS ARE APPLICABLE TO ALL ELECTRICAL AND TELECOMMUNICATIONS DUCT BANKS.
4. REFER TO DUCT BANK DETAILS FOR SPECIFIC CONDUIT REQUIREMENTS.
5. BURIAL DEPTH TO TOP OF DUCT BANK SHALL BE 36".

8 TYPICAL DUCT BANK DETAILS
SCALE: N.T.S.



5 GROUND TEST WELL
SCALE: NONE





NOTES

1. EMERGENCY TELEPHONE MANUFACTURED BY GAI-TRONICS CORP., MODEL 397-001 OR EQUAL. TELEPHONE CABLE FURNISHED AND INSTALLED BY ISC.
2. TELEPHONE SHALL BE 10" TALL X 8.5" WIDE X 2.5" DEEP AND INCLUDE A FLUSH MOUNT BACK BOX.
3. MOUNT TELEPHONE SO TOP OF RED EMERGENCY CALL BUTTON IS CLOSE TO BUT NO MORE THAN 48" AFF.
4. PROVIDE #12 AWG GREEN INSULATED GROUND WIRE FROM THE TELEPHONE INTERNAL GROUND TERMINAL, THROUGH THE TELECOM CONDUIT, TO THE TELECOM ROOM GROUND BAR.
5. PROVIDE 24" WIDE X 13" TALL LAMINATED PLASTIC SIGN WITH BLACK TEXT AND GRAPHIC ON WHITE BACKGROUND AS SHOWN. TEXT SHALL COMPLY WITH ADA SECTION 703.3. MOUNT SIGN IN COMPLIANCE WITH ADA SECTION 703.5.5 AND 703.5.6 SO BASELINE OF CHARACTERS IS A MINIMUM OF 40" AFF.
6. UNIVERSITY OF PENNSYLVANIA PROJECT MANAGER SHALL ARRANGE FOR ISC TO CONNECT TELEPHONE TO TELEPHONE IN PUBLIC SAFETY COMMAND CENTER.

9 TWO WAY COMMUNICATION
SCALE: NONE

Plot Date: 7/16/2013 7:59:40 AM

ROOM LEGEND

KEYED NOTES

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KEYPLAN

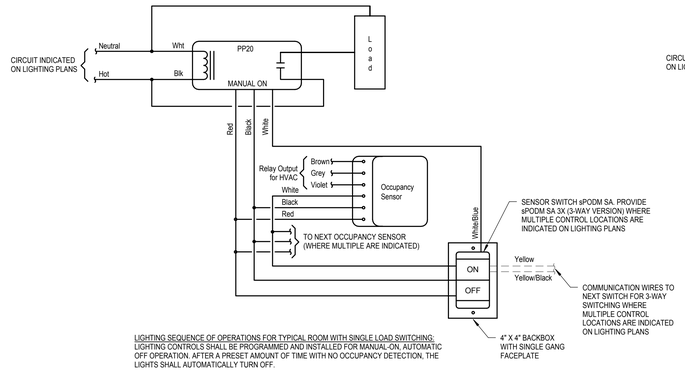
DRAWING TITLE
ELECTRICAL DETAILS

SCALE
22668.000

PROJECT NUMBER

E6.1

DRAWING NUMBER

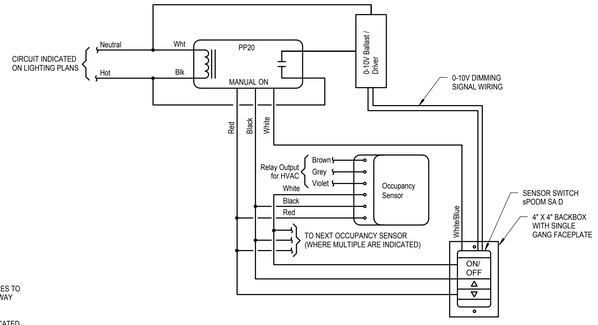


LIGHTING SEQUENCE OF OPERATIONS FOR TYPICAL ROOM WITH SINGLE LOAD SWITCHING:
LIGHTING CONTROLS SHALL BE PROGRAMMED AND INSTALLED FOR MANUAL-ON, AUTOMATIC OFF OPERATION. AFTER A PRESET AMOUNT OF TIME WITH NO OCCUPANCY DETECTION, THE LIGHTS SHALL AUTOMATICALLY TURN OFF.

NOTE 1: WIRING DIAGRAM BASED ON SENSOR SWITCH PRODUCTS.

NOTE2 :DIAGRAM SHOWN TO INDICATE INTENT ONLY. REFER TO MANUFACTURER'S WIRING DIAGRAMS FOR INSTALLATION.

1 OCCPUANCY SENSOR WIRING DIAGRAM - SINGLE LOAD, MANUAL ON
SCALE: NO SCALE

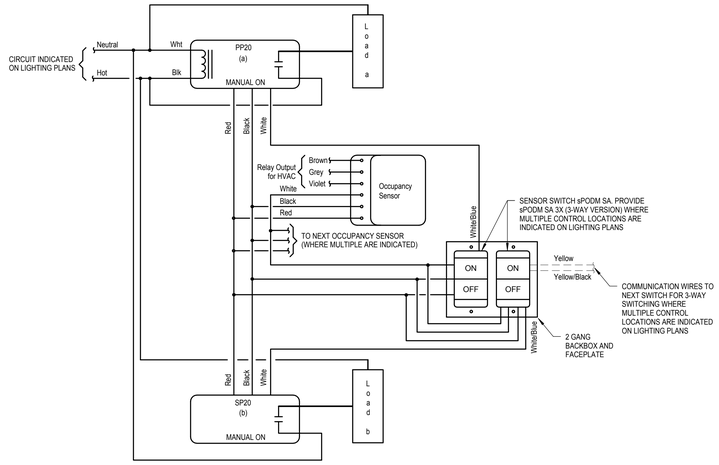


LIGHTING SEQUENCE OF OPERATIONS FOR TYPICAL ROOM WITH SINGLE LOAD DIMMING:
LIGHTING CONTROLS SHALL BE PROGRAMMED AND INSTALLED FOR MANUAL-ON, AUTOMATIC OFF OPERATION. PRESSING THE UP/DOWN ARROWS SHALL SMOOTHLY DIM THE LOAD. AFTER A PRESET AMOUNT OF TIME WITH NO OCCUPANCY DETECTION, THE LIGHTS SHALL AUTOMATICALLY TURN OFF.

NOTE 1: WIRING DIAGRAM BASED ON SENSOR SWITCH PRODUCTS.

NOTE2 : DIAGRAM SHOWN TO INDICATE INTENT ONLY. REFER TO MANUFACTURER'S WIRING DIAGRAMS FOR INSTALLATION.

2 OCCPUANCY SENSOR WIRING DIAGRAM - SINGLE LOAD DIMMING, MANUAL ON
SCALE: NO SCALE

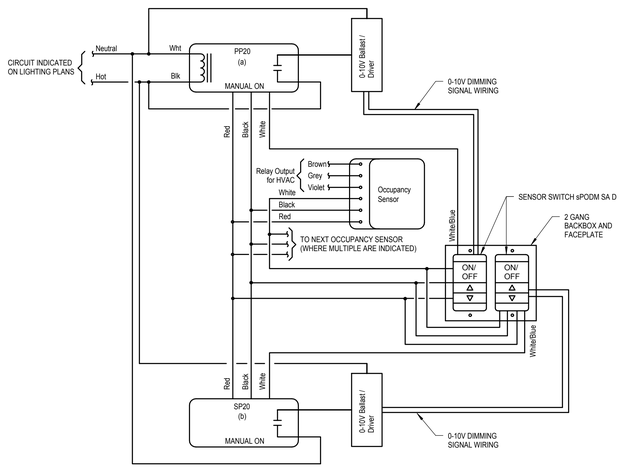


LIGHTING SEQUENCE OF OPERATIONS FOR TYPICAL ROOM WITH DUAL LEVEL SWITCHING:
LIGHTING CONTROLS SHALL BE PROGRAMMED AND INSTALLED FOR MANUAL-ON, AUTOMATIC OFF OPERATION. AFTER A PRESET AMOUNT OF TIME WITH NO OCCUPANCY DETECTION, THE LIGHTS SHALL AUTOMATICALLY TURN OFF.

NOTE 1: WIRING DIAGRAM BASED ON SENSOR SWITCH PRODUCTS.

NOTE2 :DIAGRAM SHOWN TO INDICATE INTENT ONLY. REFER TO MANUFACTURER'S WIRING DIAGRAMS FOR INSTALLATION.

3 OCCPUANCY SENSOR WIRING DIAGRAM - DUAL LEVEL, MANUAL ON
SCALE: NO SCALE

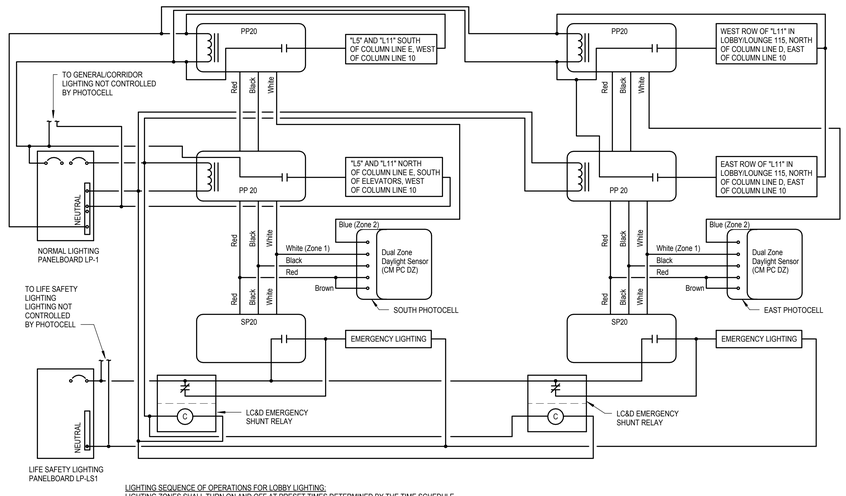


LIGHTING SEQUENCE OF OPERATIONS FOR TYPICAL ROOM WITH DUAL LOAD DIMMING:
LIGHTING CONTROLS SHALL BE PROGRAMMED AND INSTALLED FOR MANUAL-ON, AUTOMATIC OFF OPERATION. PRESSING THE RAISE/LOWER BUTTONS SHALL SMOOTHLY DIM THE LOAD. AFTER A PRESET AMOUNT OF TIME WITH NO OCCUPANCY DETECTION, THE LIGHTS SHALL AUTOMATICALLY TURN OFF.

NOTE 1: WIRING DIAGRAM BASED ON SENSOR SWITCH PRODUCTS.

NOTE2 : DIAGRAM SHOWN TO INDICATE INTENT ONLY. REFER TO MANUFACTURER'S WIRING DIAGRAMS FOR INSTALLATION.

4 OCCPUANCY SENSOR WIRING DIAGRAM - DUAL DIMMING, MANUAL ON
SCALE: NO SCALE

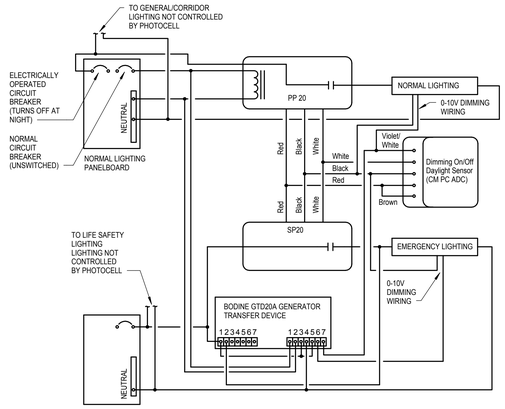


LIGHTING SEQUENCE OF OPERATIONS FOR LOBBY LIGHTING:
LIGHTING ZONES SHALL TURN ON AND OFF AT PRESET TIMES DETERMINED BY THE TIME SCHEDULE PROGRAMMED INTO THE ELECTRONICALLY OPERATED CIRCUIT BREAKER PANELBOARD. WHEN THERE IS ADEQUATE DAYLIGHT, ALL LIGHTS INDICATED TO BE CONTROLLED BY THE PHOTOCELL (INCLUDING EMERGENCY LIGHTING) SHALL TURN OFF. ZONE 2 SHALL BE SET TO TURN LIGHTS ON AT A HIGHER THRESHOLD THAN ZONE 1. WHEN THERE IS NOT ADEQUATE DAYLIGHT, EMERGENCY LIGHTS SHALL ACT AS UNSWITCHED NIGHT LIGHTS.

NOTE 1: WIRING DIAGRAM BASED ON SENSOR SWITCH PRODUCTS.

NOTE 2 :DIAGRAM SHOWN TO INDICATE INTENT ONLY. REFER TO MANUFACTURER'S WIRING DIAGRAMS FOR INSTALLATION.

5 LIGHTING CONTROL DIAGRAM - LOBBY
SCALE: NO SCALE



LIGHTING SEQUENCE OF OPERATIONS FOR 2ND, 3RD, AND 4TH FLOOR EAST CORRIDOR LIGHTING:
LIGHTING ZONES SHALL TURN ON AND OFF AT PRESET TIMES DETERMINED BY THE TIME SCHEDULE PROGRAMMED INTO THE ELECTRONICALLY OPERATED CIRCUIT BREAKER PANELBOARD. WHEN THERE ARE MODERATE DAYLIGHT LEVELS, ALL LIGHTS INDICATED TO BE CONTROLLED BY THE PHOTOCELL (INCLUDING EMERGENCY LIGHTING) SHALL DIM TOGETHER. WHEN THERE ARE HIGH DAYLIGHT LEVELS, THE LIGHTS SHALL TURN OFF. WHEN THERE IS NOT ADEQUATE DAYLIGHT, EMERGENCY LIGHTS SHALL ACT AS UNSWITCHED NIGHT LIGHTS. THE GENERATOR TRANSFER DEVICE SHALL BE WIRED AS A SWITCH BYPASS DEVICE SUCH THAT WHEN THE NORMAL POWER SOURCE FAILS, THE EMERGENCY LIGHTING SHALL COME ON AT FULL OUTPUT, BYPASSING THE PHOTOCELL SWITCHING AND DIMMING SIGNALS.

NOTE 1: WIRING DIAGRAM BASED ON SENSOR SWITCH PRODUCTS.

NOTE 2 :DIAGRAM SHOWN TO INDICATE INTENT ONLY. REFER TO MANUFACTURER'S WIRING DIAGRAMS FOR INSTALLATION.

6 LIGHTING CONTROL DIAGRAM - 2ND, 3RD, AND 4TH FLOOR EAST CORRIDOR
SCALE: NO SCALE

Plot Date: 7/16/2013 7:59:58 AM

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ISSUE NO. 2		18JULY2013

SEALS AND SIGNATURES

KEYPLAN

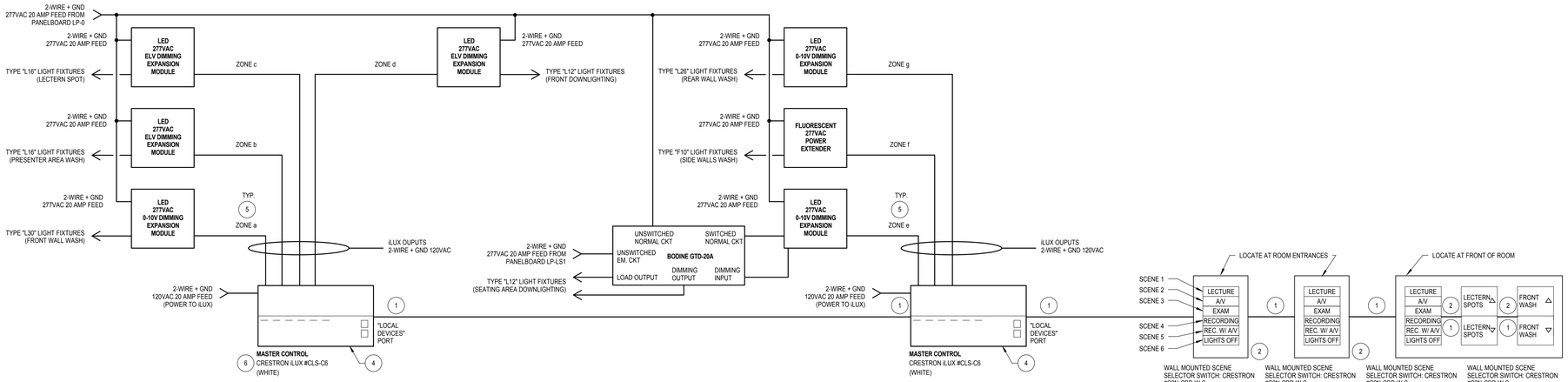
DRAWING TITLE
LIGHTING CONTROL DIAGRAMS

SCALE
22668.000

PROJECT NUMBER

E6.4

DRAWING NUMBER

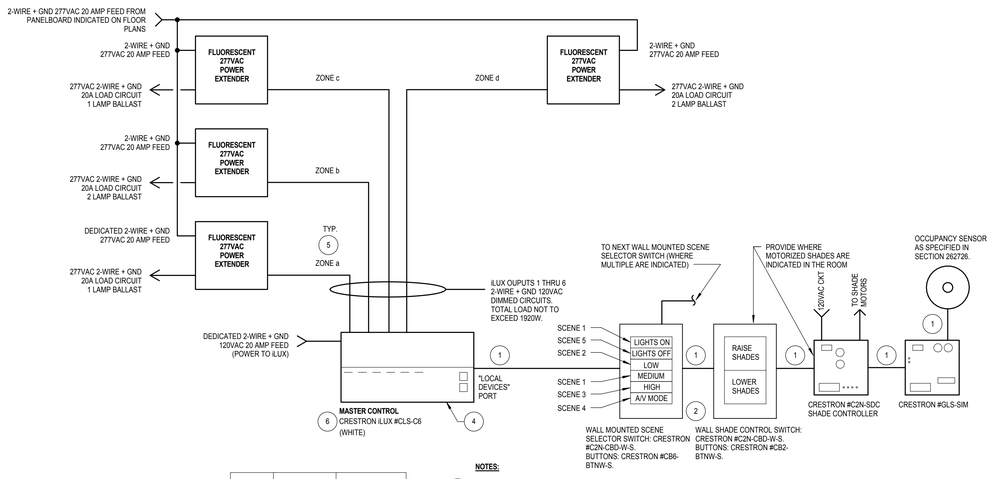


SCENE #	OPERATION
1	a,b,d,e,f,g ON, ALL AT 100%
2	c ON AT 100%, e ON DIMMED AT 10%
3	a,d,e,f,g ON, ALL AT 100%
4	SAME AS SCENE 1
5	SAME AS SCENE 2
6	ALL ZONES OFF

NOTES:

1. "CRESNET" CABLE: (1) PAIR #18AWG, (1) TWISTED PAIR 22AWG W/SHIELD
2. SEQUENCE OF OPERATIONS SHALL BE AS FOLLOWS: WHEN ANY OF THE SCENE SELECTION BUTTONS ARE PRESSED, THE CORRESPONDING SCENE SHALL BE ACTIVATED. THE "LECTERN SPOT" DIMMER SWITCH SHALL ACT AS AN OVERRIDE FOR ZONE c. THE "FRONT WASH" DIMMER SWITCH SHALL ACT AS AN OVERRIDE FOR ZONE b. THESE OVERRIDDEN DIMMING LEVELS SHALL NOT BE RESET UNTIL THE "LIGHTS OFF" BUTTON IS PRESSED (FOR EXAMPLE: IN LECTURE MODE, THE DIMMING LEVELS ARE OVERRIDDEN TO 50% BY AN OCCUPANT VIA THE DIMMING KEYPAD(S) AT THE FRONT OF THE ROOM. THE A/V SCENE BUTTON IS THEN PRESSED, AND ZONES b AND c TURN OFF. IF THE LECTURE SCENE BUTTON IS THEN PRESSED SOME TIME LATER, ZONES b AND c SHALL TURN BACK ON AT 50%. IF THE LIGHTS OFF SCENE IS SELECTED, ZONES b AND c WILL TURN ON AT THEIR PRESET DIMMING LEVEL THE NEXT TIME THEY ARE TURNED ON.)
3. DIAGRAM INDICATES DESIGN INTENT ONLY. REFER TO MANUFACTURER'S WIRING DIAGRAMS.
4. MOUNT CONTROLLER IN A/V STORAGE ROOM ADJACENT TO LECTURE HALL.
5. REFER TO E3 SERIES DRAWINGS FOR ZONE DESIGNATIONS.
6. ALL REFERENCES TO MANUFACTURERS AND MODEL NUMBERS ARE TO BE CONSIDERED BASIS OF DESIGN. REFER TO SPECIFICATIONS FOR OTHER ACCEPTABLE MANUFACTURERS.

1 LIGHTING CONTROL DIAGRAM FOR LECTURE HALL
SCALE: NO SCALE

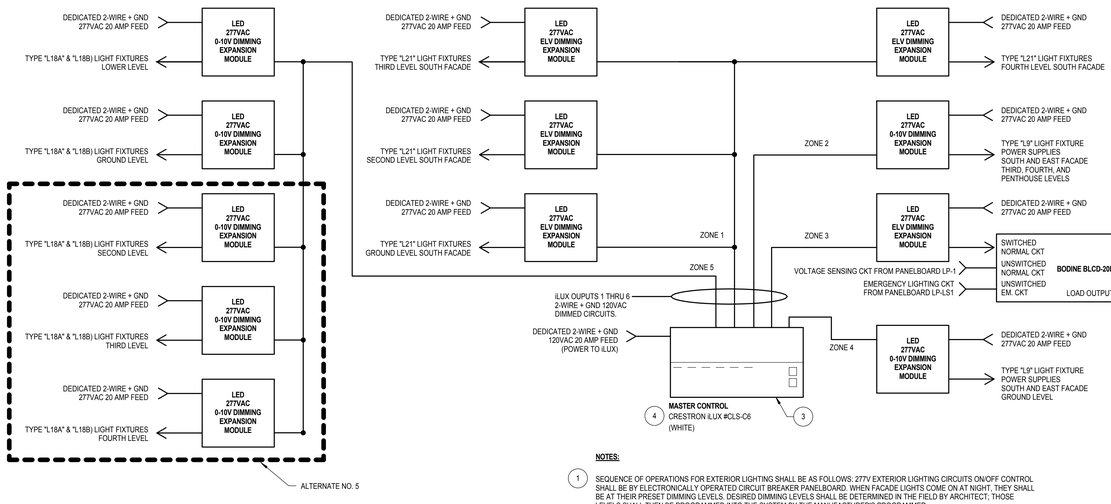


SCENE #	OPERATION	SHADES (WHERE APPLICABLE)
1	ZONES b & d ON	RAISED
2	ZONE a & c ON	RAISED
3	ALL ZONES ON	RAISED
4	ZONE a ON	LOWERED
5	ALL ZONES OFF	RAISED

NOTES:

1. "CRESNET" CABLE: (1) PAIR #18AWG, (1) TWISTED PAIR 22AWG W/SHIELD
2. SEQUENCE OF OPERATIONS SHALL BE AS FOLLOWS: LIGHTING SHALL BE MANUAL-ON, AUTOMATIC OFF. WHEN OCCUPANTS ENTER THE ROOM AND PRESS ANY OF THE BUTTONS ON THE WALL MOUNTED SWITCH, THE SCENE CORRESPONDING TO THAT SWITCH WILL TURN ON THE APPROPRIATE ZONES. WHEN ANY OF THE ROOM OCCUPANCY SENSORS DO NOT DETECT MOTION FOR 15 MINUTES, A CONTACT CLOSURE FROM THE OCCUPANCY SESNORS SHALL TELL THE CONTROLLER TO RUN SCENE #5 AND TURN OFF ALL LIGHTS. MOTORIZED SHADES, WHERE PRESENT, SHALL BE POSITIONED AS INDICATED IN SCHEDULE. SHADE SWITCH SHALL OVERRIDE CURRENT SHADE POSITION SETTING.
3. DIAGRAM INDICATES DESIGN INTENT ONLY. REFER TO MANUFACTURER'S WIRING DIAGRAMS.
4. MOUNT CONTROLLER IN AN ACCESSIBLE LOCATION ABOVE THE CEILING.
5. REFER TO E3 SERIES DRAWINGS FOR ZONE DESIGNATIONS.
6. ALL REFERENCES TO MANUFACTURERS AND MODEL NUMBERS ARE TO BE CONSIDERED BASIS OF DESIGN. REFER TO SPECIFICATIONS FOR OTHER ACCEPTABLE MANUFACTURERS.

2 LIGHTING CONTROL DIAGRAM FOR ROOMS L11, L12, L57, AND 111
SCALE: NO SCALE



NOTES:

1. SEQUENCE OF OPERATIONS FOR EXTERIOR LIGHTING SHALL BE AS FOLLOWS: 277V EXTERIOR LIGHTING CIRCUITS ON/OFF CONTROL SHALL BE BY ELECTRONICALLY OPERATED CIRCUIT BREAKER PANELBOARD. WHEN FACADE LIGHTS COME ON AT NIGHT, THEY SHALL BE AT THEIR PRESET DIMMING LEVELS. DESIRED DIMMING LEVELS SHALL BE DETERMINED IN THE FIELD BY ARCHITECT; THOSE LEVELS SHALL THEN BE PROGRAMMED INTO THE SYSTEM BY THE MANUFACTURER'S PROGRAMMER.

   SEQUENCE OF OPERATIONS FOR INTERIOR LIGHTING SHALL BE AS FOLLOWS: INTERIOR DECORATIVE LIGHTING CIRCUITS ON/OFF CONTROL SHALL BE BY ELECTRONICALLY OPERATED CIRCUIT BREAKER PANELBOARD. WHEN DECORATIVE LIGHTING COMES ON EACH DAY, THEY SHALL BE AT THEIR PRESET DIMMING LEVELS. DESIRED DIMMING LEVELS SHALL BE DETERMINED IN THE FIELD BY ARCHITECT; THOSE LEVELS SHALL THEN BE PROGRAMMED INTO THE SYSTEM BY THE MANUFACTURER'S PROGRAMMER.
2. DIAGRAM INDICATES DESIGN INTENT ONLY. REFER TO MANUFACTURER'S WIRING DIAGRAMS.
3. MOUNT CONTROLLER IN FIRST FLOOR ELECTRICAL ROOM.
4. ALL REFERENCES TO MANUFACTURERS AND MODEL NUMBERS ARE TO BE CONSIDERED BASIS OF DESIGN. REFER TO SPECIFICATIONS FOR OTHER ACCEPTABLE MANUFACTURERS.

3 DECORATIVE LIGHTING CONTROL DIAGRAM
SCALE: NO SCALE

Plot Date: 7/16/2013 8:00:02 AM

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SEALS AND SIGNATURES

KEYPLAN

DRAWING TITLE

LIGHTING CONTROL DIAGRAMS

NO SCALE

SCALE

PROJECT NUMBER 22668.000

DRAWING NUMBER **E6.5**

Panelboard: LP-0

Location: ELEC L18 | **Volts:** 480Y/277 | **A.I.C. Rating:** 35,000
Supply From: BUS DUCT | **Phases:** 3 | **Mains Type:** MLO
Mounting: Surface | **Wires:** 4 | **Bus Rating:** 100 A
Enclosure: Type 1 | **Neutral Rating:** 100%

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1				10000...	1620...					1	20 A	(EO) LIGHTING - EXTERIOR POLES	2
3	STERILIZER - INSTRUCTIONAL CLASS LABS PREP SPACE L06C	50 A	3			10000...	953 VA			1	20 A	(EO) GENERAL LIGHTING - LOWER LEVEL...	4
5								10000...	1640...	1	20 A	(EO) DECORATIVE LIGHTING - LOWER LEVEL	6
7	LIGHTING - L11, L12, L13	20 A	1	2912...	0 VA					1	20 A	(EO) SPARE	8
9	LIGHTING - L05, L06A, L06B, L06C, L07A, L08,...	20 A	1			1245...	0 VA			1	20 A	(EO) SPARE	10
11	LIGHTING - L40, L50, L59, L54, L51, L41, L52, L53	20 A	1					1200...	0 VA	1	20 A	SPARE	12
13	LIGHTING - L59, L57, L56, L55	20 A	1	2491...	0 VA					1	20 A	SPARE	14
15	LIGHTING - LECTURE HALL L01	20 A	1			2140...	0 VA			1	20 A	SPARE	16
17	LIGHTING - L16A, L17A, L16B, L17B, L14, L15	20 A	1					441 VA	0 VA	1	20 A	SPARE	18
19	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	20
21	SPACE	--	--			0 VA	0 VA			--	--	SPACE	22
23	SPACE	--	--					0 VA	0 VA	--	--	SPACE	24
25	SPACE	--	--	0 VA	0 VA					--	--	SPACE	26
27	SPACE	--	--			0 VA	0 VA			--	--	SPACE	28
29	SPACE	--	--					0 VA	0 VA	--	--	SPACE	30
			Total Load:	17023 VA		14338 VA		13281 VA					
			Total Amps:	62 A		52 A		48 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
EQUIPMENT	30000 VA	100.00%	30000 VA	
LIGHTING	14642 VA	100.00%	14642 VA	**Total Conn. Load:** 44642 VA
POWER	0 VA	0.00%	0 VA	**Total Est. Demand:** 44642 VA
				Total Conn.: 54 A
				Total Est. Demand: 54 A

Notes:
(EO) - INDICATES ELECTRONICALLY OPERATED CIRCUIT BREAKER

Distribution Panel: RDP-0

Location: ELEC L18 | **Volts:** 208Y/120 | **A.I.C. Rating:** 10,000
Supply From: T-0A | **Phases:** 3 | **Mains Type:** MCB
Mounting: Surface | **Wires:** 4 | **Bus Rating:** 400 A
Enclosure: Type 1 | **MCB Rating:** 400 A

CKT	Circuit Description	# of Poles	Frame Size	Trip Rating	Load	Remarks
1	RP-0A	3	150 A	150 A	38838 VA	
2	RP-0B	3	100 A	100 A	14600 VA	
3	RP-0C	3	100 A	100 A	14520 VA	
4	RP-0D	3	100 A	100 A	26100 VA	
5	RP-0E	3	150 A	150 A	31420 VA	
6	SPARE	3	--	100 A	0 VA	
7	SPACE	--	--	--	0 VA	--
8	SPACE	--	--	--	0 VA	--
				Total Conn. Load:	125478 VA	
				Total Amps:	348 A	

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
EQUIPMENT	50250 VA	100.00%	50250 VA	
POWER	200 VA	100.00%	200 VA	**Total Conn. Load:** 125478 VA
RECEPTACLES	71480 VA	56.99%	40740 VA	**Total Est. Demand:** 94188 VA
MECHANICAL EQUIPMENT	2748 VA	80.00%	2198 VA	**Total Conn.:** 348 A
APPLIANCE	800 VA	100.00%	800 VA	**Total Est. Demand:** 261 A

Notes:

Distribution Panel: PP-0A

Location: ELEC L18 | **Volts:** 480Y/277 | **A.I.C. Rating:** 35,000
Supply From: SUBSTATION 1B | **Phases:** 3 | **Mains Type:** MLO
Mounting: Surface | **Wires:** 4 | **Bus Rating:** 200 A
Enclosure: Type 1

CKT	Circuit Description	# of Poles	Frame Size	Trip Rating	Load	Remarks
1	PP-0B	3	100 A	100 A	36232 VA	
2	CHWP-1	3	60 A	50 A	17451 VA	
3	CHWP-2	3	60 A	50 A	17451 VA	
4	SEP-1&2	3	30 A	15 A	3989 VA	
5	SPARE	3	--	30 A	0 VA	
6	SPARE	3	--	30 A	0 VA	
7	SPARE	3	--	60 A	0 VA	
8	SPARE	3	--	100 A	0 VA	
				Total Conn. Load:	75122 VA	
				Total Amps:	90 A	

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
MECHANICAL EQUIPMENT	75122 VA	80.00%	60098 VA	
				Total Conn. Load: 75122 VA
				Total Est. Demand: 60098 VA
				Total Conn.: 90 A
				Total Est. Demand: 72 A

Notes:

Panelboard: RP-0A

Location: ELEC L18 | **Volts:** 208Y/120 | **A.I.C. Rating:** 10,000
Supply From: RDP-0 | **Phases:** 3 | **Mains Type:** MLO
Mounting: Surface | **Wires:** 4 | **Bus Rating:** 225 A
Enclosure: Type 1 | **Neutral Rating:** 200%

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	DWH-1	20 A	1	100 VA	696 VA					1	15 A	CUH-1	2
3	DWH-2	20 A	1			100 VA	696 VA			1	15 A	CUH-2	4
5	DWH-3	20 A	1					100 VA	790 VA	1	20 A	RECEPTACLES - ROOM L15	6
7	DWCP-1	15 A	1	528 VA	790 VA					1	20 A	RECEPTACLES - ROOM L14	8
9	DWCP-2	15 A	1			528 VA	900 VA			1	20 A	RECEPTACLES - ROOMS L18, L20, L16, L17	10
11	RECEPTACLES - METER/DOMESTIC WATER...	20 A	1					540 VA	720 VA	1	20 A	RECEPTACLES - ROOMS L40, L41, L60	12
13	RECEPTACLES - LECTURE HALL QUEING C-L01	20 A	1	720 VA	900 VA					1	20 A	RECEPTACLES - L54, C-L04, C-L03, L22, C-L05	14
15	RECEPTACLES - AV STOR L02	20 A	1			360 VA	500 VA			1	20 A	ELECTRIC WATER COOLER (GFCI CB)	16
17	RECEPTACLES - GREENROOM L03	20 A	1					970 VA	1500...	1	20 A	REFRIGERATOR - PREP STOR L51	18
19	RECEPTACLES - COFFEE/FOOD L13	20 A	1	360 VA	1500...					1	20 A	REFRIGERATOR - PREP STOR L51	20
21	REFRIGERATOR - COFFEE/FOOD L13	20 A	1			1000...	720 VA			1	20 A	RECEPTACLES - PREP STOR L51	22
23	COUNTERTOP RCPT - COFFEE/FOOD L13	20 A	1					180 VA	1080...	1	20 A	RECEPTACLES - ROOMS L52, L53	24
25	COUNTERTOP RCPT - COFFEE/FOOD L13	20 A	1	180 VA	1000...					1	20 A	RECEPTACLE - KITCHEN L50	26
27	FLOOR BOXES - LECTURE HALL L01	20 A	1			720 VA	180 VA			1	20 A	RECEPTACLES KITCHEN L50	28
29	PROJECTOR & SCREEN - LECTURE HALL L01	20 A	1					180 VA	180 VA	1	20 A	RECEPTACLES - KITCHEN L50	30
31	FLOOR RECEPTACLES - LECTURE HALL...	20 A	1	720 VA	180 VA					1	20 A	RECEPTACLES - KITCHEN L50	32
33	TABLE RECEPTACLES - LECTURE HALL L01	20 A	1			1440...	0 VA			1	20 A	RECEPTACLES - EXTERIOR LIGHT POLE	34
35	TABLE RECEPTACLES - LECTURE HALL L01	20 A	1					1080...	0 VA	1	20 A	RECEPTACLES - EXTERIOR LIGHT POLE	36
37	TABLE RECEPTACLES - LECTURE HALL L01	20 A	1	1440...	0 VA					1	20 A	RECEPTACLES - UNIV. AVE POLES SOUTH	38
39	TABLE RECEPTACLES - LECTURE HALL L01	20 A	1			900 VA	0 VA			1	20 A	RECEPTACLES - UNIV. AVE POLES NORTH	40
41	TABLE RECEPTACLES - LECTURE HALL L01	20 A	1					1080...	180 VA	1	20 A	RECEPTACLES - KITCHEN L50	42
43	TABLE RECEPTACLES - LECTURE HALL L01	20 A	1	1080...	200 VA					1	20 A	DOOR POWER SUPPLY L16,L17	44
45	TABLE RECEPTACLES - LECTURE HALL L01	20 A	1			1260...	100 VA			1	20 A	LECTURE HALL LIGHTING CONTROLLERS	46
47	TABLE RECEPTACLES - LECTURE HALL L01	20 A	1	1440...	0 VA			1440...	0 VA	1	20 A	SPARE	48
49	TABLE RECEPTACLES - LECTURE HALL L01	20 A	1	1440...	0 VA					1	20 A	SPARE	50
51	TABLE RECEPTACLES - LECTURE HALL L01	20 A	1			1080...	0 VA			1	20 A	SPARE	52
53	TABLE RECEPTACLES - LECTURE HALL L01	20 A	1					1260...	0 VA	1	20 A	SPARE	54
55	TABLE RECEPTACLES - LECTURE HALL L01	20 A	1	1440...	0 VA					1	20 A	SPARE	56
57	RECEPTACLES - LECTURE HALL L01	20 A	1			720 VA	0 VA			1	20 A	SPARE	58
59	RECEPTACLES - VENDING L07B	20 A	1					1180...	540 VA	1	20 A	RECEPTACLES - TUNNEL	60
61	RECEPTACLES VENDING L07B	20 A	1	1000...	0 VA					1	20 A	SPARE	62
63	RECEPTACLES TELE L19	20 A	1			360 VA	0 VA			1	20 A	SPARE	64
65	SPARE	0 A	1					0 VA	0 VA	1	20 A	SPARE	66
67	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	68
69	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	70
71	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	72
			Total Load:	14274 VA		11564 VA		13000 VA					
			Total Amps:	121 A		96 A		110 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
EQUIPMENT	5850 VA	100.00%	5850 VA	
POWER	200 VA	100.00%	200 VA	**Total Conn. Load:** 38838 VA
RECEPTACLES	29540 VA	66.93%	19770 VA	**Total Est. Demand:** 28518 VA
MECHANICAL EQUIPMENT	2748 VA	80.00%	2198 VA	**Total Conn.:** 108 A
APPLIANCE	500 VA	100.00%	500 VA	**Total Est. Demand:** 79 A

Notes:

Distribution Panel: PP-0B

Location: METER/DOMESTIC WATER... | **Volts:** 480Y/277 | **A.I.C. Rating:** 14,000
Supply From: PP-0A | **Phases:** 3 | **Mains Type:** MCB
Mounting: Surface | **Wires:** 4 | **Bus Rating:** 100 A
Enclosure: Type 1 | **MCB Rating:** 100 A

CKT	Circuit Description	# of Poles	Frame Size	Trip Rating	Load	Remarks
1	HHWP-1	3	30 A	20 A	6316 VA	
2	HHWP-2	3	30 A	20 A	6316 VA	
3	PHWP-1	3	30 A	15 A	3989 VA	
4	PHWP-2	3	30 A	15 A	3989 VA	
5	PHWP-3	3	30 A	15 A	3989 VA	
6	PHWP-4	3	30 A	15 A	3989 VA	
7	CRU-1	3	30 A	15 A	1330 VA	
8	DWBP-1	3	30 A	20 A	6316 VA	
9	SPARE	3	--	60 A	0 VA	
10	SPARE	3	--	30 A	0 VA	
11	SPARE	3	--	15 A	0 VA	
12	SPARE	3	--	15 A	0 VA	
				Total Conn. Load:	36232 VA	
				Total Amps:	44 A	

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
MECHANICAL EQUIPMENT	36232 VA	80.00%	28985 VA	
				Total Conn. Load: 36232 VA
				Total Est. Demand: 28985 VA
				Total Conn.: 44 A
				Total Est. Demand: 35 A

Notes:

Panelboard: RP-0B

Location: MOLECULAR BIOLOGY L12 | **Volts:** 208Y/120 | **A.I.C. Rating:** 10,000
Supply From: RDP-0 | **Phases:** 3 | **Mains Type:** MCB
Mounting: FLUSH | **Wires:** 4 | **Bus Rating:** 100 A
Enclosure: Type 1 | **Neutral Rating:** 200% | **MCB Rating:** 100 A

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	RECEPTACLES - WEST TABLE	20 A	1	720 VA	540 VA					2	20 A	RACEWAY - NORTH WALL	2
3	RECEPTACLES - WEST TABLE	20 A	1			720 VA	540 VA						4
5	RECEPTACLES - WEST TABLE	20 A	1					1080...	720 VA	2	20 A	RACEWAY - NORTH WALL	6
7	RECEPTACLES - CENTER TABLE	20 A	1	720 VA	540 VA								8
9	RECEPTACLES - CENTER TABLE	20 A	1			720 VA	200 VA			1	20 A	MOTORIZED SHADES	10
11	RECEPTACLES - CENTER TABLE	20 A	1					540 VA	1000...	1	20 A	REFRIGERATOR - EAST WALL	12
13	RECEPTACLES - WEST TABLE	20 A	1	720 VA	1200...					1	20 A	NORTH INCUBATOR - WEST WALL	14
15	RECEPTACLES - WEST TABLE	20 A	1			720 VA	1200...			1	20 A	SOUTH INCUBATOR - WEST WALL	16
17	RECEPTACLES - WEST TABLE	20 A	1					1080...	250 VA	1	20 A	FUME HOOD	18
19	RECEPTACLES - GENERAL PURPOSE	20 A	1	540 VA	540 VA					1	20 A	RECEPTACLES - WEST WALL	20
21	SPARE	20 A	1			0 VA	180 VA			1	20 A	PROJECTOR & SCREEN	22
23	SPARE	20 A	1					0 VA	50 VA	1	20 A	LIGHTING CONTROLLER	24
25	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	26
27	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	28
29	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	30
31	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	32
33	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	34
35	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	36
37	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	38
39	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	40
41	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	42
			Total Load:	5030 VA		4850 VA		4720 VA					
			Total Amps:	42 A		41 A		39 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
EQUIPMENT	3700 VA	100.00%	3700 VA	
RECEPTACLES	10800 VA	96.30%	10400 VA	**Total Conn. Load:** 14600 VA
APPLIANCE	100 VA	100.00%	100 VA	**Total Est. Demand:** 14200 VA
				Total Conn.: 41 A
				Total Est. Demand: 39 A

Notes:

Panelboard: RP-0C

Location: MOLECULAR BIOLOGY L11 | **Volts:** 208Y/120 | **A.I.C. Rating:** 10,000
Supply From: RDP-0 | **Phases:** 3 | **Mains Type:** MCB
Mounting: FLUSH | **Wires:** 4 | **Bus Rating:** 100 A
Enclosure: Type 1 | **Neutral Rating:** 200% | **MCB Rating:** 100 A

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	RECEPTACLES - EAST TABLE	20 A	1	720 VA	540 VA					2	20 A	RACEWAY - NORTH WALL	2
3	RECEPTACLES - EAST TABLE	20 A	1			720 VA	540 VA						4
5	RECEPTACLES - EAST TABLE	20 A	1					1080...	720 VA	2	20 A	RACEWAY - NORTH WALL	6
7	RECEPTACLES - CENTER TABLE	20 A	1	720 VA	540 VA								8
9	RECEPTACLES - CENTER TABLE	20 A	1			720 VA	200 VA			1	20 A	MOTORIZED SHADES	10
11	RECEPTACLES - CENTER TABLE	20 A	1					540 VA	1000...	1	20 A	REFRIGERATOR - EAST WALL	12
13	RECEPTACLES - WEST TABLE	20 A	1	720 VA	1200...					1	20 A	NORTH INCUBATOR - WEST WALL	14
15	RECEPTACLES - WEST TABLE	20 A	1			720 VA	1200...			1	20 A	SOUTH INCUBATOR - WEST WALL	16
17	RECEPTACLES - WEST TABLE	20 A	1					1080...	250 VA	1	20 A	FUME HOOD	18
19	RECEPTACLES - GENERAL PURPOSE	20 A	1	540 VA	540 VA					1	20 A	RECEPTACLES - WEST WALL	20
21	SPARE	20 A	1			0 VA	180 VA			1	20 A	PROJECTOR & SCREEN	22
23	SPARE	20 A	1					0 VA	50 VA	1	20 A	LIGHTING CONTROLLER	24
25	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	26
27	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	28
29	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	30
31	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	32
33	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	34
35	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	36
37	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	38
39	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	40
41	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	42
			Total Load:	5520 VA		4280 VA		4720 VA					
			Total Amps:	47 A		36 A		40 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
EQUIPMENT	3700 VA	100.00%	3700 VA	
RECEPTACLES	10620 VA	97.08%	10310 VA	**Total Conn. Load:** 14520 VA
APPLIANCE	200 VA	100.00%	200 VA	**Total Est. Demand:** 14210 VA
				Total Conn.: 40 A
				Total Est. Demand: 39 A

Notes:

Panelboard: RP-0D

Location: INSTRUCTIONAL CLASS LAB ... | **Volts:** 208Y/120 | **A.I.C. Rating:** 10,000
Supply From: RDP-0 | **Phases:** 3 | **Mains Type:** MCB
Mounting: FLUSH | **Wires:** 4 | **Bus Rating:** 100 A
Enclosure: Type 1 | **Neutral Rating:** 200% | **MCB Rating:** 100 A

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	FUME HOOD	20 A	1	250 VA	360 VA					2	20 A	RACEWAY - TC ROOM	2
3	NORTH REFRIGERATOR	20 A	1			1000...	360 VA						4
5	FREEZER	20 A	1					1000...	540 VA	2	20 A	RACEWAY - EAST WALL	6
7	SOUTH REFRIGERATOR	20 A	1	1000...	360 VA								8
9	EAST INCUBATOR - TC ROOM	20 A	1			1200...	900 VA			2	20 A	RACEWAY - WEST WALL	10
11	WEST INCUBATOR - TC ROOM	20 A	1					1200...	540 VA				12
13	EAST BIO SAFETY CABINET - TC ROOM	20 A	1	1440...	540 VA					2	20 A	RACEWAY - NORTH WALL	14
15	CENTER BIO SAFETY CABINET - TC ROOM	20 A	1			1440...	360 VA						16
17	WEST BIO SAFETY CABINET - TC ROOM	20 A	1					1440...	540 VA	2	20 A	RACEWAY - NORTH WALL	18
19	SHAKER - HOLD ROOM	20 A	1	1500...	360 VA								20
21	LIGHTING CONTROLLER	20 A	1			50 A	720 VA			2	20 A	RACEWAY - NORTH WALL	22
23	RECEPTACLES - SOUTHEAST TABLE	20 A	1					540 VA	540 VA				24
25	RECEPTACLES - SOUTHEAST TABLE	20 A	1	540 VA	540 VA					1	20 A	RECEPTACLES - NORTHEAST TABLE	26
27	RECEPTACLES - SOUTH CENTRAL TABLE	20 A	1			540 VA	540 VA			1	20 A	RECEPTACLES - NORTHEAST TABLE	28
29	RECEPTACLES - SOUTH CENTRAL TABLE	20 A	1					540 VA	540 VA	1	20 A	RECEPTACLES - NORTH CENTRAL TABLE	30
31	RECEPTACLES - SOUTHWEST TABLE	20 A	1	540 VA	540 VA					1	20 A	RECEPTACLES - NORTH CENTRAL TABLE	32
33	RECEPTACLES - SOUTHWEST TABLE	20 A	1			540 VA	540 VA			1	20 A	RECEPTACLES - NORTHWEST TABLE	34
35	RECEPTACLES - NORTHWEST TABLE	20 A	1					540 VA	900 VA	1	20 A	GENERAL PURPOSE RECEPTACLES	36
37	RECEPTACLES - GEL L55	20 A	1	540 VA	360 VA					1	20 A	RECEPTACLES - FUME HOOD STATION	38
39	PROJECTOR & SCREEN	20 A	1			180 VA	0 VA			1	20 A	SPARE	40
41	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	42
43	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	44
45	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	46
47	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	48
49	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	50
51	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	52
53	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	54
			Total Load:	8870 VA		8370 VA		8860 VA					
			Total Amps:	75 A		70 A		74 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
EQUIPMENT	11520 VA	100.00%	11520 VA	
RECEPTACLES	14580 VA	84.29%	12290 VA	**Total Conn. Load:** 26100 VA
				Total Est. Demand: 23810 VA
				Total Conn.: 72 A
				Total Est. Demand: 66 A

Notes:

Panelboard: RP-0E

Location: INSTRUCTIONAL CLASS LABS... | **Volts:** 208Y/120 | **A.I.C. Rating:** 10,000
Supply From: RDP-0 | **Phases:** 3 | **Mains Type:** MCB
Mounting: FLUSH | **Wires:** 4 | **Bus Rating:** 225 A
Enclosure: Type 1 | **Neutral Rating:** 200% | **MCB Rating:** 150 A

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	NORTH ICE MACHINE	20 A	1	720 VA	540 VA					2	20 A	RACEWAY - GLASSWASH	2
3	SOUTH ICE MAKER	20 A	1			720 VA	540 VA						4
5	EQUIPMENT	20 A	1					720 VA	900 VA	2	20 A	RACEWAY - NORTH PREP SPACE	6
7	CHROMATOGRAPHY REFRIGERATOR	20 A	1	1500...	720 VA								8
9	INCUBATOR	20 A	1			1200...	540 VA			2	20 A	RACEWAY - CENTER PREP SPACE, NORTH WALL	10
11	RERIGERATOR	20 A	1					1000...	540 VA				12
13	REFRIGERATOR/FREEZER	20 A	1	1000...	720 VA					2	20 A	RACEWAY - CENTER PREP SPACE, SOUTH WALL	14
15	RECEPTACLES - WORKSTATION	20 A	1			1440...	720 VA						16
17	INCUBATOR CONTROLS POWER	20 A	1					180 VA	360 VA	2	20 A	RACEWAY - SOUTH PREP SPACE	18
19	SPARE	20 A	1	0 VA	360 VA								20
21						2333...	2333...						22
23	UNDERCOUNTER GLASS WASHER	50 A	3					2333...	2333...	3	50 A	UNDERCOUNTER GLASS WASHER	24
25				2333...	2333...								26
27	EQUIPMENT INSTRUCTIONAL CLASS LABS PREP SPACE L06C	20 A	3			1000...	0 VA			1	20 A	SPARE	28
29								1000...	0 VA	1	20 A	SPARE	30
31				1000...	0 VA					1	20 A	SPARE	32
33	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	34
35	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	36
37	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	38
39	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	40
41	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	42
			Total Load:	11227 VA		10827 VA		9367 VA					
			Total Amps:	95 A		92 A		78 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
EQUIPMENT	25480 VA	100.00%	25480 VA	
RECEPTACLES	5940 VA	100.00%	5940 VA	**Total Conn. Load:** 31420 VA
				Total Est. Demand: 31420 VA
				Total Conn.: 87 A
				Total Est. Demand: 87 A

Notes:

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SEALS AND SIGNATURES

KEYPLAN

LP-0	PP-0A	PP-0B
RDP-0	RP-0A	RP-0B
RP-0C	RP-0D	RP-0E

DRAWING TITLE

LOWER LEVEL PANELBOARD SCHEDULES

SCALE 22668.000

PROJECT NUMBER

E7.3

DRAWING NUMBER

Plot Date: 7/17/2013 3:26:06 PM

Panelboard: LP-1

Location: ELEC 128 | **Volts:** 480Y/277 | **A.I.C. Rating:** 35,000
Supply From: BUS DUCT | **Phases:** 3 | **Mains Type:** MLO
Mounting: Surface | **Wires:** 4 | **Bus Rating:** 100 A
Enclosure: Type 1 | **Neutral Rating:** 100%

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	LIGHTING - ROOM 101-104, 106, 108-110	20 A	1	1801... 128 VA			1	20 A	(EO) LIGHTING - GLASS SIGNAGE	2
3	LIGHTING - ROOM 111, 125	20 A	1		1829... 1817...		1	20 A	(EO) LIGHTING - SOUTH FACADE	4
5	LIGHTING - ROOM 120,130,127,122-124, 140,141	20 A	1			1192... 1060...	1	20 A	(EO) LIGHTING - GROUND LEVEL LOBBY/CORR.	6
7	PHOTOCELL POWER; SENSING CKT FOR GTDs	20 A	1	0 VA 4640...			1	20 A	(EO) DECORATIVE LIGHTING - GROUND LOBBY	8
9	SPARE	20 A	1		0 VA 0 VA		1	20 A	(EO) SPARE	10
11	SPARE	20 A	1			0 VA 0 VA	1	20 A	(EO) SPARE	12
13	SPARE	20 A	1	0 VA 0 VA			1	20 A	(EO) SPARE	14
15	SPARE	20 A	1		0 VA 0 VA		1	20 A	(EO) SPARE	16
17	SPACE	--	--			0 VA 0 VA	--	--	SPACE	18
19	SPACE	--	--	0 VA 0 VA			--	--	SPACE	20
21	SPACE	--	--		0 VA 0 VA		--	--	SPACE	22
23	SPACE	--	--			0 VA 0 VA	--	--	SPACE	24
25	SPACE	--	--	0 VA 0 VA			--	--	SPACE	26
27	SPACE	--	--		0 VA 0 VA		--	--	SPACE	28
29	SPACE	--	--			0 VA 0 VA	--	--	SPACE	30
	Total Load:			6569 VA	3646 VA	2252 VA				
	Total Amps:			24 A	14 A	8 A				

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
LIGHTING	12467 VA	100.00%	12467 VA		
				Total Conn. Load:	12467 VA
				Total Est. Demand:	12467 VA
				Total Conn.:	15 A
				Total Est. Demand:	15 A

Notes:
(EO) - INDICATES ELECTRONICALLY OPERATED CIRCUIT BREAKER

Panelboard: LP-LS1

Location: ELEC 128 | **Volts:** 480Y/277 | **A.I.C. Rating:** 14,000
Supply From: LP-LS4 | **Phases:** 3 | **Mains Type:** MCB
Mounting: Surface | **Wires:** 4 | **Bus Rating:** 100 A
Enclosure: Type 1 | **Neutral Rating:** 100% | **MCB Rating:** 50 A

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1				100 VA 1072...			1	20 A	LIFE SAFETY LIGHTING - LOWER LEVEL	2
3	T-LS1	30 A	3		964 VA 842 VA		1	20 A	LIFE SAFETY LIGHTING - GROUND LEVEL	4
5						100 VA 740 VA	1	20 A	LIFE SAFETY LIGHTING - SECOND LEVEL	6
7	SPARE	20 A	1	0 VA 0 VA			1	20 A	SPARE	8
9	SPARE	20 A	1		0 VA 0 VA		1	20 A	SPARE	10
11	SPARE	20 A	1			0 VA 0 VA	1	20 A	SPARE	12
13	SPARE	20 A	1	0 VA 0 VA			1	20 A	SPARE	14
15	SPACE	--	--		0 VA 0 VA		--	--	SPACE	16
17	SPACE	--	--			0 VA 0 VA	--	--	SPACE	18
	Total Load:			1760 VA	2443 VA	840 VA				
	Total Amps:			7 A	9 A	3 A				

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
LIGHTING	3879 VA	100.00%	3879 VA		
POWER	300 VA	100.00%	300 VA	**Total Conn. Load:**	5043 VA
MECHANICAL EQUIPMENT	864 VA	80.00%	691 VA	**Total Est. Demand:**	4870 VA
				Total Conn.:	6 A
				Total Est. Demand:	6 A

Notes:

Panelboard: RP-LS1

Location: ELEC 128 | **Volts:** 208Y/120 | **A.I.C. Rating:** 10,000
Supply From: LP-1&2 | **Phases:** 3 | **Mains Type:** MCB
Mounting: Surface | **Wires:** 4 | **Bus Rating:** 100 A
Enclosure: Type 1 | **Neutral Rating:** 100% | **MCB Rating:** 60 A

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	FUEL OIL TANK CONTROL PANEL	20 A	1	0 VA 0 VA			1	20 A	FIRE SHUTTER POWER - GROUND LEVEL WEST	2
3	FOP-1&2	20 A	1		864 VA 0 VA		1	20 A	FIRE SHUTTER POWER - GROUND LEVEL EAST	4
5	FACP POWER ELEC L18	20 A	1			100 VA 0 VA	1	20 A	FIRE SHUTTER POWER - GROUND LEVEL EAST	6
7	NAC POWER ELEC 128	20 A	1	100 VA 0 VA			1	20 A	FIRE SHUTTER POWER - SECOND LEVEL EAST	8
9	NAC POWER ELEC 228	20 A	1		100 VA 0 VA		1	20 A	FIRE SHUTTER POWER - SECOND LEVEL WEST	10
11	SPARE	20 A	1			0 VA 0 VA	1	20 A	FIRE SHUTTER POWER - SECOND LEVEL EAST	12
13	SPARE	20 A	1	0 VA 0 VA			1	20 A	SPARE	14
15	SPARE	20 A	1		0 VA 0 VA		1	20 A	SPARE	16
17	SPARE	20 A	1			0 VA 0 VA	1	20 A	SPARE	18
19	SPACE	--	--	0 VA 0 VA			--	--	SPACE	20
21	SPACE	--	--		0 VA 0 VA		--	--	SPACE	22
23	SPACE	--	--			0 VA 0 VA	--	--	SPACE	24
25	SPACE	--	--	0 VA 0 VA			--	--	SPACE	26
27	SPACE	--	--		0 VA 0 VA		--	--	SPACE	28
29	SPACE	--	--			0 VA 0 VA	--	--	SPACE	30
	Total Load:			100 VA	964 VA	100 VA				
	Total Amps:			1 A	8 A	1 A				

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
POWER	300 VA	100.00%	300 VA		
MECHANICAL EQUIPMENT	864 VA	80.00%	691 VA	**Total Conn. Load:**	1164 VA
				Total Est. Demand:	991 VA
				Total Conn.:	3 A
				Total Est. Demand:	3 A

Notes:

Panelboard: RP-OS1

Location: ELEC 128 | **Volts:** 208Y/120 | **A.I.C. Rating:** 10,000
Supply From: RP-OS4 | **Phases:** 3 | **Mains Type:** MCB
Mounting: Surface | **Wires:** 4 | **Bus Rating:** 100 A
Enclosure: Type 1 | **Neutral Rating:** 200% | **MCB Rating:** 100 A

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	FC-1	20 A	1	264 VA 180 VA			1	20 A	RECEPTACLES - FIRE PUMP ROOM L08A	2
3	FC-2	20 A	1		264 VA 1000...		1	20 A	REFRIGERATOR/FREEZER - EAST WALL	4
5	FC-3	20 A	1			264 VA 1000...	1	20 A	REFRIGERATOR/FREEZER - WEST WALL	6
7	6-30R RECEPTACLE - TELE L19	30 A	2	1000... 1500...			1	20 A	REFRIGERATOR - HOLD ROOM	8
9					1000... 180 VA		1	20 A	RECEPTACLES - ELEC 228	10
11	RECEPTACLES - ELEC L18	20 A	1			180 VA 360 VA	1	20 A	RECEPTACLES - TELE 229	12
13	RECEPTACLES - TELE L19	20 A	1	360 VA 720 VA			1	20 A	RECEPTACLES - TELE 229	14
15	RECEPTACLES TELE L19	20 A	1		720 VA 1000...		2	30 A	6-30R RECEPTACLE - TELE 229	16
17	RECEPTACLES - SECURITY STATION	20 A	1			360 VA 1000...				18
19	-80 DEGREE FREEZER	20 A	1	1000... 180 VA			1	20 A	RECEPTACLES - ELEC 128	20
21	SMOKE DAMPERS - LOWER, GROUND, SECOND	20 A	1		100 VA 720 VA		1	20 A	RECEPTACLES - TELE 129	22
23	CONTROLS POWER - LOWER LEVEL	20 A	1			500 VA 1000...	2	30 A	6-30R RECEPTACLE - TELE 129	24
25	CONTROLS POWER - LOWER LEVEL	20 A	1	500 VA 1000...						26
27	CONTROLS POWER - GROUND LEVEL	20 A	1		500 VA 360 VA		1	20 A	RECEPTACLES - TELE 129	28
29	CONTROLS POWER - GROUND LEVEL	20 A	1			500 VA 944 VA	1	20 A	STANDBY LIGHTING - LOWER LEVEL	30
31	CONTROLS POWER - SECOND LEVEL	20 A	1	500 VA 472 VA			1	20 A	STANDBY LIGHTING - GROUND & SECOND...	32
33	CONTROLS POWER - SECOND LEVEL	20 A	1		500 VA 300 VA		1	20 A	DOOR HARDWARE POWER SUPPLIES	34
35	SPARE	20 A	1			0 VA 1100...	1	20 A	DOOR HARDWARE - SOUTH VESTIBULE	36
37	SPARE	20 A	1	0 VA 1100...			1	20 A	DOOR HARDWARE - EAST VESTIBULE	38
39	SPARE	20 A	1		0 VA 100 VA		1	20 A	SECURITY PANEL CONNECTION	40
41	SPARE	20 A	1			0 VA 0 VA	1	20 A	SPARE	42
43	SPARE	20 A	1	0 VA 0 VA			1	20 A	SPARE	44
45	SPARE	20 A	1		0 VA 0 VA		1	20 A	SPARE	46
47	SPARE	20 A	1			0 VA 0 VA	1	20 A	SPARE	48
49	SPACE	--	--	0 VA 0 VA			--	--	SPACE	50
51	SPACE	--	--		0 VA 0 VA		--	--	SPACE	52
53	SPACE	--	--			0 VA 0 VA	--	--	SPACE	54
55	SPACE	--	--	0 VA 0 VA			--	--	SPACE	56
57	SPACE	--	--		0 VA 0 VA		--	--	SPACE	58
59	SPACE	--	--			0 VA 0 VA	--	--	SPACE	60
	Total Load:			8776 VA	6744 VA	7208 VA				
	Total Amps:			74 A	56 A	61 A				

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
EQUIPMENT	10500 VA	100.00%	10500 VA		
LIGHTING	1416 VA	100.00%	1416 VA	**Total Conn. Load:**	22728 VA
POWER	2600 VA	100.00%	2600 VA	**Total Est. Demand:**	21950 VA
RECEPTACLES	4320 VA	100.00%	4320 VA	**Total Conn.:**	63 A
MECHANICAL EQUIPMENT	3892 VA	80.00%	3114 VA	**Total Est. Demand:**	61 A

Notes:

Panelboard: RP-1A

Location: ELEC 128 | **Volts:** 208Y/120 | **A.I.C. Rating:** 10,000
Supply From: T-1A | **Phases:** 3 | **Mains Type:** MCB
Mounting: Surface | **Wires:** 4 | **Bus Rating:** 225 A
Enclosure: Type 1 | **Neutral Rating:** 200% | **MCB Rating:** 175 A

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	RECEPTACLES - AV CLOSET 125A	20 A	1	180 VA 696 VA			1	15 A	CUH-3	2
3	RECEPTACLES - WEST CORRIDORS	20 A	1		360 VA 900 VA		1	20 A	RECEPTACLES - ROOMS 127, 128, 130, 140, 141	4
5	RECEPTACLES - WEST LOBBY BENCHES	20 A	1			900 VA 900 VA	1	20 A	RECEPTACLES - OFFICE 124	6
7	RECEPTACLES - WEST LOBBY BENCHES	20 A	1	720 VA 1080...			1	20 A	RECEPTACLES - PSYCHOLOGY 123	8
9	REFRIGERATOR RECEPTACLE - BREAK 106	20 A	1		1000... 900 VA		1	20 A	RECEPTACLES - BIOLOGY 122	10
11	COUNTERTOP RECEPTACLE - BREAK 106	20 A	1			1500... 900 VA	1	20 A	RECEPTACLES - ROOM 120, 122	12
13	GARBAGE DISPOSAL - BREAK 106	20 A	1	180 VA 900 VA			1	20 A	RECEPTACLES - BBB-1 120	14
15	RECEPTACLES - ROOMS 102, 106, 103	20 A	1		900 VA 1080...		1	20 A	RECEPTACLES - EAST CORRIDORS	16
17	RECEPTACLES - ROOMS 103, 104	20 A	1			900 VA 1000...	1	20 A	RECEPTACLES - EAST LOBBY TELEVISIONS	18
19	RECEPTACLES - LSM 101	20 A	1	1260... 720 VA			1	20 A	RECEPTACLES - EAST LOBBY BENCHES	20
21	RECEPTACLES - LSM 101	20 A	1		1440... 900 VA		1	20 A	RECEPTACLES - EAST LOBBY BENCHES	22
23	RECEPTACLES - OFFICE 108	20 A	1			720 VA 900 VA	1	20 A	RECEPTACLES - EAST LOBBY BENCHES	24
25	RECEPTACLES - OFFICE 109	20 A	1	900 VA 720 VA			1	20 A	RECEPTACLES - EAST LOBBY BENCHES	26
27	RECEPTACLES - OFFICE 110	20 A	1			720 VA 720 VA	1	20 A	RECEPTACLES - EAST LOBBY BENCHES	28
29	RECEPTACLES - CLASSROOM 111	20 A	1			1260... 720 VA	1	20 A	RECEPTACLES - EAST LOBBY BENCHES	30
31	RECEPTACLES - CLASSROOM 111	20 A	1	1050... 1440...			1	20 A	RECEPTACLES - EAST LOBBY BOOTHS	32
33	RECEPTACLES - CLASSROOM 111	20 A	1		1440... 180 VA		1	20 A	EXTERIOR RECEPTACLE - NORTH	34
35	RECEPTACLES - CLASSROOM 111	20 A	1			1440... 360 VA	1	20 A	RECEPTACLES - TELE 129	36
37	RECEPTACLES - CLASSROOM 111	20 A	1	1440... 50 VA			1	20 A	LIGHTING CONTROLLER	38
39	RECEPTACLES CLASSROOM 111	20 A	1		1440... 500 VA		1	20 A	ELECTRIC WATER COOLER (GFCI CB)	40
41	PROJECTION EQUIPMENT - CLASSROOM 111	20 A	1			180 VA 0 VA	1	20 A	SPARE	42
43	PROJECTION EQUIPMENT - CLASSROOM 111	20 A	1	180 VA 0 VA			1	20 A	SPARE	44
45	PROJECTION EQUIPMENT - CLASSROOM 111	20 A	1		180 VA 0 VA		1	20 A	SPARE	46
47	RECEPTACLES - LOBBY	20 A	1			1080... 0 VA	1	20 A	SPARE	48
49	SPARE	20 A	1	0 VA 0 VA			1	20 A	SPARE	50
51	SPARE	20 A	1		0 VA 0 VA		1	20 A	SPARE	52
53	SPARE	20 A	1			0 VA 0 VA	1	20 A	SPARE	54
55	SPARE	20 A	1	0 VA 0 VA			1	20 A	SPARE	56
57	SPARE	20 A	1		0 VA 0 VA		1	20 A	SPARE	58
59	SPARE	20 A	1			0 VA 0 VA	1	20 A	SPARE	60
	Total Load:			11516 VA	12660 VA	12760 VA				
	Total Amps:			96 A	107 A	108 A				

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
EQUIPMENT	3600 VA	100.00%	3600 VA		
LIGHTING	0 VA	0.00%	0 VA	**Total Conn. Load:**	36936 VA
POWER	500 VA	100.00%	500 VA	**Total Est. Demand:**	25777 VA
RECEPTACLES	32040 VA	65.61%	21020 VA	**Total Conn.:**	103 A
MECHANICAL EQUIPMENT	696 VA	80.00%	557 VA	**Total Est. Demand:**	72 A
APPLIANCE	100 VA	100.00%	100 VA		

Notes:

Panelboard: LP-2

Location: ELEC 228 | **Volts:** 480Y/277 | **A.I.C. Rating:** 35,000
Supply From: BUS DUCT | **Phases:** 3 | **Mains Type:** MLO
Mounting: Surface | **Wires:** 4 | **Bus Rating:** 100 A
Enclosure: Type 1 | **Neutral Rating:** 100%

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	LIGHTING - 255, 260-267	20 A	1	1062... 780 VA			1	20 A	(EO) LIGHTING - EAST CANOPY	2
3	LIGHTING - 240, 241, 250-254	20 A	1		1400... 1926...		1	20 A	(EO) LIGHTING - SOUTH FACADE	4
5	LIGHTING - 201-204, 206-210, 215-217	20 A	1			1540... 1764...	1	20 A	(EO) LIGHTING - SECOND LEVEL CORRIDORS	6
7	LIGHTING - 205, 211, 218	20 A	1	1652... 0 VA			1	20 A	(EO) DECORATIVE LIGHTING (ALTERNATE NO...	8
9	PHOTOCELL POWER; SENSING CKT FOR GTDs	20 A	1		0 VA 0 VA		1	20 A	(EO) SPARE	10
11	SPARE	20 A	1			0 VA 0 VA	1	20 A	(EO) SPARE	12
13	SPARE	20 A	1	0 VA 0 VA			1	20 A	SPARE	14
15	SPARE	20 A	1		0 VA 0 VA		1	20 A	SPARE	16
17	SPACE	--	--			0 VA 0 VA	--	--	SPACE	18
19	SPACE	--	--	0 VA 0 VA			--	--	SPACE	20
21	SPACE	--	--		0 VA 0 VA		--	--	SPACE	22
23	SPACE	--	--			0 VA 0 VA	--	--	SPACE	24
25	SPACE	--	--	0 VA 0 VA			--	--	SPACE	26
27	SPACE	--	--		0 VA 0 VA		--	--	SPACE	28
29	SPACE	--	--			0 VA 0 VA	--	--	SPACE	30
	Total Load:			3494 VA	3326 VA	3304 VA				
	Total Amps:			13 A	12 A	12 A				

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
LIGHTING	10123 VA	100.00%	10123 VA		
				Total Conn. Load:	10123 VA
				Total Est. Demand:	10123 VA
				Total Conn.:	12 A
				Total Est. Demand:	12 A

Notes:
(EO) - INDICATES ELECTRONICALLY OPERATED CIRCUIT BREAKER

Panelboard: RP-2A

Location: ELEC 228 | **Volts:** 208Y/120 | **A.I.C. Rating:** 10,000
Supply From: T-2A | **Phases:** 3 | **Mains Type:** MCB
Mounting: Surface | **Wires:** 4 | **Bus Rating:** 225 A
Enclosure: Type 1 | **Neutral Rating:** 200% | **MCB Rating:** 150 A

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	FURNITURE RECEPTACLES - D-DRY TECH WORKROOM LARGE 205	20 A	3	720 VA 900 VA			1	20 A	RECEPTACLES - OFFICE 267	2
3					720 VA 900 VA		1	20 A	RECEPTACLES - OFFICE - GRAD 266	4
5						720 VA 1080...	1	20 A	RECEPTACLES - BBB LECTURERS 265	6
7	FURNITURE RECEPTACLES - D-DRY TECH WORKROOM LARGE 205	20 A	3	720 VA 1080...			1	20 A	RECEPTACLES - BBB LECTURERS 264	8
9					720 VA 720 VA		1	20 A	RECEPTACLES - OFFICE - FACULTY 263	10
11						720 VA 900 VA	1	20 A	RECEPTACLES - OFFICE - GRAD 262	12
13	RECEPTACLES - WORKROOM LARGE 205	20 A	1	720 VA 1080...			1	20 A	RECEPTACLES - OFFICES 262, 255	14
15	RECEPTACLES - WORKROOM LARGE 205	20 A	1		720 VA 900 VA		1	20 A	RECEPTACLES - OFFICE - GRAD 255	16
17	RECEPTACLES - ROOMS 205, 201	20 A	1			900 VA 540 VA	1	20 A	RECEPTACLES - OFFICE - GRAD 260	18
19	SPARE	20 A	1	0 VA 720 VA			1	20 A	RECEPTACLES OFFICE - GRAD 260	20
21	SPARE	20 A	1		0 VA 720 VA		1	20 A	RECEPTACLES - A-WORK ROOM 211	22
23	SPARE	20 A	1			0 VA 720 VA	1	20 A	RECEPTACLES A-WORKROOM 211	24
25	SPARE	20 A	1	0 VA 720 VA						26
27	SPARE	20 A	1		0 VA 720 VA		3	20 A	FURNITURE RECEPTACLES - A-WORKROOM 211	28
29	SPARE	20 A	1			0 VA 720 VA				30
31	SPACE	--	--	0 VA 720 VA						32
33	SPACE	--	--		0 VA 720 VA		3	20 A	FURNITURE RECEPTACLES - A-WORKROOM 211	34
35	SPACE	--	--			0 VA 720 VA				36
37	SPACE	--	--	0 VA 720 VA			1	20 A	RECEPTACLES - A-WORKROOM 211	38
39	SPACE	--	--		0 VA 900 VA		1	20 A	RECEPTACLES - ROOMS 211, 218	40
41	SPACE	--	--			0 VA 0 VA	1	20 A	SPARE	42
43	SPACE	--	--	0 VA 0 VA			1	20 A	SPARE	44
45	SPACE	--	--		0 VA 0 VA		1	20 A	SPARE	46
47	SPACE	--	--			0 VA 0 VA	1	20 A	SPARE	48
49	SPACE	--	--	0 VA 0 VA			1	20 A	SPARE	50
51	SPACE	--	--		0 VA 0 VA		1	20 A	SPARE	52
53	SPACE	--	--			0 VA 0 VA	1	20 A	SPARE	54
	Total Load:			8100 VA	7740 VA	7020 VA				
	Total Amps:			68 A	65 A	59 A				

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
RECEPTACLES	22860 VA	71.87%	16430 VA		
				Total Conn. Load:	22860 VA
				Total Est. Demand:	16430 VA
				Total Conn.:	63 A
				Total Est. Demand:	46 A

Notes:

Panelboard: RP-2B

Location: ELEC 228 | **Volts:** 208Y/120 | **A.I.C. Rating:** 10,000
Supply From: T-2A | **Phases:** 3 | **Mains Type:** MCB
Mounting: Surface | **Wires:** 4 | **Bus Rating:** 225 A
Enclosure: Type 1 | **Neutral Rating:** 200% | **MCB Rating:** 150 A

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	RECEPTACLES - OFFICE 203	20 A	1	720 VA 1000...			1	20 A	REFRIGERATOR - BREAK/COPY 261	2
3	RECEPTACLES - OFFICE 203	20 A	1		900 VA 1440...		1	20 A	COPIER - BREAK/COPY 261	4
5	RECEPTACLES - TESTING 204	20 A	1			900 VA 1500...	1	20 A	COUNTER RCPT - BREAK/COPY 261	6
7	SMALL SOUND BOOTH - TESTING 204	20 A	1	500 VA 1500...			1	20 A	COUNTER RCPT - BREAK/COPY 261	8
9	LARGE SOUND BOOTH - TESTING 204	20 A	1		500 VA 1500...		1	20 A	COUNTER RCPT - BREAK/COPY 261	10
11	MEDIUM SOUND BOOTH - TESTING 204	20 A	1			500 VA 1500...	1	20 A	COUNTER RCPT - BREAK/COPY 261	12
13	RECEPTACLES - PREP 202	20 A	1	720 VA 1500...			1	20 A	COUNTER RCPT - BREAK/COPY 261	14
15	RECEPTACLES PREP 202	20 A	1		540 VA 900 VA		1	20 A	RECEPTACLES - OFFICE - FACULTY 254	16
17	DRYER - PREP 202	20 A	2			2288... 1440...	1	20 A	RECEPTACLES - OFFICE - FACULTY 253	18
19				2288... 1080...			1	20 A	RECEPTACLES - OFFICE - POST DOC 252	20
21	WASHER - PREP 202	20 A	1		180 VA 1080...		1	20 A	RECEPTACLES OFFICE - GRAD 251	22
23	RECEPTACLES - WEST CORRIDORS	20 A	1			720 VA 610 VA	1	20 A	RECEPTACLES - SEMINAR 250	24
25	RECEPTACLES - A-MEDIUM TESTING 209	20 A	1	900 VA 1180...			1	20 A	RECEPTACLES - ROOMS 250, 220	26
27	RECEPTACLES Room 209, 207	20 A	1		900 VA 1080...		1	20 A	RECEPTACLES - CORRIDORS	28
29	RECEPTACLES - A-MEDIUM TESTING 207	20 A	1			900 VA 720 VA	1	20 A	RECEPTACLES - ROOMS 228, 241, 240, 230	30
31	RECEPTACLES - A-LARGE TESTING 210	20 A	1	900 VA 500 VA			1	20 A	ELECTRIC WATER COOLER (GFCI CB)	32
33	RECEPTACLES Room 208, 210	20 A	1		1080... 720 VA		1	20 A	RECEPTACLES - INTERACTION 220	34
35	RECEPTACLES A-MEDIUM TESTING 208	20 A	1			1080... 360 VA	1	20 A	RECEPTACLES - TELE 229	36
37	RECEPTACLES A-MEDIUM TESTING 206	20 A	1	1080... 0 VA			1	20 A	SPARE	38
39	RECEPTACLES - ROOMS 217, 215, 215A	20 A	1		1080... 0 VA		1	20 A	SPARE	40
41	RECEPTACLES - A-SMALL TESTING 217	20 A	1			1080... 0 VA	1	20 A	SPARE	42
43	RECEPTACLES - A-SMALL TESTING 216	20 A	1	900 VA 0 VA			1	20 A	SPARE	44
45	SPARE	20 A	1		0 VA 0 VA		1	20 A	SPARE	46
47	SPARE	20 A	1			0 VA 0 VA	1	20 A	SPARE	48
49	SPARE	20 A	1	0 VA 0 VA			1	20 A	SPARE	50
51	SPARE	20 A	1		0 VA 0 VA		1	20 A	SPARE	52
53	SPARE	20 A	1			0 VA 0 VA	1	20 A	SPARE	54
	Total Load:			14768 VA	11900 VA	13598 VA				
	Total Amps:			125 A	99 A	115 A				

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
EQUIPMENT	14766 VA	100.00%	14766 VA		
LIGHTING	0 VA	0.00%	0 VA	**Total Conn. Load:**	40266 VA
RECEPTACLES	23400 VA	71.37%	16700 VA	**Total Est. Demand:**	33566 VA
APPLIANCE	2100 VA	100.00%	2100 VA	**Total Conn.:**	112 A
				Total Est. Demand:	93 A

Notes:

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ISSUE NO. 2		18JULY2013

SEALS AND SIGNATURES

KEYPLAN

LP-1	LP-LS1	RP-LS1
RP-OS1	RP-1A	LP-2
RP-2A	RP-2B	

DRAWING TITLE

GROUND AND SECOND LEVEL PANELBOARD SCHEDULES

SCALE 22668.000

PROJECT NUMBER

E7.4

DRAWING NUMBER

Plot Date: 7/16/2013 8:09:53 AM

Panelboard: LP-3

Location: ELEC 328 **Supply From:** BUS DUCT **Mounting:** Surface **Enclosure:** Type 1
Volts: 480Y/277 **Phases:** 3 **Wires:** 4 **Neutral Rating:** 100%
A.I.C. Rating: 35,000 **Mains Type:** MLO **Bus Rating:** 100 A

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	LIGHTING - 357, 358 360-367	20 A	1	1593...	1926...					1	20 A	(EO) LIGHTING - SOUTH FACADE	2
3	LIGHTING - 340, 341, 350-356	20 A	1			1298...	992 VA			1	20 A	(EO) LIGHTING - EAST FACADE GLASS	4
5	LIGHTING - 301, 302, 304, 305, 306	20 A	1					1980...	1969...	1	20 A	(EO) LIGHTING - THIRD LEVEL CORRIDORS	6
7	LIGHTING - 303, 308, 309, 311, 312, 313, 315, 316	20 A	1	1180...	0 VA					1	20 A	(EO) DECORATIVE LIGHTING (ALTERNATE NO...	8
9	SPARE	20 A	1			0 VA	0 VA			1	20 A	(EO) SPARE	10
11	SPARE	20 A	1					0 VA	0 VA	1	20 A	(EO) SPARE	12
13	SPARE	20 A	1	0 VA	0 VA					1	20 A	(EO) SPARE	14
15	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	16
17	SPACE	--	--					0 VA	0 VA	--	--	SPACE	18
19	SPACE	--	--	0 VA	0 VA					--	--	SPACE	20
21	SPACE	--	--			0 VA	0 VA			--	--	SPACE	22
23	SPACE	--	--					0 VA	0 VA	--	--	SPACE	24
25	SPACE	--	--	0 VA	0 VA					--	--	SPACE	26
27	SPACE	--	--			0 VA	0 VA			--	--	SPACE	28
29	SPACE	--	--					0 VA	0 VA	--	--	SPACE	30
			Total Load:	4699 VA		2290 VA		3949 VA					
			Total Amps:	18 A		8 A		15 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
LIGHTING	10938 VA	100.00%	10938 VA		
				Total Conn. Load:	10938 VA
				Total Est. Demand:	10938 VA
				Total Conn.:	13 A
				Total Est. Demand:	13 A

Notes:

Panelboard: RP-3A

Location: ELEC 328 **Supply From:** T-3A **Mounting:** Surface **Enclosure:** Type 1
Volts: 208Y/120 **Phases:** 3 **Wires:** 4 **Neutral Rating:** 200%
A.I.C. Rating: 10,000 **Mains Type:** MCB **Bus Rating:** 225 A **MCB Rating:** 150 A

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	RECEPTACLES - B/C CONTROL 302	20 A	1	1080...	1080...					1	20 A	RECEPTACLES - OFFICE 367	2
3	RECEPTACLES - B/C WORK ROOM 301	20 A	1			720 VA	1080...			1	20 A	RECEPTACLES - OFFICE 366	4
5	RECEPTACLES - B/C WORK ROOM 301	20 A	1					720 VA	1080...	1	20 A	RECEPTACLES - OFFICE POST DOC 365	6
7	RECEPTACLES - B/C WORK ROOM 301	20 A	1	720 VA	900 VA					1	20 A	RECEPTACLES - OFFICE - FACULTY 364	8
9	RECEPTACLES - B/C WORK ROOM 301	20 A	1			900 VA	900 VA			1	20 A	RECEPTACLES - OFFICE - FACULTY 362	10
11	RECEPTACLES - B/C WORK ROOM 301	20 A	1					720 VA	900 VA	1	20 A	RECEPTACLES - OFFICE - FACULTY 363	12
13					720 VA					1	20 A	RECEPTACLES - B/C COMPUTER LAB 315	14
15							720 VA			1	20 A	RECEPTACLES - B/C COMPUTER LAB 315	16
17	RECEPTACLES - B/C WORK ROOM 303	20 A	1					180 VA	720 VA	1	20 A	RECEPTACLES - B/C COMPUTER LAB 315	18
19				720 VA	720 VA					1	20 A	RECEPTACLES - B/C COMPUTER LAB 315	20
21	RECEPTACLES - B/C WORK ROOM 303	20 A	3			720 VA	720 VA			1	20 A	RECEPTACLES - B/C COMPUTER LAB 315	22
23								720 VA	720 VA	1	20 A	RECEPTACLES - B/C COMPUTER LAB 315	24
25				720 VA	720 VA					1	20 A	RECEPTACLES - B/C COMPUTER LAB 308	26
27	RECEPTACLES - B/C WORK ROOM 301	20 A	3			720 VA	720 VA			1	20 A	RECEPTACLES - B/C COMPUTER LAB 308	28
29								720 VA	720 VA	1	20 A	RECEPTACLES - B/C COMPUTER LAB 308	30
31				720 VA	720 VA					1	20 A	RECEPTACLES - B/C COMPUTER LAB 308	32
33	RECEPTACLES - B/C WORK ROOM 301	20 A	3			720 VA	720 VA			1	20 A	RECEPTACLES - B/C COMPUTER LAB 308	34
35								720 VA	720 VA	1	20 A	RECEPTACLES - B/C COMPUTER LAB 308	36
37				720 VA	720 VA								38
39	RECEPTACLES B/C WORK ROOM 303	20 A	3			720 VA	720 VA			3	20 A	RECEPTACLES B/C WORK ROOM 303	40
41								720 VA	720 VA				42
43	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	44
45	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	46
47	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	48
49	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	50
51	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	52
53	SPACE	--	--					0 VA	0 VA	--	--	SPACE	54
55	SPACE	--	--	0 VA	0 VA					--	--	SPACE	56
57	SPACE	--	--			0 VA	0 VA			--	--	SPACE	58
59	SPACE	--	--					0 VA	0 VA	--	--	SPACE	60
			Total Load:	10260 VA		10080 VA		10080 VA					
			Total Amps:	86 A		84 A		84 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
RECEPTACLES	30420 VA	66.44%	20210 VA		
				Total Conn. Load:	30420 VA
				Total Est. Demand:	20210 VA
				Total Conn.:	84 A
				Total Est. Demand:	56 A

Notes:

Panelboard: RP-3B

Location: ELEC 328 **Supply From:** T-3A **Mounting:** Surface **Enclosure:** Type 1
Volts: 208Y/120 **Phases:** 3 **Wires:** 4 **Neutral Rating:** 200%
A.I.C. Rating: 10,000 **Mains Type:** MCB **Bus Rating:** 225 A **MCB Rating:** 150 A

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	RECEPTACLES - ROOMS 315, 308, 316, 309	20 A	1	1080...	1440...					1	20 A	REFRIGERATOR - BREAK/COPY 360	2
3	RECEPTACLES - WEST CORRIDORS	20 A	1			1080...	1000...			1	20 A	COPIER - BREAK/COPY 360	4
5	RECEPTACLES - B/C SMALL TEST ROOM 313	20 A	1					720 VA	1500...	1	20 A	COUNTERTOP RCPT - BREAK/COPY 360	6
7	RECEPTACLES - B/C SMALL TEST ROOM 312	20 A	1	720 VA	1500...					1	20 A	COUNTERTOP RCPT - BREAK/COPY 360	8
9	RECEPTACLES - B/C SMALL TEST ROOM 311	20 A	1			720 VA	1500...			1	20 A	COUNTERTOP RCPT - BREAK/COPY 360	10
11	RECEPTACLES - B/C MEDIUM TEST ROOM 305	20 A	1					720 VA	1500...	1	20 A	COUNTERTOP RCPT - BREAK/COPY 360	12
13	RECEPTACLES - B/C LARGE TEST ROOM 304	20 A	1	720 VA	1500...					1	20 A	COUNTERTOP RCPT - BREAK/COPY 360	14
15	RECEPTACLES - B/C COMPUTER LAB 306	20 A	1			720 VA	500 VA			1	20 A	ELECTRIC WATER COOLER - CORR C-305	16
17	RECEPTACLES - B/C COMPUTER LAB 306	20 A	1					720 VA	900 VA	1	20 A	RECEPTACLES - CORRDIORS	18
19	RECEPTACLES - B/C COMPUTER LAB 306	20 A	1	720 VA	720 VA					1	20 A	RECEPTACLES - TOILET ROOMS, JC, ELEC	20
21	RECEPTACLES - B/C COMPUTER LAB 306	20 A	1			720 VA	1280...			1	20 A	RECEPTACLES - DEPARTMENTAL SEMINAR 357	22
23	RECEPTACLES - B/C COMPUTER LAB 306	20 A	1					720 VA	720 VA	1	20 A	RECEPTACLES - DEPARTMENTAL SEMINAR 357	24
25	RECEPTACLES - B/C COMPUTER LAB 306	20 A	1	720 VA	1080...					1	20 A	RECEPTACLES OFFICE - GRAD 361	26
27	RECEPTACLES - B/C COMPUTER LAB 306	20 A	1			720 VA	1080...			1	20 A	RECEPTACLES OFFICE - GRAD 358	28
29	RECEPTACLES B/C COMPUTER LAB 306	20 A	1					1440...	900 VA	1	20 A	RECEPTACLES - OFFICE - FACULTY 356	30
31	RECEPTACLES B/C COMPUTER LAB 306	20 A	1	1440...	900 VA					1	20 A	RECEPTACLES - OFFICE - FACULTY 355	32
33	RECEPTACLES B/C COMPUTER LAB 306	20 A	1			1440...	900 VA			1	20 A	RECEPTACLES - OFFICE - FACULTY 354	34
35	RECEPTACLES - INTERACTION 320	20 A	1					720 VA	1080...	1	20 A	RECEPTACLES - OFFICE POST DOC 353	36
37	RECEPTACLES - TELE 329	20 A	1	360 VA	1080...					1	20 A	RECEPTACLES - OFFICE 352	38
39	SPARE	20 A	1			0 VA	1430...			1	20 A	RECEPTACLES - SEMINAR 351	40
41	SPARE	20 A	1					0 VA	1430...	1	20 A	RECEPTACLES - SEMINAR 350	42
43	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	44
45	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	46
47	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	48
49	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	50
51	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	52
53	SPACE	--	--					0 VA	0 VA	--	--	SPACE	54
55	SPACE	--	--	0 VA	0 VA					--	--	SPACE	56
57	SPACE	--	--			0 VA	0 VA			--	--	SPACE	58
59	SPACE	--	--					0 VA	0 VA	--	--	SPACE	60
			Total Load:	13980 VA		13090 VA		13070 VA					
			Total Amps:	117 A		109 A		109 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
EQUIPMENT	10440 VA	100.00%	10440 VA		
LIGHTING	0 VA	0.00%	0 VA	Total Conn. Load:	40140 VA
POWER	500 VA	100.00%	500 VA	Total Est. Demand:	30740 VA
RECEPTACLES	28800 VA	67.36%	19400 VA	Total Conn.:	111 A
APPLIANCE	400 VA	100.00%	400 VA	Total Est. Demand:	85 A

Notes:

Panelboard: LP-4

Location: ELEC 428 **Supply From:** BUS DUCT **Mounting:** Surface **Enclosure:** Type 1
Volts: 480Y/277 **Phases:** 3 **Wires:** 4 **Neutral Rating:** 100%
A.I.C. Rating: 35,000 **Mains Type:** MLO **Bus Rating:** 100 A

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	LIGHTING - 460-469	20 A	1	1121...	1876...					1	20 A	(EO) LIGHTING - SOUTH FACADE	2
3	LIGHTING - 440, 441, 450-457	20 A	1			1990...	128 VA			1	20 A	(EO) LIGHTING - CORRIDOR 404, 415	4
5	LIGHTING - 401, 403-409, 413, 414, 416, 418	20 A	1					1155...	2053...	1	20 A	(EO) LIGHTING - FOURTH LEVEL CORRIDORS	6
7	LIGHTING - 405, 405A, 405B, 417, 419-425	20 A	1	1657...	0 VA					1	20 A	(EO) DECORATIVE LIGHTING (ALTERNATE NO...	8
9	LIGHTING - PENTHOUSE	20 A	1			1300...	0 VA			1	20 A	(EO) SPARE	10
11	SPARE	20 A	1					0 VA	0 VA	1	20 A	(EO) SPARE	12
13	SPARE	20 A	1	0 VA	0 VA					1	20 A	(EO) SPARE	14
15	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	16
17	SPACE	--	--					0 VA	0 VA	--	--	SPACE	18
19	SPACE	--	--	0 VA	0 VA					--	--	SPACE	20
21	SPACE	--	--			0 VA	0 VA			--	--	SPACE	22
23	SPACE	--	--					0 VA	0 VA	--	--	SPACE	24
25	SPACE	--	--	0 VA	0 VA					--	--	SPACE	26
27	SPACE	--	--			0 VA	0 VA			--	--	SPACE	28
29	SPACE	--	--					0 VA	0 VA	--	--	SPACE	30
			Total Load:	4654 VA		3418 VA		3208 VA					
			Total Amps:	17 A		12 A		12 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
LIGHTING	11279 VA	100.00%	11279 VA		
				Total Conn. Load:	11279 VA
				Total Est. Demand:	11279 VA
				Total Conn.:	14 A
				Total Est. Demand:	14 A

Notes:
(EO) - INDICATES ELECTRONICALLY OPERATED CIRCUIT BREAKER

Panelboard: LP-LS4

Location: ELEC 428 **Supply From:** ATS-LS **Mounting:** Surface **Enclosure:** Type 1
Volts: 480Y/277 **Phases:** 3 **Wires:** 4 **Neutral Rating:** 100%
A.I.C. Rating: 35,000 **Mains Type:** MCB **Bus Rating:** 100 A **MCB Rating:** 100 A

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1				1150...	1760...								2
3	T-LS4	30 A	3			1460...	2443...			3	50 A	LP-LS1	4
5								100 VA	840 VA				6
7	SPARE	20 A	1	0 VA	775 VA					1	20 A	LIFE SAFETY LIGHTING - THIRD LEVEL	8
9	SPARE	20 A	1			0 VA	709 VA			1	20 A	LIFE SAFETY LIGHTING - FOURTH LEVEL	10
11	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	12
13	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	14
15	SPACE	--	--			0 VA	0 VA			--	--	SPACE	16
17	SPACE	--	--					0 VA	0 VA	--	--	SPACE	18
			Total Load:	3685 VA		4612 VA		940 VA					
			Total Amps:	15 A		18 A		3 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
LIGHTING	5363 VA	100.00%	5363 VA		
POWER	2650 VA	100.00%	2650 VA	Total Conn. Load:	9237 VA
RECEPTACLES	360 VA	100.00%	360 VA	Total Est. Demand:	9064 VA
MECHANICAL EQUIPMENT	864 VA	80.00%	691 VA	Total Conn.:	11 A
				Total Est. Demand:	11 A

Notes:

Panelboard: RP-LS4

Location: ELEC 428 **Supply From:** T-LS4 **Mounting:** Surface **Enclosure:** Type 1
Volts: 208Y/120 **Phases:** 3 **Wires:** 4 **Neutral Rating:** 100%
A.I.C. Rating: 10,000 **Mains Type:** MCB **Bus Rating:** 100 A **MCB Rating:** 60 A

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1				1050...	0 VA					1	20 A	FIRE SHUTTER	2
3	RP-GEN	30 A	3			1360...	0 VA			1	20 A	FIRE SHUTTER	4
5								100 VA	0 VA	1	20 A	FIRE SHUTTER	6
7	NAC POWER ELEC 328	20 A	1	100 VA	0 VA					1	20 A	FIRE SHUTTER	8
9	NAC POWER ELEC 428	20 A	1			100 VA	0 VA			1	20 A	FIRE SHUTTER	10
11	DRY PIPE CONTROL PANEL	20 A	1					0 VA	0 VA	1	20 A	FIRE SHUTTER	12
13	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	14
15	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	16
17	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	18
19	SPACE	--	--	0 VA	0 VA					--	--	SPACE	20
21	SPACE	--	--			0 VA	0 VA			--	--	SPACE	22
23	SPACE	--	--					0 VA	0 VA	--	--	SPACE	24
25	SPACE	--	--	0 VA	0 VA					--	--	SPACE	26
27	SPACE	--	--			0 VA	0 VA			--	--	SPACE	28
29	SPACE	--	--					0 VA	0 VA	--	--	SPACE	30
			Total Load:	1150 VA		1460 VA		100 VA					
			Total Amps:	11 A		14 A		1 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
POWER	2350 VA	100.00%	2350 VA		
RECEPTACLES	360 VA	100.00%	360 VA	Total Conn. Load:	2710 VA
				Total Est. Demand:	2710 VA
				Total Conn.:	8 A
				Total Est. Demand:	8 A

Notes:

Panelboard: RP-OS4

Location: ELEC 428 **Supply From:** T-OS **Mounting:** Surface **Enclosure:** Type 1
Volts: 208Y/120 **Phases:** 3 **Wires:** 4 **Neutral Rating:** 200%
A.I.C. Rating: 10,000 **Mains Type:** MCB **Bus Rating:** 225 A **MCB Rating:** 175 A

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	FC-4	20 A	1	264 VA	1500...					1	20 A	-80 FREEZER - CLINICAL GENOMICS 412	2
3	FC-5	20 A	1			264 VA	1500...			1	20 A	-80 FREEZER - CLINICAL GENOMICS 412	4
5	RECEPTACLES - ELEC 328	20 A	1					180 VA	180 VA	1	20 A	RECEPTACLES - ELEC 428	6
7	RECEPTACLES - TELE 329	20 A	1	360 VA	360 VA					1	20 A	RECEPTACLES - TELE 429	8
9	RECEPTACLES - TELE 329	20 A	1			720 VA	720 VA			1	20 A	RECEPTACLES - TELE 429	10
11	6-30R RECEPTACLE - TELE 329	30 A	2					1000...	1000...	2	30 A	6-30R RECEPTACLE - TELE 429	12
13				1000...	1000...								14
15	RECEPTACLES - PENTHOUSE	20 A	1			720 VA	500 VA			1	20 A	CONTROLS POWER - THIRD LEVEL	16
17	RECEPTACLES - SUBSTATION ROOM	20 A	1					540 VA	500 VA	1	20 A	CONTROLS POWER - THIRD LEVEL	18
19	SWITCHGEAR BATTERY CHARGER	20 A	1	50 VA	500 VA					1	20 A	CONTROLS POWER - FOURTH LEVEL	20
21	STANDBY LIGHTING - THIRD AND FOURTH...	20 A	1			472 VA	500 VA			1	20 A	CONTROLS POWER - FOURTH LEVEL	22
23	GLP-1	20 A	1					864 VA	500 VA	1	20 A	CONTROLS POWER - PENTHOUSE	24
25	LIGHTING	20 A	1	118 VA	500 VA					1	20 A	CONTROLS POWER - PENTHOUSE	26
27	SPARE	20 A	1			0 VA	100 VA			1	20 A	SMOKE DAMPERS-THIRD, FOURTH,...	28
29	STANDBY LIGHTING - PENTHOUSE	20 A	1					1139...	0 VA	1	20 A	SPARE	30
31	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	32
33	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	34
35	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	36
37	SPARE	20 A	1	0 VA	8776...								38
39	SPARE	20 A	1			0 VA	6744...			3	100 A	RP-OS1	40
41	SPARE	20 A	1					0 VA	7208...				42
			Total Load:	14428 VA		12240 VA		13111 VA					
			Total Amps:	121 A		102 A		110 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
EQUIPMENT	17500 VA	100.00%	17500 VA		
LIGHTING	3145 VA	100.00%	3145 VA	Total Conn. Load:	39779 VA
POWER	2650 VA	100.00%	2650 VA	Total Est. Demand:	38102 VA
RECEPTACLES	8100 VA	100.00%	8100 VA	Total Conn.:	110 A
MECHANICAL EQUIPMENT	8384 VA	80.00%	6707 VA	Total Est. Demand:	106 A

Notes:

Panelboard: RP-4A

Location: ELEC 428 **Supply From:** T-4A **Mounting:** Surface **Enclosure:** Type 1
Volts: 208Y/120 **Phases:** 3 **Wires:** 4 **Neutral Rating:** 200%
A.I.C. Rating: 10,000 **Mains Type:** MCB **Bus Rating:** 225 A **MCB Rating:** 150 A

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	RECEPTACLES - MH OFFICE 422	20 A	1	900 VA	1080...					1	20 A	RECEPTACLES - OFFICE 469	2
3	RECEPTACLES - SMALL TEST 420	20 A	1			1080...	1080...			1	20 A	RECEPTACLES - OFFICE 468	4
5	RECEPTACLES - WORKROOM 405	20 A	1					720 VA	1080...	1	20 A	RECEPTACLES - OFFICE POST DOC 467	6
7	RECEPTACLES - WORKROOM 405	20 A	1	720 VA	900 VA					1	20 A	RECEPTACLES - OFFICE - FACULTY 466	8
9						720 VA	900 VA			1	20 A	RECEPTACLES - OFFICE - FACULTY 465	10
11	FURNITURE RECEPTACLES - WORKROOM 405	20 A	3					720 VA	720 VA	1	20 A	RECEPTACLES - OFFICE - FACULTY 464	12
13				720 VA	900 VA					1	20 A	RECEPTACLES - OFFICE - GRAD 463	14
15						720 VA	1260...			1	20 A	RECEPTACLES - ROOMS 463, 462	16
17	FURNITURE RECEPTACLES - WORKROOM 405	20 A	3					720 VA	1080...	1	20 A	RECEPTACLES - ROOMS 462, 461	18
19				720 VA	900 VA					1	20 A	RECEPTACLES - OFFICE 461	20
21	FURNITURE RECEPTACLES - WORKROOM 405	20 A	2			540 VA	1260...			1	20 A	RECEPTACLES - OFFICE 458	22
23								540 VA	1440...	1	20 A	RECEPTACLES - OFFICE - GRAD 457	24
25	RECEPTACLES - CONFERENCE 405B	20 A	1	1080...	1440...					1	20 A	RECEPTACLES - OFFICE - GRAD 456	26
27	RECEPTACLES - OFFICE 405A	20 A	1			1080...	970 VA			1	20 A	RECEPTACLES - SEMINAR 450	28
29	RECEPTACLES - SMALL TEST 424	20 A	1					1080...	0 VA	1	20 A	SPARE	30
31	RECEPTACLES - SMALL TEST 425	20 A	1	900 VA	0 VA					1	20 A	SPARE	32
33	RECEPTACLES - AC THERAPY 421	20 A	1			1080...	0 VA			1	20 A	SPARE	34
35	RECEPTACLES - AC THERAPY 419	20 A	1					1080...	0 VA	1	20 A	SPARE	36
37	RECEPTACLES - ROOMS 417, 415	20 A	1	900 VA	0 VA					1	20 A	SPARE	38
39	RECEPTACLES - CENTRAL CORRIDORS, ROOF	20 A	1			1080...	0 VA			1	20 A	SPARE	40
41	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	42
43	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	44
45	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	46
47	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	48
49	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	50
51	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	52
53	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	54
			Total Load:	11160 VA		11770 VA		9180 VA					
			Total Amps:	96 A		101 A		77 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
EQUIPMENT	250 VA	100.00%	250 VA		
RECEPTACLES	31860 VA	65.69%	20930 VA	Total Conn. Load:	32110 VA
				Total Est. Demand:	21180 VA
				Total Conn.:	89 A
				Total Est. Demand:	59 A

Notes:

Panelboard: RP-4B

Location: ELEC 428 **Supply From:** T-4A **Mounting:** Surface **Enclosure:** Type 1
Volts: 208Y/120 **Phases:** 3 **Wires:** 4 **Neutral Rating:** 200%
A.I.C. Rating: 10,000 **Mains Type:** MCB **Bus Rating:** 225 A **MCB Rating:** 150 A

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	RECEPTACLES - CL SMALL TEST 403	20 A	1	1080...	500 VA					1	20 A	GARBAGE DISPOSAL - BREAK/COPY 460	2
3	RECEPTACLES - CL SMALL TEST 401	20 A	1			1080...	1500...			1	20 A	COUNTER RCPT - BREAK/COPY 460	4
5	RECEPTACLES - CL SMALL TEST 404	20 A	1					1080...	1500...	1	20 A	COUNTER RCPT - BREAK/COPY 460	6
7	RECEPTACLES - CL SMALL TEST 402	20 A	1	1080...	1500...					1	20 A	COUNTER RCPT - BREAK/COPY 460	8
9	RECEPTACLES - CL SMALL TEST 409	20 A	1			1080...	1500...			1	20 A	COUNTER RCPT - BREAK/COPY 460	10
11	RECEPTACLES - CL SMALL TEST 407	20 A	1					1080...	1500...	1	20 A	COUNTERTOP RCPT - BREAK/COPY 460	12
13	RECEPTACLES - CL SMALL TEST 408	20 A	1	1080...	1000...					1	20 A	REFRIGERATOR - BREAK/COPY 460	14
15	RECEPTACLES - CL SMALL TEST 406	20 A	1			1080...	1440...			1	20 A	COPIER - BREAK/COPY 460	16
17	RECEPTACLES - ROOMS 412, 413	20 A	1					900 VA	500 VA	1	20 A	ELECTRIC WATER COOLER (GFCI CB)	18
19	REFRIGERATOR - CLINICAL GENOMICS 412	20 A	1	1000...	720 VA					1	20 A	RECEPTACLES - ROOMS 440, 441, 428, 430	20
21	RECEPTACLES - AC FAMILY TEST 418	20 A	1			720 VA	1080...			1	20 A	RECEPTACLES - EAST CORRIDORS	22
23	RECEPTACLES - AC FAMILY TEST 416	20 A	1					720 VA	820 VA	1	20 A	RECEPTACLES - ROOMS 450, 433	24
25	RECEPTACLES - MEDIUM TEST 413	20 A	1	900 VA	1080...					1	20 A	RECEPTACLES - OFFICE 451	26
27	RECEPTACLES - WEST CORRIDORS	20 A	1			720 VA	1080...			1	20 A	RECEPTACLES - OFFICE POST DOC 452	28
29	SPARE	20 A	1					0 VA	720 VA	1	20 A	RECEPTACLES - OFFICE - FACULTY 453	30
31	SPARE	20 A	1	0 VA	900 VA					1	20 A	RECEPTACLES - OFFICE - FACULTY 454	32
33	SPARE	20 A	1			0 VA	720 VA			1	20 A	RECEPTACLES - OFFICE - FACULTY 455	34
35	SPARE	20 A	1					0 VA	360 VA	1	20 A	RECEPTACLES TELE 429	36
37	SPARE	20 A	1	0 VA	720 VA					1	20 A	RECEPTACLES INTERACTION 433	38
39	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	40
41	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	42
43	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	44
45	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	46
47	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	48
49	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	50
51	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	52
53	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	54
			Total Load:	11560 VA		12000 VA		9180 VA					
			Total Amps:	99 A		103 A		77 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
EQUIPMENT	10940 VA	100.00%	10940 VA		
LIGHTING	0 VA	0.00%	0 VA	Total Conn. Load:	32740 VA
POWER	500 VA	100.00%	500 VA	Total Est. Demand:	27140 VA
RECEPTACLES	21200 VA	73.58%	15600 VA	Total Conn.:	91 A
APPLIANCE	100 VA	100.00%	100 VA	Total Est. Demand:	75 A

Notes:

Plot Date: 7/16/2013 8:01:48 AM

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ISSUED FOR	REV	DATE
ISSUE NO. 2		18JULY2013

SEALS AND SIGNATURES

KEYPLAN

LP-3	RP-3A	RP-3B
LP-4	LP-LS4	RP-LS4
RP-OS4	RP-4A	RP-4B

DRAWING TITLE
THIRD AND FOURTH LEVEL PANELBOARD SCHEDULES

SCALE

22668.000
PROJECT NUMBER

E7.5
DRAWING NUMBER

Substation: 1A

Location: SWITCHGEAR/SUBSTATION ROOM P02 **Volts:** 480Y/277 **A.I.C. Rating:** 65,000
Supply From: SUBSTATION TRANSFORMER **Phases:** 3 **Mains Type:** MCB
Mounting: FREESTANDING **Wires:** 4 **Bus Rating:** 3200 A
Enclosure: **MCB Rating:** 2500 A

CKT	Circuit Description	# of Poles	Frame Size	Trip Rating	Load	Remarks
1	PP-5	3	800 A	600 A	256059 VA	
2	ATS-OS	3	400 A	400 A	144817 VA	
3	ATS-LR	3	400 A	250 A	93578 VA	
4	SPARE	3	--	300 A	0 VA	
5	SPARE	3	--	150 A	0 VA	
6	SPARE	3	--	100 A	0 VA	
7	SPARE	3	--	100 A	0 VA	
				Total Conn. Load:	494455 VA	
				Total Amps:	595 A	

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
ELEVATOR	86424 VA	95.00%	82103 VA		
EQUIPMENT	17850 VA	100.00%	17850 VA	**Total Conn. Load:**	494455 VA
LIGHTING	3617 VA	100.00%	3617 VA	**Total Est. Demand:**	414733 VA
POWER	2650 VA	100.00%	2650 VA	**Total Conn.:**	595 A
RECEPTACLES	12060 VA	91.46%	11030 VA	**Total Est. Demand:**	499 A
MECHANICAL EQUIPMENT	371854 VA	80.00%	297483 VA		

Notes:

Substation: 1B

Location: SWITCHGEAR/SUBSTATION ROOM P02 **Volts:** 480Y/277 **A.I.C. Rating:** 65,000
Supply From: SUBSTATION TRANSFORMER **Phases:** 3 **Mains Type:** MCB
Mounting: FREESTANDING **Wires:** 4 **Bus Rating:** 3200 A
Enclosure: **MCB Rating:** 2500 A

CKT	Circuit Description	# of Poles	Frame Size	Trip Rating	Load	Remarks
1	BUS DUCT	3	800 A	600 A	450423 VA	
2	PP-0A	3	400 A	200 A	75122 VA	
3	ATS-LS	3	125 A	100 A	9188 VA	
4	SPARE	3	--	400 A	0 VA	
5	SPARE	3	--	225 A	0 VA	
6	SPARE	3	--	100 A	0 VA	
7	SPARE	3	--	100 A	0 VA	
				Total Conn. Load:	534733 VA	
				Total Amps:	643 A	

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
EQUIPMENT	120246 VA	100.00%	120246 VA		
LIGHTING	64787 VA	100.00%	64787 VA	**Total Conn. Load:**	534733 VA
POWER	4350 VA	100.00%	4350 VA	**Total Est. Demand:**	392637 VA
RECEPTACLES	262420 VA	51.91%	136210 VA	**Total Conn.:**	643 A
MECHANICAL EQUIPMENT	79430 VA	80.00%	63544 VA	**Total Est. Demand:**	472 A
APPLIANCE	3500 VA	100.00%	3500 VA		

Notes:

Switchboard: SWBD-EM

Location: SWITCHGEAR/SUBSTATION... **Volts:** 480Y/277 **A.I.C. Rating:** 35,000
Supply From: GENERATOR **Phases:** 3 **Mains Type:** MLO
Mounting: Surface **Wires:** 4 **Bus Rating:** 800 A
Enclosure: Type 1

CKT	Circuit Description	# of Poles	Frame Size	Trip Rating	Load	Remarks
1	ATS-LS	3	100 A	100 A	9188 VA	
2	ATS-LR	3	400 A	250 A	93578 VA	
3	ATS-OS	3	400 A	400 A	144817 VA	
4	SPARE	3	400 A	300 A	0 VA	
				Total Conn. Load:	247583 VA	
				Total Amps:	298 A	

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
ELEVATOR	86424 VA	95.00%	82103 VA		
EQUIPMENT	17700 VA	100.00%	17700 VA	**Total Conn. Load:**	247583 VA
LIGHTING	8931 VA	100.00%	8931 VA	**Total Est. Demand:**	219288 VA
POWER	5300 VA	100.00%	5300 VA	**Total Conn.:**	298 A
RECEPTACLES	9360 VA	100.00%	9360 VA	**Total Est. Demand:**	264 A
MECHANICAL EQUIPMENT	119869 VA	80.00%	95895 VA		

Notes:
PROVIDE UL891 SWITCHBOARD CONSTRUCTION WITH SEPARATE VERTICAL SECTIONS COMPLIANT WITH NEC ARTICLE 700.

SUBSTATION CIRCUIT BREAKER SETTINGS SCHEDULE

CIRCUIT BREAKER	SENSOR	PLUG	LTPU	LTD	STPU	STD-I2D	INST
1A-MAIN	2500	2500	1	2	12	0.5	5
1A-1	600	600	1	3.1	10	0.5	5.1
1A-2	400	400	1	10.5	10	0.5	7.9
1A-3	400	250	1	24	8	0.5	8
TIE	2500	2500	1	2	12	0.5	5
1B-MAIN	2500	2500	1	2	12	0.5	5
1B-1	600	600	1	16.5	10	0.45	10
1B-2	200	200	1	24	10	0.43	10.5
1B-3	125	100	1	24	8	0.5	8

Distribution Panel: PP-5

Location: MECHANICAL EQUIPMENT P01 **Volts:** 480Y/277 **A.I.C. Rating:** 65,000
Supply From: SUBSTATION 1A **Phases:** 3 **Mains Type:** MLO
Mounting: Surface **Wires:** 4 **Bus Rating:** 600 A
Enclosure: Type 1

CKT	Circuit Description	# of Poles	Frame Size	Trip Rating	Load	Remarks
1	SF-1A & 1B	3	100 A	90 A	44874 VA	
2	SF-1C & 1D	3	100 A	90 A	44874 VA	
3	RF-1	3	100 A	80 A	28254 VA	
4	SF-2A & 2B	3	100 A	90 A	44874 VA	
5	SF-2C & 2D	3	100 A	90 A	44874 VA	
6	RF-2	3	100 A	80 A	28254 VA	
7	EF-3	3	30 A	15 A	2493 VA	
8	EF-4	3	30 A	15 A	1330 VA	
9	VP-1	3	30 A	20 A	9141 VA	
10	T-5	3	30 A	30 A	4266 VA	
11	AHU-4	3	15 A	15 A	2825 VA	
12	SPARE	3	--	100 A	0 VA	
13	SPARE	3	--	60 A	0 VA	
14	SPACE	--	--	--	0 VA	--
15	SPACE	--	--	--	0 VA	--
				Total Conn. Load:	256059 VA	
				Total Amps:	308 A	

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
EQUIPMENT	150 VA	100.00%	150 VA		
RECEPTACLES	3060 VA	100.00%	3060 VA	**Total Conn. Load:**	256059 VA
MECHANICAL EQUIPMENT	252849 VA	80.00%	202279 VA	**Total Est. Demand:**	205489 VA
				Total Conn.:	308 A
				Total Est. Demand:	247 A

Notes:

Panelboard: RP-5

Location: MECHANICAL EQUIPMENT P01 **Volts:** 208Y/120 **A.I.C. Rating:** 10,000
Supply From: T-5 **Phases:** 3 **Mains Type:** MCB
Mounting: Surface **Wires:** 4 **Bus Rating:** 100 A
Enclosure: Type 1 **Neutral Rating:** 100% **MCB Rating:** 60 A

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	UH-1, UH-2, UH-3, UH-4	20 A	1	1056...	0 VA					1	20 A	SPARE	2
3	RECEPTACLES - PENTHOUSE	20 A	1			900 VA	0 VA			1	20 A	SPARE	4
5	RECEPTACLES - PENTHOUSE, SUBSTATION...	20 A	1					1080...	0 VA	1	20 A	SPARE	6
7	RECEPTACLES - PENTHOUSE	20 A	1	1080...	0 VA					1	20 A	SPARE	8
9	DIRECT CONNECTION - AHU LIGHTS	20 A	1			150 VA	0 VA			1	20 A	SPARE	10
11	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	12
13	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	14
15	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	16
17	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	18
19	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	20
21	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	22
23	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	24
				Total Load:	2136 VA		1050 VA		1080 VA				
				Total Amps:	18 A		9 A		9 A				

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
EQUIPMENT	150 VA	100.00%	150 VA		
RECEPTACLES	3060 VA	100.00%	3060 VA	**Total Conn. Load:**	4266 VA
MECHANICAL EQUIPMENT	1056 VA	80.00%	845 VA	**Total Est. Demand:**	4055 VA
				Total Conn.:	12 A
				Total Est. Demand:	11 A

Notes:

BUS DUCT

Location: ELEC 428 **Volts:** 480Y/277
Supply From: SUBSTATION 1B **Phases:** 3
Wires: 4 **Bus Rating:** 600 A

CKT	Circuit Description	# of Poles	Frame Size	Trip Rating	Load	Remarks
1	LP-0	3	100 A	100 A	44878 VA	
2	T-0A	3	200 A	125 A	125478 VA	
3	LP-1	3	100 A	100 A	12467 VA	
4	T-1A	3	100 A	70 A	36936 VA	
5	LP-2	3	100 A	100 A	9993 VA	
6	T-2A	3	200 A	125 A	63126 VA	
7	LP-3	3	100 A	100 A	10888 VA	
8	T-3A	3	200 A	125 A	70560 VA	
9	LP-4	3	100 A	100 A	11247 VA	
10	T-4A	3	200 A	125 A	64850 VA	
				Total Conn. Load:	450423 VA	
				Total Amps:	542 A	

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
EQUIPMENT	120246 VA	100.00%	120246 VA		
LIGHTING	59473 VA	100.00%	59473 VA	**Total Conn. Load:**	450423 VA
POWER	1700 VA	100.00%	1700 VA	**Total Est. Demand:**	323704 VA
RECEPTACLES	262060 VA	51.91%	136030 VA	**Total Conn.:**	542 A
MECHANICAL EQUIPMENT	3444 VA	80.00%	2755 VA	**Total Est. Demand:**	389 A
APPLIANCE	3500 VA	100.00%	3500 VA		

Notes:

Distribution Panel: PP-LR

Location: MECHANICAL EQUIPMENT P01 **Volts:** 480Y/277 **A.I.C. Rating:** 35,000
Supply From: ATS-LR **Phases:** 3 **Mains Type:** MLO
Mounting: Surface **Wires:** 4 **Bus Rating:** 250 A
Enclosure: Type 1

CKT	Circuit Description	# of Poles	Frame Size	Trip Rating	Load	Remarks
1	ELEVATOR 1	3	225 A	100 A	43212 VA	
2	ELEVATOR 2	3	225 A	100 A	43212 VA	
3	T-LR	3	30 A	30 A	1836 VA	
4	ESP-1	3	30 A	15 A	3989 VA	
5	JOCKEY PUMP	3	30 A	15 A	1330 VA	
6	SPARE	3	--	100 A	0 VA	
7	SPARE	3	--	60 A	0 VA	
8	SPARE	3	--	30 A	0 VA	
				Total Conn. Load:	93578 VA	
				Total Amps:	113 A	

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
ELEVATOR	86424 VA	95.00%	82103 VA		
EQUIPMENT	200 VA	100.00%	200 VA	**Total Conn. Load:**	93578 VA
LIGHTING	472 VA	100.00%	472 VA	**Total Est. Demand:**	88141 VA
POWER	0 VA	0.00%	0 VA	**Total Conn.:**	113 A
RECEPTACLES	900 VA	100.00%	900 VA	**Total Est. Demand:**	106 A
MECHANICAL EQUIPMENT	5582 VA	80.00%	4466 VA		

Notes:

Distribution Panel: PP-OS

Location: MECHANICAL EQUIPMENT P01 **Volts:** 480Y/277 **A.I.C. Rating:** 35,000
Supply From: ATS-OS **Phases:** 3 **Mains Type:** MLO
Mounting: Surface **Wires:** 4 **Bus Rating:** 400 A
Enclosure: Type 1

CKT	Circuit Description	# of Poles	Frame Size	Trip Rating	Load	Remarks
1	EF-1	3	100 A	80 A	28254 VA	
2	EF-2	3	100 A	80 A	28254 VA	
3	SF-3A & 3B	3	100 A	70 A	34902 VA	
4	T-OS	3	100 A	70 A	39779 VA	
5	HHWP-3	3	30 A	15 A	2825 VA	
6	HHWP-4	3	30 A	15 A	2825 VA	
7	WSP-1	3	20 A	20 A	7978 VA	
8	SPARE	3	--	200 A	0 VA	
9	SPARE	3	--	100 A	0 VA	
10	SPARE	3	--	30 A	0 VA	
				Total Conn. Load:	144817 VA	
				Total Amps:	174 A	

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
EQUIPMENT	17500 VA	100.00%	17500 VA		
LIGHTING	3145 VA	100.00%	3145 VA	**Total Conn. Load:**	144817 VA
POWER	2650 VA	100.00%	2650 VA	**Total Est. Demand:**	122133 VA
RECEPTACLES	8100 VA	100.00%	8100 VA	**Total Conn.:**	174 A
MECHANICAL EQUIPMENT	113422 VA	80.00%	90738 VA	**Total Est. Demand:**	147 A

Notes:

Panelboard: RP-LR

Location: **Volts:** 208Y/120 **A.I.C. Rating:** 10,000
Supply From: T-LR **Phases:** 3 **Mains Type:** MCB
Mounting: Surface **Wires:** 4 **Bus Rating:** 60 A
Enclosure: Type 1 **Neutral Rating:** 100% **MCB Rating:** 60 A

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	*MACHINE ROOMS LIGHTS & RECEPTACLES	20 A	1	357 VA	298 VA					1	20 A	*ELEVATOR 1 HOISTWAY LIGHTS & RCPT	2
3	*ELEVATOR 2 HOISTWAY LIGHTS &...	20 A	1			239 VA	478 VA			1	20 A	*ELEVATOR PIT LIGHTS & RECEPTACLES	4
5	FC-6	15 A	1					264 VA	100 VA	1	20 A	*ELEVATOR 1 LIGHTS/RCPT/VENTILATION	6
7	SPARE	20 A	1	0 VA	100 VA					1	20 A	*ELEVATOR 2 LIGHTS/RCPT/VENTILATION	8
9	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	10
11	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	12
				Total Load:	755 VA		717 VA		364 VA				
				Total Amps:	7 A		6 A		3 A				

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
EQUIPMENT	200 VA	100.00%	200 VA		
LIGHTING	472 VA	100.00%	472 VA	**Total Conn. Load:**	1836 VA
RECEPTACLES	900 VA	100.00%	900 VA	**Total Est. Demand:**	1783 VA
MECHANICAL EQUIPMENT	264 VA	80.00%	211 VA	**Total Conn.:**	5 A
				Total Est. Demand:	5 A

Notes:
* PROVIDE PROVISION FOR LOCKING OR ADDING A LOCK TO THE CIRCUIT BREAKER PER NEC 620.55

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SEALS AND SIGNATURES

KEYPLAN

SUB 1A	SUB 1B	SWBD-EM
PP-5	RP-5	BUS DUCT
PP-LR	PP-OS	RP-LR

DRAWING TITLE

PENTHOUSE LEVEL PANELBOARD SCHEDULES

SCALE 22668.000

PROJECT NUMBER

E7.6

DRAWING NUMBER

APPENDIX B **FIXTURE SCHEDULE**

LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	MODEL	MANUFACTURER (OPTION 1)	MODEL (OPTION 1)	MANUFACTURER (OPTION 2)	MODEL (OPTION 2)	MANUFACTURER (OPTION 3)	MODEL (OPTION 3)	LOAD	LAMP	VOLTAGE	MOUNTING	COMMENTS
EBU	WET LOCATION RATED EMERGENCY BATTERY LIGHTING UNIT WITH THERMOPLATIC HOUSING, POLYCARBONATE LENS, SEALED LEAD CALCIUM BATTERY	LITHONIA	WLTU MR			WILLIAMS	EMER/MR16/CP/WET	CHLORIDE	65X6L18W9	18 VA	(2) MR16	277 V	SURFACE	
EBU2	EMERGENCY BATTERY LIGHTING UNIT WITH INJECTION-MOLDED THERMOPLASTIC HOUSING AND SEALED LEAD CALCIUM BATTERY OR NI-CAD BATTERY	LITHONIA	IND618							18 VA	PAR36 COMPOSITE	120 V	SURFACE	
F1	2' X 4' FLUORESCENT TROFFER WITH ACRYLIC PRISMATIC LENS	LITHONIA	SP8	METALUX	GC8	WILLIAMS	EP	DAY-BRITE	SP	59 VA	(2) 28W T8	277 V	RECESSED	
F1A	SAME AS "F1" EXCEPT WITH 3 LAMPS.									89 VA	(3) 28W T8	277 V	RECESSED	PROVIDE DUAL BALLAST WHERE DUAL LEVEL SWITCHING AND/OR DUAL CIRCUIT OCCUPANCY SENSORS ARE INDICATED ON DRAWINGS.
F1B	SAME AS "F1" EXCEPT 2' X 2'									32 VA	(2) 17W T8	277 V	RECESSED	
F2	2' X 4' X 3 3/4" RECESSED ARCHITECTURAL FLUORESCENT TROFFER WITH STEEL HOUSING, FROSTED ACRYLIC DIFFUSER, FLAT CENTER BASKET	FOCAL POINT	EQUATION	CORELITE	R3					59 VA	(2) 28W T8	277 V	RECESSED	
F2A	SAME AS "F2" EXCEPT WITH 3 LAMPS									89 VA	(3) 28W T8	277 V	RECESSED	
F2B	SAME AS "F2" EXCEPT WITH 0-10V DIMMING BALLAST									59 VA	(2) 28W T8	277 V	RECESSED	
F2C	SAME AS "F2" EXCEPT 3 LAMPS WITH 0-10V DIMMING BALLAST									89 VA	(3) 28W T8	277 V	RECESSED	
F2D	SAME AS "F2" EXCEPT WITH 2 BALLASTS FOR DUAL LEVEL SWITCHING									59 VA	(2) 28W T8	277 V	RECESSED	
F2E	SAME AS "F2" EXCEPT WITH 3 LAMPS, 2 BALLASTS FOR DUAL LEVEL SWITCHING									89 VA	(3) 28W T8	277 V	RECESSED	
F3	4' FULLY GASKETED, TOTALLY ENCLOSED WALL MOUNTED LINEAR FLUORESCENT, IP65 RATED, SUITABLE FOR INSTALLATION IN AREAS SUBJECT TO HOSEDOWN AND SPLASHING WATER	LITHONIA	EIS	COOPER	VT	WILLIAMS	96	DAY-BRITE	V2	59 VA	(2) 28W T8	120 V	WALL	
F4	8" X 2" X 8' LOW PROFILE RECTANGULAR FLUORESCENT DIRECT/INDIRECT PENDANT WITH STEEL HOUSING, HIGH PERFORMANCE LENS, DUAL CIRCUIT SWITCHING	PEERLESS	BRUNO	PRUDENTIAL	PRU15-SQ					178 VA	(3) 28W T8	277 V	PENDANT	MOUNT 18" BELOW CEILING TO BOTTOM OF FIXTURE
F4A	SAME AS "F4" EXCEPT 4' LENGTH									89 VA	(3) 28W T8	277 V	PENDANT	
F4B	SAME AS "F4" EXCEPT 12' LENGTH									267 VA	(3) 28W T8	277 V	PENDANT	
F4C	SAME AS "F4" EXCEPT 2 LAMPS									118 VA	(2) 28W T8	277 V	PENDANT	
F4D	SAME AS "F4" EXCEPT 12' LENGTH, 2 LAMPS									177 VA	(2) 28W T8	277 V	PENDANT	
F4E	SAME AS "F4" EXCEPT 2 LAMPS, SINGLE CIRCUIT, DIMMING BALLAST, INTEGRAL DAYLIGHT SENSOR									118 VA	(2) 28W T8	277 V	PENDANT	
F4F	SAME AS "F4" EXCEPT 4' LENGTH, 2 LAMPS, DIMMING BALLAST, INTEGRAL DAYLIGHT SENSOR									59 VA	(2) 28W T8	277 V	PENDANT	
F4G	SAME AS "F4" EXCEPT 12' LENGTH, 2 LAMPS, SINGLE CIRCUIT, DIMMING BALLAST, INTEGRAL DAYLIGHT SENSOR									177 VA	(2) 28W T8	277 V	PENDANT	
F4H	SAME AS "F4" EXCEPT 2 LAMPS, SINGLE CIRCUIT, DIMMING BALLAST									118 VA	(2) 28W T8	277 V	PENDANT	
F5A	6" OPEN FLUORESCENT DOWNLIGHT WITH ONE PIECE FLANGED LOW IRRIDESENCE REFLECTOR, WET LOCATION RATED	GOTHAM	AF	PORTFOLIO	C6	WILLIAMS	PH60	LIGHTOLIER	8031	35 VA	(1) 32W TTT	277 V	RECESSED	
F6	4' FLUORESCENT INDUSTRIAL WITH SYMMETRIC REFLECTER, WIREGUARD, 10% UPLIGHT, MULTI-VOTLAGE 120/277V BALLAST.	LITHONIA	AF	METALUX	DMF	WILLIAMS	82	DAY-BRITE	IA	59 VA	(2) 28W T8		CHAIN HUNG	MOUNT AT 10'-0" AFF TO BOTTOM, UON.
F7	WALL MOUNTED LINEAR FLUORESCENT WITH ACRYLIC PRISMATIC DIFFUSER, MULTI-VOLTAGE 120/277V BALLAST.	LITHONIA	WC	METALUX	BC	WILLIAMS	29	DAY-BRITE	SWB	59 VA	(2) 28W T8		WALL	
F9	CONTINUOUS PERIMETER LINEAR FLUORESCENT WITH ACRYLIC LENS MOUNTED NEAR LAMPS FOR OPEN APPEARANCE. PROVIDE ALL NECESSARY EXTENSIONS AND COMPONENTS NEEDED TO FIILL ENTIRE FIXTURE RUN LENGTH.	LITECONTROL	85N	NEORAY	70					8 VA	(1) 28W T8	277 V	PERIMETER	SEE PLANS FOR ACTUAL CONFIGURATIONS. PROVIDE SHOP DRAWINGS INDICATING LAMPING AND EXTRUSION DIMENSIONS PRIOR TO APPROVAL. PROVIDE ALL NECESSARY SYSTEM CONNECTORS FOR CONTINUOUS RUNS.
F10	LINEAR FLUORESCENT INGRADE FIXTURE WITH ASYMMETRIC WALL WASH REFLECTOR IN 6 DEGREE DISTRIBUTION WITH LAMP SHIELD, ALUMINUM BODY CONSTRUCTION AND LENS FRAME, TEMPERED GLASS LENS WITH 1/3 INTERNAL WHITE CERAMIC MASK, ANODIZED ALUMINUM REFLECTOR, IP65 MINIMUM RATING AND INTEGRAL DIMMING BALLAST DIMMABLE TO 1%.	WE-EF	ERT 140							24 VA	(1) 21W, T5, 4100K CCT	277 V	IN-GRADE	PROVIDE 1% DIMMING BALLAST.
F13	13.5" WIDTH X 10.5" HEIGHT PERIMETER WALL SLOT SYSTEM THAT FULLY CONCEALS LAMP FROM VIEW WITH EXTRUDED WHITE ALUMINUM WALL-MOUNTED CONTINUOUS RAIL, AND EXTRUDED ALUMINUM CEILING TRIM. LUMINANCE CONTROL DEFLECTOR, ALL NECESSARY HOUSING EXTRSIONS AND COMPONENTS NEEDED TO FILL ENTIRE FIXTURE RUN AND INTEGRAL BALLAST.	LITECONTROL	WALLSLOT 2000	PRUDENTIAL	P59					9 VA	(1) 28W T8 3500K CCT (IN CROSS-SECTION)	277 V	RECESSED PERIMETER	SEE PLANS FOR ACTUAL CONFIGURATIONS. PROVIDE SHOP DRAWINGS INDICATING LAMPING AND EXTRUSION DIMENSIONS PRIOR TO APPROVAL. PROVIDE ALL NECESSARY SYSTEM CONNECTORS FOR CONTINUOUS RUNS. CONTINUE FINISH OF ADJACENT WALLS 9" ABOVE FINISHED CEILING HEIGHT.
F16	LINEAR FLUORESCENT WALL-MOUNTED 4" APERTURE DOWNLIGHT WITH SEAMLESS FLUSH 85% TRANSMISSION FROSTED LENS, EXTRUDED ALUMINUM HOUSING, DIRECT DISTRIBUTION, 2 LAMPS IN CROSS SECTION, WHITE FINISH AND INTEGRAL ELECTRONIC BALLAST.	A-LIGHT	G3 SERIES	FOCAL POINT	SEEM 4	AXIS	BEAM 4 WALLMOUNT	FINELITE	HP4 LED	70 VA	(2) 28W T8 3500K CCT	277 V	WALL	CONCEAL ABOVE PERFORATED STAINLESS STEEL PANEL. SEE ARCHITECTURAL A9 SERIES DRAWINGS FOR DETAIL.
F17	SURFACE MOUNTED LOW PROFILE (2.75" X 2.75") DIAGONAL-STAGGERED LINEAR FLUORESCENT STRIP LIGHT WITH 4"LAMP OVERLAP	BARTCO	BDS850	BIRCHWOOD	WP SYSTEM					32 VA	(1) 28W T8 3500K CCT (IN CROSS-SECTION)	277 V	SURFACE	WHITE FINISH
F18	3.25" X 3.25' X 6' SURFACE MOUNT LINEAR FLUORESCENT FIXTURE WITH FROSTED WHITE LENS, STAGGERRED 4' LAMPS, INTEGRAL BALLAST, ALUMINUM HOUSING AND END CAPS AND STANDARD ALUMINUM FINISH.	BIRCHWOOD	NOLAN							35 VA	(1) 28W T8 3500K CCT (IN CROSS-SECTION)	277 V	SURFACE	FINISH TO MATCH STAIRS
F20	5" APERTURE RECESSED FLUORESCENT FIXTURE WITH EXTRUDED ALUMINUM HOUSING, STAGGERRED LAMPING, OPAL ACRYLIC LENS, STANDARD ALUMINUM TRIM FINISH AND INTEGRAL ELECTRONIC BALLAST.	ALIGHT	G5 SERIES	FOCAL POINT	SEEM 4	FINELITE	HP4 LED			28 VA	(1) 28W T8 3500K CCT (IN CROSS-SECTION)	277 V	RECESSED	PROVIDE APPROPRIATE QUANTITY OF 3' AND 4' LENGTHS TO FILL ENTIRE FIXTURE RUN. PROVIDE SHOP DRAWINGS SHOWING ALL LENGTHS AND COMPONENTS PRIOR TO FINAL APPROVAL
L1	2" X 2 3/4" MULLIION MOUNTED LED FIXTURE WITH INDIRECT SYMMETRIC LIGHT DISTRIBUTION, EXTRUDED ALUMINUM HOUSING, FINISH TO MATCH MULLION, MULLION MOUNT BLOCKING, INTEGRAL 0-10V DIMMING DRIVER, SEE PLAN FOR LENGTH, CONTINUOUS HOUSING.	ALIGHT	B4 SERIES							28 VA	LED 7 W/FT; 500 LM/FT; 3500K CCT	277 V	MULLION MOUNT	PROVIDE 0-10V DIMMING DRIVER. PROVIDE WIRING BREAKS AS REQUIRED FOR EMERGENCY LIGHTING. SEE PLANS FOR 4' SECTIONS REQUIRED TO BE CONNECTED TO EMERGENCY CIRCUIT. CONCEAL ALL POWER ROUTING WITHIN FIXTURE CHANNEL. COORDINATE MOUNTING CONDITION WITH CURTAIN WALL MANUFACTURER. COORDINATE DIMMING CONTROLS WITH DIMMING MANUFACTURER.
L2	4" DIAMETER OPEN LED DOWNLIGHT WITH ONE PIECE FLANGED LOW IRRIDESENCE REFLECTOR, STANDARD ALUMINUM FLANGE FINISH, WIDE OPTIC DISTRIBUTION, REPLACEABLE LED MODULE AND REPLACEABLE INTEGRAL 0-10V DIMMING DRIVER	GOTHAM	EVO	ZUMTOBEL	BASYS					16 VA	LED 18W; 1800 NOMINAL LM MIN; 3500K CCT; 3 SDCM MAX	277 V	RECESSED	PROVIDE 0-10V DIMMING DRIVER. COORDINATE DIMMING CONTROLS WITH DIMMING MANUFACTURER.
L5	RECESSED LENSED LED WALLWASHER WITH 4" DIAMETER APERTURE, HIGH REFLECTANCE KICKER REFLECTOR, SPECULAR FINISH ALUMINUM LOWER REFLECTOR WITH STANDARD ALUMINUM TRIM FLANGE FINISH, REPLACEABLE LED MODULE AND INTEGRAL REPLACEABLE DIMMING DRIVER.	GOTHAM	EVO LENSED WALLWASH	ZUMTOBEL	BASYS					16 VA	LED 18W MAX; 1800 LM NOMINAL MIN; 3500K CCT; 3 SDCM MAX	277 V	RECESSED	PROVIDE 0-10V DIMMING DRIVER. COORDINATE DIMMING CONTROLS WITH DIMMING MANUFACTURER.
L9	SURFACE MOUNTED LINEAR LED FIXTURE WITH 8.9MM LED PITCH, EXTRUDED ALUMINUM BASE PROFILE AND MOUNTING PROFILE, EXTRUDED ACRYLIC DIFFUSE LENS, AND REMOTE POWER SUPPLY.	LEDLINEAR	VARIOLED FLEX HYDRA HD6							15 VA	LED 1.8W/FT MAX; 190 LM/FT MIN; 3500K CCT; 3 SDCM MAX	277 V	SURFACE	PROVIDE REMOTE 200W AND 300W, 277V, Q-TRAN QTM-ELED SERIES POWER SUPPLIES WITH ADDITIONAL 0-10V DIMMING MODULES AS REQUIRED. GROUP REMOTE DRIVERS TOGETHER ABOVE ACCESSIBLE CEILING. REFER TO MANUFACTURER LIMITATIONS FOR MAXIMUM REMOTE DISTANCE. PROVIDE CONTINUOUS VARIOCONTOUR 005 BASE AND MOUNTING PROFILE AND VARIOCOVER 006 DIFFUSE H HIGH SQUARE ACRYLIC COVER ALONG ENTIRE RUN LENGTH. PROVIDE SHOP DRAWINGS SHOWING ALL COMPONENTS AND CONFIGURATIONS PRIOR TO FINAL APPROVAL.
L10	SURFACE MOUNTED 2.8" X 2.7" LINEAR LED FIXTURE, WITH 30 x 60 DEGREE DISTRIBUTION, INTEGRAL DRIVER, END-TO-END CONNECTORS, MIN. 90 DEGREE ADJUSTABILITY, AND CLEAR POLYCARBONATE LENS. IP66 RATING. SEE PLANS FOR ACTUAL RUN LENGTHS. PROVIDE MINIMUM QUANTITY OF FIXTURES TO FILL ENTIRE LENGTH OF RUN. PROVIDE ELV DIMMING CONTROL.	COLOR KINETICS	EW GRAZE QLX POWERCORE	LUMENPULSE	LUMENFACADE					40 VA	LED 10 W/FT; 580 LM/FT MIN; 3500K CCT	277 V	SURFACE	PROVIDE TEMPEST LIGHTING 45° CUTOFF LOUVER ACCESSORY. MATCH MULLION FINISH. PROVIDE ELV DIMMING. COORDINATE DIMMING CONTROLS WITH DIMMING MANUFACTURER.
L11	RECESSED 2" APERTURE LED DOWNLIGHT WITH SPECULAR CLEAR ALZAK REFLECTOR, SPUN ALUMINUM REFLECTOR WITH 45 DEGREE DISTRIBUTION, FIELD REPLACEABLE LED MODULE AND INTEGRAL DIMMING DRIVER, SINGLE UNIT THAT COMBINES 6" HEIGHT X 2.75" DIAMETER FIXTURE HOUSING WITH SEPARATE 5" LENGTH X 2.5" DIAMETER DRIVER HOUSING	PRESCOLITE	D2	LUCIFER	DLRF3-LEDX					20 VA	LED 20W; 850 LM; 3500K CCT	277 V	RECESSED	PROVIDE 0-10V DIMMING DRIVER. COORDINATE DIMMING CONTROLS WITH DIMMING MANUFACTURER.
L11A	SAME AS "L11" EXCEPT 25 DEGREE DISTRIBUTION.	PRESCOLITE	D2	LUCIFER	DLRF3-LEDX					20 VA	LED 20W; 780 LM; 3500CCT	277 V	RECESSED	PROVIDE 0-10V DIMMING DRIVER. COORDINATE DIMMING CONTROLS WITH DIMMING MANUFACTURER.
L12	SUSPENDED LOW PROFILE (1-7/8" X 17-7/8" X 3") LINEAR LED DOWNLIGHT WITH DOUBLE FOCUS LENS, 55 DEGREE GLARE CONTROL CUT OFF, 2/5" APERTURE WIDTH, 55 DEGREE OPTIC, AND INTEGRAL 0-10V DRIVER DIMMABLE TO 1%.	KREON	NUiT							7 VA	LED 7.1W; MIN 630LM; 3000K	277 V	PENDANT	PROVIDE 0-10V DIMMING DRIVER DIMMABLE TO 1%. COORDINATE DIMMING CONTROLS WITH DIMMING MANUFACTURER.
L16	TRACK MOUNTED LED SPOT WITH CYLINDIRCAL ALUMINUM HOUSING, REPLACEABLE HIGH CRI LED MODULE, FIELD INTERCHANGEABLE 20° REFLECTOR, WHITE FINISH, AND INTEGRAL DRIVER.	LSI	LUMLEX 2044 SERIES LED							50 VA	LED 25W; 860 LMS; 4000K; 90+ CRI; 2 SDCM MAX	277 V	PENDANT	PROVIDE REQUIRED LENGTH OF 277V SUSPENDED BLACK TRACK WITH STAINLESS STEEL CABLE SUPPORTS, AND ALL NECESSARY POWER SUPPLY AND INSTALLATION ACCESSORIES.
L18	2" TALL SUSPENDED LED LIGHT PANEL WITH 2' X 2' LUMINOUS PLANE, 0-10V DIMMING CAPABILITY, AND INTEGRAL DRIVER.	CORELITE	EDGELIT 2X2	ZUMTOBEL	LIGHTPLANE					24 VA	LED 24W; 2100 LMS; 3500K CCT	277 V	PENDANT	FIXTURE TO BE DIMMED TO A MAXIMUM OUTPUT OF 65% (16W). COORDINATE DIMMING CONTROLS WITH DIMMING MANUFACTURER.
L18A	SAME AS L18 EXCEPT WITH 1' X 4' SIZE.	CORELITE	EDGELIT 1X4	ZUMTOBEL	LIGHTPLANE					24 VA	LED 24W; 2100 LMS; 3500K CCT	277 V	PENDANT	FIXTURE TO BE DIMMED TO A MAXIMUM OUTPUT OF 65% (16W). COORDINATE DIMMING CONTROLS WITH DIMMING MANUFACTURER.
L20	4.75" WIDTH X 3.75" DEPTH X .85" HEIGHT LED WALL MOUNTED FIXTURE WITH IP 66 RATING, DIRECT ONLY TYPE 4 DISTRIBUTION, STAINLESS STEEL HOUSING, TEMPERED GLASS LENS, SILICON GASKET, FACTORY SEALED, ADA COMPLIANT, AND INTEGRAL DRIVER	LUMIERE	EON 303-W1							30 VA	LED	277 V	WALL	
L21	4' LINEAR LED FIXTURE WITH DIE CAST ALUMINUM HOUSING, WHITE POWDER COAT FINISH, POLYCARBONATE LENS, MALE/FEMALE CONNECTORS, ELV DIMMABILITY, AND 120 DEGREE BEAM ANGLE. IP20	ECOSENSE	LINEAR INT - LP	COLOR KINETICS	eW COVE QLX POWERCORE					12 VA	LED 12W; 660 LM; 3500K CCT	277 V	SURFACE	100" MAX RUN PER LEADER CABLE.
L21A	SAME AS L21 BUT WITH 1' LENGTH	ECOSENSE	LINEAR INT - LP	COLOR KINETICS	eW COVE QLX POWERCORE					3 VA	LED 3W; 160 LM; 3500K CCT	277 V	SURFACE	100' MAX RUN PER LEADER CABLE.
L22	LED PENDANT WITH THREE ARMS ALIGNED RADIALLY, LOW OUTPUT LEDS, OPAL DIFFUSE LENS, DIRECT ONLY DISTRIBUTION, WHITE FINISH AND INTEGRAL BALLAST	XAL	GEAR 3							90 VA	LED 3.8W/FT; 3500K CCT	277 V	PENDANT	PROVIDE CUSTOM 3500K CCT LED
L25	7.5' X 7.5" X 2.1" SURFACE MOUNT LED DOWNLIGHT WITH 30 DEGREE BEAM, DIE-CAST ALUMINUM CHASSIS AND BEZEL, WITH IP50 RATING AND INTEGRAL DRIVER	COLOR KINETICS	EW DOWNLIGHT							15 VA	LED 15W MAX; 800 LM; 3500K CCT	277 V	SURFACE	FINISH TO MATCH STAIRS
L26	4' X 4" CONTINUOUS LENSED LINEAR LED WALL-MOUNTED FIXTURE WITH DIRECT DISTRIBUTION, EXTRUDED ALUMINUM HOUSING, LED DIODE OBFUSCATING LENS, REMOVABLE LED BOARD/DRIVER, INTEGRAL 0-10V DIMMING, BLACK FINISH.	A-LIGHT	D3 SERIES	FINELITE	HP-4 DIRECT					7 VA	LED 7W/FT; 500 LM/FT; 3000K	277 V	WALL	PROVIDE LEAST QUANTITY OF FIXTURES WITH MANUFACTURERS STANDARD LENGTHS TO ALLOW FOR CONTINUOUS LENGTH SHOWN IN PLAN. PROVIDE 0-10V DIMMING DRIVER PER MANUFACTURERS RECOMMENDATIONS. COORDINATE DIMMING CONTROLS WITH DIMMING DRIVER MANUFACTURER.
L27	96" LENGTH x 32.5" WIDTH X 5/16" DEPTH EDGE LIT LED LIGHT PANEL WITH UNIFORM BRIGHTNESS ACROSS ENTIRE PANEL, SINGLE-SIDE LIGHT EMISSION WITH HIGHLY REFLECTIVE WHITE BACKING, STAND-OFF MOUNTING BRACKETS, REMOTE POWER SUPPLY AND DRIVER, LEDS ALONG 2 LONG EDGES AND BACK-POWER-FEED.	DLC	LUMISHEET LED LIGHT PANEL							80 VA	2 ROWS 4100K CCT LED	277 V	SURFACE	PROVIDE REMOTE DRIVER AND POWER SUPPLY.
L29	48" LENGTH X 18" WIDTH X 5/16" DEPTH EDGE LIT LED LIGHT PANEL WITH UNIFORM BRIGHTNESS ACROSS ENTIRE PANEL, SINGLE-SIDE LIGHT EMISSION WITH HIGHLY REFLECTIVE WHITE BACKING, STAND-OFF MOUNTING BRACKETS, REMOTE POWER SUPPLY AND DRIVER, LEDS ALONG 2 LONG EDGES WITH TOP ROW WHITE LED AND BOTTOM ROW RED LED, AND BACK-POWER-FEED	DLC	LUMISHEET LED LIGHT PANEL							35 VA	ONE ROW 4100K CCT WHITE LED AND ONE ROW RED LED	24 V	SURFACE	PROVIDE REMOTE DRIVER, POWER SUPPLY AND CUSTOM RED AND WHITE LED ARRAYS. PROVIDE ALL NECESSARY CONNECTORS AND CONTROL GEAR TO SYNC WITH ELEVATOR CALL SIGNALS. COORDINATE DIMMING CONTROLS WITH DIMMING MANUFACTURER.
L30	SEMI-RECESSED LINEAR LED ASYMMETRIC WALLWASH FIXTURE WITH EXTRUDED ALUMINUM HOUSING, 3.5" APERTURE, FROSTED ACRYLIC LENS, FLANGELESS MOUNTING FOR GYPSUM INSTALLATION, FIELD REPLACEABLE LED BOARD AND 0-10V DIMMABLE DRIVER.	A-LIGHT	D7 SERIES	FINELITE	HPW-LED					56 VA	LED 56W; 1000 LM/FT; 4000K CCT	277 V	RECESSED	PROVIDE 0-10V DIMMING DRIVER DIMMABLE TO 5%. COORDINATE DIMMING CONTROLS WITH DIMMING MANUFACTURER.
S4	UNIVERSITY OF PENNSYLVANIA STANDARD DECORATIVE EXTERIOR LIGHT FIXTURE WITH CAST ALUMINUM BASE WELDED AS PART OF THE POLE, ACRYLIC INJECTION MOLDED FROSTED GLOBE, INJECTION MOLDED POLYCARBONATE DOME, CLEAR POLYCARBONATE DOME CAP, 8'-8" TALL ROUND TAPERED .125" ALUMINUM POLE (3" AT TOP, 5" AT BOTTOM), CAST ALUMINUM ANCHOR BASE, CAST ALUMINUM ACCESS DOOR, PARK GREEN FINISH	STREET LIGHTING EQUIPMENT CORPORATION	UPA/3-MH150							60 VA	BEACON LRK-3D TYPE V DIRECT LED RETRO FIT KIT. 55W 24 LED ARRAY. 3500K CCT	277 V	POLE	FIXTURES WILL UTILIZE LED RETROFIT KIT INDICATED; DO NOT FURNISH METAL HALIDE BALLAST. FURNISH ONE SAMPLE FIXTURE HEAD TO BEACON PRODUCTS, 2041 58TH AVENUE CIRCLE EAST, BRADENTON, FLORIDA 34203. MANUFACTURER SHALL CLOSELY COORDINATE WITH BEACON PRODUCTS TO ENSURE CORRECT FITMENT OF LED RETROFIT KIT.
S4A	SAME AS "S4" EXCEPT WITH LOCKABLE, WEATHERPROOF-IN-USE GFCI RECEPTACLE MOUNTED AT BOTTOM OF POLE									60 VA	BEACON LRK-3D TYPE V DIRECT LED RETRO FIT KIT. 55W 24 LED ARRAY. 3500K CCT	277 V	POLE	
S4B	SAME AS "S4" EXCEPT 15' OVERALL HEIGHT									60 VA	BEACON LRK-3D TYPE V DIRECT LED RETRO FIT KIT. 55W 24 LED ARRAY. 3500K CCT	277 V	POLE	
X1	EDGE LIT LED EXIT SIGN WITH GREEN LETTERS, RECESSED HOUSING, MIRRORED BACKGROUND	LITHONIA	EDGR	COOPER	SURE-LITES ES	WILLIAMS	EXIT/EL/RECESSED	CHLORIDE	45V	3 VA	LED	277 V	WALL/CEILNG	PROVIDE NUMBER OF FACES AND DIRECTIONAL ARROWS AS INDICATED ON PLANS
X2	BLACK LED EXIT SIGN WITH BRUSHED ALUMINUM FACES, GREEN LETTERS	LITHONIA	LQC							3 VA	LED	277 V		PROVIDE NUMBER OF FACES AND DIRECTIONAL ARROWS AS INDICATED ON PLANS

NOTE: ALL LAMP QUANTITIES ARE LAMPS IN CROSS- SECTION

LIGHTING CONTROL SCHEDULE

CONTROL ZONE	LOAD NAME	CONTROL DESCRIPTION	PANEL	CIRCUIT	VOLTAGE	# OF POLES	LOAD	COMMENTS
j	(EO) LIGHTING - CORRIDOR 404, 415	ON AT 7 AM, OFF AT 10 PM	LP-4	4	277 V	1	128 VA	
k	(EO) LIGHTING - FOURTH LEVEL CORRIDORS	ON AT 7 AM, OFF AT 10 PM	LP-4	6	277 V	1	2021 VA	
m	(EO) LIGHTING - THIRD LEVEL CORRIDORS	ON AT 7 AM, OFF AT 10 PM	LP-3	6	277 V	1	1969 VA	
n	(EO) LIGHTING - SECOND LEVEL CORRIDORS	ON AT 7 AM, OFF AT 10 PM	LP-2	6	277 V	1	1684 VA	
o	(EO) LIGHTING - GROUND LEVEL LOBBY/CORR.	ON AT 7 AM, OFF AT 10 PM. LIGHTS NEAR SOUTH AND EAST EXTERIOR GLASS SHALL TURN OFF WHEN THERE IS ADEQUATE DAYLIGHT. REFER TO DETAIL ON SHEET E6.4	LP-1	6	277 V	1	1060 VA	
p	(EO) DECORATIVE LIGHTING - GROUND LOBBY	ON AT 7 AM, OFF AT 10 PM. LIGHTS SHALL TURN ON AT A PRESET DIMMING LEVEL CONTROLLED BY THE MODULAR LIGHTING CONTROLLER LOCATED IN THE GROUND LEVEL ELECTRICAL ROOM. DIMMING LEVEL SHALL BE FIELD DETERMINED BY THE ARCHITECT AND THAT LEVEL SHALL BE PROGRAMMED BY THE SYSTEM PROGRAMMER.	LP-1	8	277 V	1	4640 VA	
q	(EO) DECORATIVE LIGHTING - LOWER LEVEL	ON AT 7 AM, OFF AT 10 PM. LIGHTS SHALL TURN ON AT A PRESET DIMMING LEVEL CONTROLLED BY THE MODULAR LIGHTING CONTROLLER LOCATED IN THE GROUND LEVEL ELECTRICAL ROOM. DIMMING LEVEL SHALL BE FIELD DETERMINED BY THE ARCHITECT AND THAT LEVEL SHALL BE PROGRAMMED BY THE SYSTEM PROGRAMMER.	LP-0	6	277 V	1	1640 VA	
r	(EO) GENERAL LIGHTING - LOWER LEVEL CORR.	ON AT 7 AM, OFF AT 10 PM	LP-0	4	277 V	1	953 VA	
s	(EO) LIGHTING - EXTERIOR POLES	ON AT SUNSET, OFF AT SUNRISE	LP-0	2	277 V	1	1620 VA	
t	(EO) LIGHTING - GLASS SIGNAGE	ON AT SUNSET, OFF AT SUNRISE. LIGHTS SHALL TURN ON AT A PRESET DIMMING LEVEL CONTROLLED BY THE MODULAR LIGHTING CONTROLLER LOCATED IN THE GROUND LEVEL ELECTRICAL ROOM. DIMMING LEVEL SHALL BE FIELD DETERMINED BY THE ARCHITECT AND THAT LEVEL SHALL BE PROGRAMMED BY THE SYSTEM PROGRAMMER.	LP-1	2	277 V	1	128 VA	
u	(EO) LIGHTING - EAST CANOPY	ON AT SUNSET, OFF AT SUNRISE. LIGHTS SHALL TURN ON AT A PRESET DIMMING LEVEL CONTROLLED BY THE MODULAR LIGHTING CONTROLLER LOCATED IN THE GROUND LEVEL ELECTRICAL ROOM. DIMMING LEVEL SHALL BE FIELD DETERMINED BY THE ARCHITECT AND THAT LEVEL SHALL BE PROGRAMMED BY THE SYSTEM PROGRAMMER.	LP-2	2	277 V	1	780 VA	
v	(EO) LIGHTING - EAST FACADE GLASS	ON AT SUNSET, OFF AT 2 AM. LIGHTS SHALL TURN ON AT A PRESET DIMMING LEVEL CONTROLLED BY THE MODULAR LIGHTING CONTROLLER LOCATED IN THE GROUND LEVEL ELECTRICAL ROOM. DIMMING LEVEL SHALL BE FIELD DETERMINED BY THE ARCHITECT AND THAT LEVEL SHALL BE PROGRAMMED BY THE SYSTEM PROGRAMMER.	LP-3	4	277 V	1	992 VA	
w	(EO) LIGHTING - SOUTH FACADE	ON AT SUNSET, OFF AT 2 AM. LIGHTS SHALL TURN ON AT A PRESET DIMMING LEVEL CONTROLLED BY THE MODULAR LIGHTING CONTROLLER LOCATED IN THE GROUND LEVEL ELECTRICAL ROOM. DIMMING LEVEL SHALL BE FIELD DETERMINED BY THE ARCHITECT AND THAT LEVEL SHALL BE PROGRAMMED BY THE SYSTEM PROGRAMMER.	LP-1	4	277 V	1	1817 VA	
x	(EO) LIGHTING - SOUTH FACADE	ON AT SUNSET, OFF AT 2 AM. LIGHTS SHALL TURN ON AT A PRESET DIMMING LEVEL CONTROLLED BY THE MODULAR LIGHTING CONTROLLER LOCATED IN THE GROUND LEVEL ELECTRICAL ROOM. DIMMING LEVEL SHALL BE FIELD DETERMINED BY THE ARCHITECT AND THAT LEVEL SHALL BE PROGRAMMED BY THE SYSTEM PROGRAMMER.	LP-2	4	277 V	1	1876 VA	
y	(EO) LIGHTING - SOUTH FACADE	ON AT SUNSET, OFF AT 2 AM. LIGHTS SHALL TURN ON AT A PRESET DIMMING LEVEL CONTROLLED BY THE MODULAR LIGHTING CONTROLLER LOCATED IN THE GROUND LEVEL ELECTRICAL ROOM. DIMMING LEVEL SHALL BE FIELD DETERMINED BY THE ARCHITECT AND THAT LEVEL SHALL BE PROGRAMMED BY THE SYSTEM PROGRAMMER.	LP-3	2	277 V	1	1876 VA	
z	(EO) LIGHTING - SOUTH FACADE	ON AT SUNSET, OFF AT 2 AM. LIGHTS SHALL TURN ON AT A PRESET DIMMING LEVEL CONTROLLED BY THE MODULAR LIGHTING CONTROLLER LOCATED IN THE GROUND LEVEL ELECTRICAL ROOM. DIMMING LEVEL SHALL BE FIELD DETERMINED BY THE ARCHITECT AND THAT LEVEL SHALL BE PROGRAMMED BY THE SYSTEM PROGRAMMER.	LP-4	2	277 V	1	1876 VA	

Plot Date: 7/17/2013 4:03:15 PM

KEYED NOTES

UNIVERSITY OF PENNSYLVANIA

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ISSUE NO. 2		18JULY2013

SEALS AND SIGNATURES

KEYPLAN

DRAWING TITLE

LIGHTING SCHEDULES

SCALE 22668.000

PROJECT NUMBER

DRAWING NUMBER **E7.1**

APPENDIX C **MECHANICAL EQUIPMENT**

MECHANICAL EQUIPMENT SCHEDULE

TAG	PANEL	CIRCUIT NUMBER	ON EMERGENCY POWER	MOTOR		VOLTAGE	PHASE	TOTAL POWER LOAD	VFD	VFD INPUT CURRENT RATING	DISC. SW.			COMBINATION STARTER NEMA SIZE	PHASE & NEUTRAL			GROUND		CONDUIT		COMMENTS
				HP1	HP2						AMPS	POLES	FUSED		SETS	NO. OF WIRES	AWG	NO. OF WIRES	AWG	SETS	SIZE	
	PP-5	7	No			480 V	3	0 VA	No		30 A	3			1	3	#12	1	#12	1	3/4"	
	PP-5	8	No			480 V	3	0 VA	No		30 A	3			1	3	#12	1	#12	1	3/4"	
	PP-5	1	No			480 V	3	0 VA	No						1	3	#12	1	#12	1	3/4"	2 FANS OF 4 FAN ARRAY
	PP-5	2	No			480 V	3	0 VA	No						1	3	#12	1	#12	1	3/4"	2 FANS OF 4 FAN ARRAY
	PP-5	4	No			480 V	3	0 VA	No						1	3	#12	1	#12	1	3/4"	2 FANS OF 4 FAN ARRAY
	PP-5	5	No			480 V	3	0 VA	No						1	3	#12	1	#12	1	3/4"	2 FANS OF 4 FAN ARRAY
AHU-4	PP-5	11	No	2		480 V	3	2825 VA	No					1	1	3	#12	1	#12	1	3/4"	
CHWP-1	PP-0A	2	No	15		480 V	3	17451 VA	Yes	23 A					1	3	#10	1	#10	1	3/4"	
CHWP-2	PP-0A	3	No	15		480 V	3	17451 VA	Yes	23 A					1	3	#10	1	#10	1	3/4"	
CRU-1	PP-0B	7	No	3/4		480 V	3	1330 VA	No					1	1	3	#12	1	#12	1	3/4"	
CUH-1	RP-0A	2	No	1/4		120 V	1	696 VA	No						1	2	#12	1	#12	1	3/4"	
CUH-2	RP-0A	4	No	1/4		120 V	1	696 VA	No						1	2	#12	1	#12	1	3/4"	
CUH-3	RP-1A	2	No	1/4		120 V	1	696 VA	No						1	2	#12	1	#12	1	3/4"	
DWBP-1	PP-0B	8	No	5		480 V	3	6316 VA	No					1	1	3	#12	1	#12	1	3/4"	
DWCP-1	RP-0A	7	No	1/6		120 V	1	528 VA	No						1	2	#12	1	#12	1	3/4"	
DWCP-2	RP-0A	9	No	1/6		120 V	1	528 VA	No						1	2	#12	1	#12	1	3/4"	
DWH-1	RP-0A	1	No			120 V	1	100 VA	No						1	2	#12	1	#12	1	3/4"	
DWH-2	RP-0A	3	No			120 V	1	100 VA	No						1	2	#12	1	#12	1	3/4"	
DWH-3	RP-0A	5	No			120 V	1	100 VA	No						1	2	#12	1	#12	1	3/4"	
EF-1	PP-OS	1	Yes	25		480 V	3	28254 VA	Yes	38 A	60 A	3			1	3	#6	1	#8	1	3/4"	INTERLOCK EXTERIOR DISCONNECT SWITCH TO INTERIOR VFD SUCH THAT VFD CANNOT ENERGIZE LOAD CONDUCTORS WHEN DISCONNECT SWITCH IS IN THE OPEN POSITION.
EF-2	PP-OS	2	Yes	25		480 V	3	28254 VA	Yes	38 A	60 A	3			1	3	#6	1	#8	1	3/4"	INTERLOCK EXTERIOR DISCONNECT SWITCH TO INTERIOR VFD SUCH THAT VFD CANNOT ENERGIZE LOAD CONDUCTORS WHEN DISCONNECT SWITCH IS IN THE OPEN POSITION.
EF-3	PP-5	7	No	1 1/2		480 V	3	2493 VA	No					1	1	3	#12	1	#12	1	3/4"	
EF-4	PP-5	8	No	3/4		480 V	3	1330 VA	No					1	1	3	#12	1	#12	1	3/4"	
ESP-1	PP-LR	4	Yes	3		480 V	3	3989 VA	No		30 A	3			1	3	#12	1	#12	1	3/4"	
FC-1	RP-OS1	1	Yes	1/20		120 V	1	264 VA	No						1	2	#12	1	#12	1	3/4"	
FC-2	RP-OS1	3	Yes	1/20		120 V	1	264 VA	No						1	2	#12	1	#12	1	3/4"	
FC-3	RP-OS1	5	Yes	1/20		120 V	1	264 VA	No						1	2	#12	1	#12	1	3/4"	
FC-4	RP-OS4	1	Yes	1/20		120 V	1	264 VA	No						1	2	#12	1	#12	1	3/4"	
FC-5	RP-OS4	3	Yes	1/20		120 V	1	264 VA	No						1	2	#12	1	#12	1	3/4"	
FC-6	RP-LR	5	Yes	1/20		120 V	1	264 VA	No						1	2	#12	1	#12	1	3/4"	
FIRE PUMP	ATS-FP2	1	Yes	25		480 V	3	28254 VA	No						1	3	#6	1	#8	1	3/4"	INDICATED CONDUIT AND WIRE SIZES ARE ONLY APPLICABLE FOR FINAL CONNECTION TO FIRE PUMP FROM FIRE PUMP CONTROLLER. INCOMING FEEDERS TO FIRE PUMP CONTROLLER SHALL BE MI CABLE. REFER TO E5 SERIES FOR MI CABLE SIZE.
FOP-1&2	RP-LS1	3	Yes	1/3		120 V	1	864 VA	No						1	2	#12	1	#12	1	3/4"	
GLP-1	RP-OS4	23	Yes	1/3		120 V	1	864 VA	No						1	2	#12	1	#12	1	3/4"	
HHWP-1	PP-0B	1	No	5		480 V	3	6316 VA	Yes	8.8 A					1	3	#12	1	#12	1	3/4"	
HHWP-2	PP-0B	2	No	5		480 V	3	6316 VA	Yes	8.8 A					1	3	#12	1	#12	1	3/4"	
HHWP-3	PP-OS	5	Yes	2		480 V	3	2825 VA	Yes	4.1 A					1	3	#12	1	#12	1	3/4"	
HHWP-4	PP-OS	6	Yes	2		480 V	3	2825 VA	Yes	4.1 A					1	3	#12	1	#12	1	3/4"	
JOCKEY PUMP	PP-LR	5	Yes	3/4		480 V	3	1330 VA	No						1	3	#12	1	#12	1	3/4"	
PHWP-1	PP-0B	3	No	3		480 V	3	3989 VA	No					1	1	3	#12	1	#12	1	3/4"	
PHWP-2	PP-0B	4	No	3		480 V	3	3989 VA	No					1	1	3	#12	1	#12	1	3/4"	
PHWP-3	PP-0B	5	No	3		480 V	3	3989 VA	No					1	1	3	#12	1	#12	1	3/4"	
PHWP-4	PP-0B	6	No	3		480 V	3	3989 VA	No					1	1	3	#12	1	#12	1	3/4"	
RF-1	PP-5	3	No	25		480 V	3	28254 VA	Yes	38 A					1	3	#6	1	#8	1	3/4"	
RF-2	PP-5	6	No	25		480 V	3	28254 VA	Yes	38 A					1	3	#6	1	#8	1	3/4"	
SEP-1&2	PP-0A	4	No	3		480 V	3	3989 VA	No		30 A	3			1	3	#12	1	#12	1	3/4"	
SF-1A & 1B	PP-5	1	No	20	20	480 V	3	44874 VA	Yes	31 A					1	3	#4	1	#8	1	1"	2 FANS OF 4 FAN ARRAY
SF-1C & 1D	PP-5	2	No	20	20	480 V	3	44874 VA	Yes	31 A					1	3	#4	1	#8	1	1"	2 FANS OF 4 FAN ARRAY
SF-2A & 2B	PP-5	4	No	20	20	480 V	3	44874 VA	Yes	31 A					1	3	#4	1	#8	1	1"	2 FANS OF 4 FAN ARRAY
SF-2C & 2D	PP-5	5	No	20	20	480 V	3	44874 VA	Yes	31 A					1	3	#4	1	#8	1	1"	2 FANS OF 4 FAN ARRAY
SF-3A & 3B	PP-OS	3	Yes	15	15	480 V	3	34902 VA	Yes	23 A					1	3	#6	1	#8	1	3/4"	
SF-3A & 3B	PP-OS	3	Yes			480 V	3	0 VA	No						1	3	#12	1	#12	1	3/4"	
UH-1	RP-5	1	No	1/20		120 V	1	264 VA	No						1	2	#12	1	#12	1	3/4"	
UH-2	RP-5	1	No	1/20		120 V	1	264 VA	No						1	2	#12	1	#12	1	3/4"	
UH-3	RP-5	1	No	1/20		120 V	1	264 VA	No						1	2	#12	1	#12	1	3/4"	
UH-4	RP-5	1	No	1/20		120 V	1	264 VA	No						1	2	#12	1	#12	1	3/4"	
VP-1	PP-5	9	No	2		480 V	3	2825 VA	No		30 A	3			1	3	#12	1	#12	1	3/4"	
WSP-1	PP-OS	7	Yes	3	3	480 V	3	7978 VA	No		30 A	3			1	3	#12	1	#12	1	3/4"	

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DRAWING TITLE

MECHANICAL EQUIPMENT SCHEDULE

SCALE 22668.000

PROJECT NUMBER

E7.2

DRAWING NUMBER

APPENDIX D **EQUIPMENT SCHEDULE**

EQUIPMENT SCHEDULE

Furnished	Installed	Program Space Name	Program Space Number	Mark	Description	Type Comments	Voltage	Cupsink FH Left	Cupsink FH Right	Cold Water	Hot Water	RODI	Drain	Air	Vacuum	Gas	CO2	LP Notes
Contractor	Contractor	INSTRUCTIONAL CLASS LABS PREP SPACE	L06C	EQ1.05.101	UC Glasswasher	RODI Water Rinse Cycle	208V, 60Hz, 3-Phase, 7kW, 20 Amps			Yes	Yes	Yes	Yes					
Contractor	Contractor	INSTRUCTIONAL CLASS LABS PREP SPACE	L06C	EQ1.05.102	UC Glasswasher	RODI Water Rinse Cycle	208V, 60Hz, 3-Phase, 7kW, 20 Amps			Yes	Yes	Yes	Yes					
Contractor	Contractor	INSTRUCTIONAL CLASS LABS PREP SPACE	L06C	EQ1.09.101	RODI Regional Unit		240V, 60 Hz, 3-Phase, 24V dc			No		Yes						
Contractor	Contractor	INSTRUCTIONAL CLASS LABS PREP SPACE	L06C	EQ1.03.101	Steam Sterilizer	Building Steam	115V, 50/60 Hz, 1 Phase, 12A (Customer Interface Box), 480V, 60Hz, 3 Phase, 3.9A (Junction Box Vacuum Pump Units)			Yes			Yes	Yes	No	No		
Contractor	Contractor	MOLECULAR BIOLOGY	L11	EQ1.01.101	4LF ADA Fumehood	48"W x 39"D, (1) 120V duplex outlet each side	120V	No	Yes	Yes		No	No	No	Yes	Yes		
Contractor	Contractor	MOLECULAR BIOLOGY	L11	EQ1.06.101	Cylinder Restraint	3"-10" cylinders												
Contractor	Contractor	MOLECULAR BIOLOGY	L12	EQ1.01.102	4LF ADA Fumehood	48"W x 39"D, (1) 120V duplex outlet each side	120V	Yes	No	Yes		No	No	No	Yes	Yes		
Contractor	Contractor	MOLECULAR BIOLOGY	L12	EQ1.06.102	Cylinder Restraint	3"-10" cylinders												
Contractor	Contractor	INSTRUCTIONAL CLASS LAB #3	L57	EQ1.01.103	4LF ADA Fumehood	48"W x 39"D, (1) 120V duplex outlet each side	120V	Yes	No	Yes		No	No	No	Yes	Yes		
Contractor	Contractor	INSTRUCTIONAL CLASS LAB #3	L57	EQ1.06.104	Cylinder Restraint	3"-10" cylinders												
Contractor	Contractor	INSTRUCTIONAL CLASS LAB #3	L57	EQ1.06.103	Cylinder Restraint	3"-10" cylinders												
Contractor	Contractor	PREP	202	EQ1.11.101	Refrigerator Under Counter		115V, 60 Hz, 1 Phase, 4.7 Amps											
Owner	Owner	INSTRUCTIONAL CLASS LABS PREP SPACE	L06A	EQ3.18.101A2	5LF Biosafety Cabinet	Recirculating	115V, 16A, 60 Hz			No				No	No	Yes	No	
Owner	Owner	INSTRUCTIONAL CLASS LABS PREP SPACE	L06A	EQ3.17.101	Ice Maker	Air Cooled	115V, 60 Hz, 1 Phase			Yes			No	No	No	No		
Owner	Owner	INSTRUCTIONAL CLASS LABS PREP SPACE	L06A	EQ3.07.101	Refrigerator/Freezer Combination	Refrigerator/Freezer	120V, 60 Hz, 1 Phase			No			No	No	No	No		
Owner	Owner	INSTRUCTIONAL CLASS LABS PREP SPACE	L06A	EQ3.06.101	Refrigerator		115V, 60 Hz, 1 Phase, 5 A											
Owner	Owner	INSTRUCTIONAL CLASS LABS PREP SPACE	L06A	EQ3.03.101	Incubator Full Height	Full Height Incubator	220V			No			No	No	No	No	No	
Owner	Owner	INSTRUCTIONAL CLASS LABS PREP SPACE	L06A	EQ3.08.101	Chromatography Refrigerator	Chromotography Refrigerator	115V, 60 Hz			No			No	No	No	No		
Owner	Owner	INSTRUCTIONAL CLASS LABS PREP SPACE	L06A	EQ3.05.101	-40C to -86C	-80C Freezer	115 V			No			No	No	No	No		
Owner	Owner	INSTRUCTIONAL CLASS LABS PREP SPACE	L06A	EQ3.17.102	Ice Maker	Air Cooled	115V, 60 Hz, 1 Phase			Yes			No	No	No	No		
Owner	Owner	MOLECULAR BIOLOGY	L11	EQ3.11.101	Carboy					No		No	No	No	No	No	No	
Owner	Owner	MOLECULAR BIOLOGY	L11	EQ3.11.102	Carboy					No		No	No	No	No	No	No	
Owner	Owner	MOLECULAR BIOLOGY	L11	EQ3.11.103	Carboy					No		No	No	No	No	No	No	
Owner	Owner	MOLECULAR BIOLOGY	L11	EQ3.04.101	Shaking Incubator		120V, 60 Hz, 5A			No	No	No						
Owner	Owner	MOLECULAR BIOLOGY	L11	EQ3.12.101	Microwave		115V, 60 Hz			No	No	No						
Owner	Owner	MOLECULAR BIOLOGY	L11	EQ3.03.102	Incubator Full Height	Full Height Incubator	220V			No			No	No	No	No	No	
Owner	Owner	MOLECULAR BIOLOGY	L11	EQ3.02.101	Incubator Stacked	CO2 required	115V, 50/60 Hz, 10.5 FLA			No			No	No	No	No	Yes	
Owner	Owner	MOLECULAR BIOLOGY	L11	EQ3.07.102	Refrigerator/Freezer Combination	Refrigerator/Freezer	120V, 60 Hz, 1 Phase			No			No	No	No	No		
Owner	Owner	MOLECULAR BIOLOGY	L11	EQ3.06.102	Refrigerator		115V, 60 Hz, 1 Phase, 5 A											
Owner	Owner	MOLECULAR BIOLOGY	L11	EQ3.13.101	Water Bath		120V, 60 Hz, 5.4 A			No	No	No						
Owner	Owner	MOLECULAR BIOLOGY	L11	EQ3.13.102	Water Bath		120V, 60 Hz, 5.4 A			No	No	No						
Owner	Owner	MOLECULAR BIOLOGY	L11	EQ3.13.103	Water Bath		120V, 60 Hz, 5.4 A			No	No	No						
Owner	Owner	MOLECULAR BIOLOGY	L11	EQ3.14.101	Mini Centrifuge		120V, 50-60 Hz, 0.9A			No		No	No	No	No	No	No	
Owner	Owner	MOLECULAR BIOLOGY	L11	EQ3.14.102	Mini Centrifuge		120V, 50-60 Hz, 0.9A			No		No	No	No	No	No	No	
Owner	Owner	MOLECULAR BIOLOGY	L11	EQ3.14.103	Mini Centrifuge		120V, 50-60 Hz, 0.9A			No		No	No	No	No	No	No	
Owner	Owner	MOLECULAR BIOLOGY	L11	EQ3.14.104	Mini Centrifuge		120V, 50-60 Hz, 0.9A			No		No	No	No	No	No	No	
Owner	Owner	MOLECULAR BIOLOGY	L11	EQ3.14.105	Mini Centrifuge		120V, 50-60 Hz, 0.9A			No		No	No	No	No	No	No	
Owner	Owner	MOLECULAR BIOLOGY	L11	EQ3.14.106	Mini Centrifuge		120V, 50-60 Hz, 0.9A			No		No	No	No	No	No	No	
Owner	Owner	MOLECULAR BIOLOGY	L11	EQ3.02.102	Incubator Stacked	CO2 required	115V, 50/60 Hz, 10.5 FLA			No			No	No	No	No	Yes	
Owner	Owner	MOLECULAR BIOLOGY	L12	EQ3.03.103	Incubator Full Height	Full Height Incubator	220V			No			No	No	No	No	No	
Owner	Owner	MOLECULAR BIOLOGY	L12	EQ3.02.103	Incubator Stacked	CO2 required	115V, 50/60 Hz, 10.5 FLA			No			No	No	No	No	Yes	
Owner	Owner	MOLECULAR BIOLOGY	L12	EQ3.07.103	Refrigerator/Freezer Combination	Refrigerator/Freezer	120V, 60 Hz, 1 Phase			No			No	No	No	No		
Owner	Owner	MOLECULAR BIOLOGY	L12	EQ3.06.103	Refrigerator		115V, 60 Hz, 1 Phase, 5 A											
Owner	Owner	MOLECULAR BIOLOGY	L12	EQ3.13.104	Water Bath		120V, 60 Hz, 5.4 A			No	No	No						
Owner	Owner	MOLECULAR BIOLOGY	L12	EQ3.13.105	Water Bath		120V, 60 Hz, 5.4 A			No	No	No						
Owner	Owner	MOLECULAR BIOLOGY	L12	EQ3.13.106	Water Bath		120V, 60 Hz, 5.4 A			No	No	No						
Owner	Owner	MOLECULAR BIOLOGY	L12	EQ3.14.107	Mini Centrifuge		120V, 50-60 Hz, 0.9A			No		No	No	No	No	No	No	
Owner	Owner	MOLECULAR BIOLOGY	L12	EQ3.14.108	Mini Centrifuge		120V, 50-60 Hz, 0.9A			No		No	No	No	No	No	No	
Owner	Owner	MOLECULAR BIOLOGY	L12	EQ3.14.109	Mini Centrifuge		120V, 50-60 Hz, 0.9A			No		No	No	No	No	No	No	
Owner	Owner	MOLECULAR BIOLOGY	L12	EQ3.14.110	Mini Centrifuge		120V, 50-60 Hz, 0.9A			No		No	No	No	No	No	No	
Owner	Owner	MOLECULAR BIOLOGY	L12	EQ3.14.111	Mini Centrifuge		120V, 50-60 Hz, 0.9A			No		No	No	No	No	No	No	
Owner	Owner	MOLECULAR BIOLOGY	L12	EQ3.14.112	Mini Centrifuge		120V, 50-60 Hz, 0.9A			No		No	No	No	No	No	No	
Owner	Owner	MOLECULAR BIOLOGY	L12	EQ3.11.104	Carboy					No		No	No	No	No	No	No	
Owner	Owner	MOLECULAR BIOLOGY	L12	EQ3.11.105	Carboy					No		No	No	No	No	No	No	
Owner	Owner	MOLECULAR BIOLOGY	L12	EQ3.11.106	Carboy					No		No	No	No	No	No	No	
Owner	Owner	MOLECULAR BIOLOGY	L12	EQ3.04.102	Shaking Incubator		120V, 60 Hz, 5A			No	No	No						
Owner	Owner	MOLECULAR BIOLOGY	L12	EQ3.12.102	Microwave		115V, 60 Hz			No	No	No						
Owner	Owner	MOLECULAR BIOLOGY	L12	EQ3.04.102	Shaking Incubator		120V, 60 Hz, 5A			No	No	No						
Owner	Owner	MOLECULAR BIOLOGY	L12	EQ3.12.102	Microwave		115V, 60 Hz			No	No	No						
Owner	Owner	MOLECULAR BIOLOGY	L12	EQ3.02.104	Incubator Stacked	CO2 required	115V, 50/60 Hz, 10.5 FLA			No			No	No	No	No	Yes	
Owner	Owner	PREP STOR	L51	EQ3.19.101	Heavy Duty Wire Shelving													
Owner	Owner	PREP STOR	L51	EQ3.08.102	Chromatography Refrigerator	Chromotography Refrigerator	115V, 60 Hz			No			No	No	No	No		
Owner	Owner	PREP STOR	L51	EQ3.08.103	Chromatography Refrigerator	Chromotography Refrigerator	115V, 60 Hz			No			No	No	No	No		
Owner	Owner	TC ROOM	L56	EQ3.18.102A2	4LF Biosafety Cabinet	Recirculating	115V, 12A, 60 Hz			No				No	No	Yes	No	
Owner	Owner	TC ROOM	L56	EQ3.18.103A2	4LF Biosafety Cabinet	Recirculating	115V, 12A, 60 Hz			No				No	No	Yes	No	
Owner	Owner	TC ROOM	L56	EQ3.18.104A2	4LF Biosafety Cabinet	Recirculating	115V, 12A, 60 Hz			No				No	No	Yes	No	
Owner	Owner	HOLD	L56	EQ3.04.103	Shaker		120V, 60 Hz, 1500 VA			No	No	No						
Owner	Owner	HOLD	L56	EQ3.08.104	Chromatography Refrigerator	Chromotography Refrigerator	115V, 60 Hz			No			No	No	No	No		
Owner	Owner	TC ROOM	L56	EQ3.02.105	Incubator Stacked	CO2 required	115V, 50/60 Hz, 10.5 FLA			No			No	No	No	No	Yes	
Owner	Owner	TC ROOM	L56	EQ3.02.106	Incubator Stacked	CO2 required	115V, 50/60 Hz, 10.5 FLA			No			No	No	No	No	Yes	
Owner	Owner	TC ROOM	L56	EQ3.02.107	Incubator Stacked	CO2 required	115V, 50/60 Hz, 10.5 FLA			No			No	No	No	No	Yes	
Owner	Owner	TC ROOM	L56	EQ3.02.108	Incubator Stacked	CO2 required	115V, 50/60 Hz, 10.5 FLA			No			No	No	No	No	Yes	
Owner	Owner	INSTRUCTIONAL CLASS LAB #3	L57	EQ3.07.104	Refrigerator/Freezer Combination	Refrigerator/Freezer	120V, 60 Hz, 1 Phase			No			No	No	No	No		
Owner	Owner	INSTRUCTIONAL CLASS LAB #3	L57	EQ3.10.101	-12C to -20C	Freezer	115 V, 60 Hz, 5 A			No			No	No	No	No		
Owner	Owner	INSTRUCTIONAL CLASS LAB #3	L57	EQ3.06.104	Refrigerator		115V, 60 Hz, 1 Phase, 5 A											
Owner	Owner	PREP	202	EQ3.15.101	Dryer Stackable	Exhaust connection required	208V, 22A, 60Hz			No	Yes	No						
Owner	Owner	PREP	202	EQ3.16.101	Washer Stackable		120V, 1 Phase, 60 Hz, 15 Amps			Yes	Yes	No						
Owner	Owner	TESTING	204	EQ2.01.103	Sound Booth Large		15 Amp dedicated circuit											
Owner	Owner	TESTING	204	EQ2.01.101	Sound Booth Large		15 Amp dedicated circuit											
Owner	Owner	TESTING	204	EQ2.01.102	Sound Booth Small		15 Amp dedicated circuit											
Owner	Owner	CLINICAL GENOMICS	412	EQ3.05.102	-80 C Freezer	-80 C Freezer	115V, 60 Hz, 16 A			No			No	No	No	No		
Owner	Owner	CLINICAL GENOMICS	412	EQ3.05.103	-80 C Freezer	-80 C Freezer	115V, 60 Hz, 16 A			No			No	No	No	No		
Owner	Owner	CLINICAL GENOMICS	412	EQ3.06.105	Refrigerator		115V, 60 Hz, 1 Phase, 5 A											

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