TONY ESPOSITO

LIGHTING/ELECTRICAL
TECHNICAL REPORT II
SEPTEMBER 15, 2011

HUNTER'S POINT SOUTH
INTERMEDIATE SCHOOL AND HIGH SCHOOL
QUEENS, NY

1A. POWER DISTRIBUTION SYSTEMS

a. EXECUTIVE SUMMARY

This section is to be included in the 60% submission report.

b. SUMMARY DESCRIPTION OF DISTRIBUTION SYSTEM

This buildings electrical distribution system is a simple radial system in that there is a single entry point into the building, and everything else branches out radially from there. The main service entry point for this building is in the main electric closet located on the (plan) North wall of the building. "Main Switchboard #1 (MS1)" is the center point of this radial system.

It is from MS1 that all other loads in the building are connected. The two side-by-side electric rooms on each floor serve as the main means of routing conduit and wire. One room is dedicated to panelboards that only connected to normal power, and the other contains panelboards connected to the emergency generator. Each room contains its own riser shaft for wire and conduit. The purpose of this is to keep the normal power and emergency power wiring separate.

The generator, located on the room of the building in the emergency generator room, provides power to the critical building loads in the event of a power outage. Some of these loads include: emergency/egress lighting, two (2) elevators, telecom equipment, and the fire and jockey pump which are critical to the operation of the schools sprinkler system.

c. UTILITY COMPANY INFORMATION

Name: conEdison (of New York

Address: ConEdison
Cooper Station
P.O. Box 138
New York, NY 10276-0138

Website: http://www.coned.com/

NOTE: I still need to find the rate schedule. I may need some help. I do not understand the rates and tariffs portion of CON-EDISONs website.

Rate Schedule Goes Here

d. SERVICE ENTRANCE

The service enters this building on the north wall from four (4) CON-EDISON underground vaults. Main Switchboard 1 (MS1) is 4000A, and fed directly from these CON-EDISON vaults by twelve (12) sets of four (4) 500 MCM wire in four inch (4") conduit. This configuration is shown in **Figure 1**.

This building is fed directly from the utility company and is not connected in any way to an owner-maintained campus distribution system. This service is metered in the CT cabinet located within MS1.

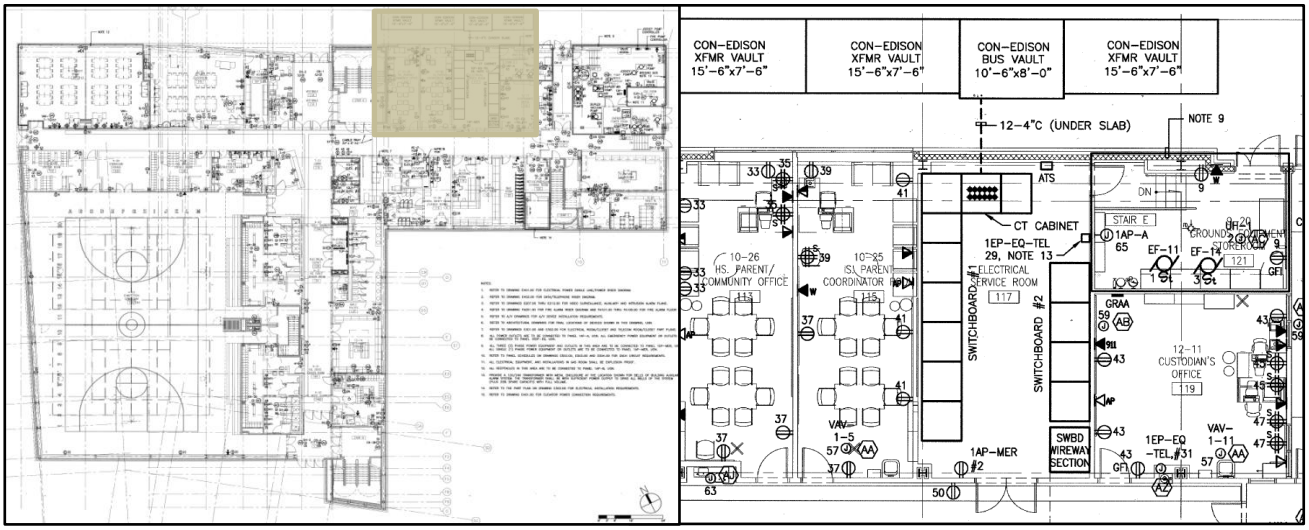

Figure 1 (a) Shows the location of the main Electrical Service Room as it is located in the floor plan. (b) An enlarged plan of the main Electrical Service room showing the four (4) CON-EDISON underground vaults and how they feed Main Switchboard #1 (MS1).

e. VOLTAGE SYSTEMS

The building utilization voltage is 208Y/120V. After hitting the main transformer in the underground CON-EDISON vault, the voltage is reduced to 208Y/120V. There are no other transformers in the building, and as a result (for better or worse) all the building loads are at this voltage.

f. EMERGENCY POWER SYSTEMS

The 400kW generator located on the roof, is the primary source of power generation in the event of an outage. The switchboard SWBD-G also located on the roof in the same room, acts as the main distribution

In the event of a power failure, the generator provides power to panels 1ELP-LS (which feeds the emergency lighting on the 1st floor), 3ELP-LS (which feeds the emergency lighting on the 2nd and 3rd floor), and 5ELP-LS (which feeds the emergency lighting on the 4th and 5th floors). The lighting is fed via distribution panel 1EDP-EQ and the 400A automatic transfer switch ATS-EQ.

In addition, the generator powers panels 4EAP-EQ and 2EAP-EQ. These panels feed the critical IT loads in the buildings telecom closets. Also powered by the emergency generator is the 1600A emergency switchboard located on the 1st floor that feeds the buildings elevators and a single air handling unit (AHU-3) via the 800A automatic transfer switch ATS-LS.

The fire and jockey pump, also powered by the emergency generator, are critical to the water supply and pressure maintenance of the buildings fire sprinkler system.

g. LOCATION OF SWITCHGEAR

The two main switchboards, MS1 and MS2 are located in the main electrical room on the first floor. This room is the location of the main service entrance to the building. Also on the first floor, is the emergency power room which contains the main emergency switchboard, two (2) emergency panelboards, and 2 of the buildings 3 automatic transfer switches.

There are two side by side electric rooms on each floor - one for normal power panelboards, and one for panels that are connected to the emergency generator. The primary mode of wiring and conduit routing is by two shafts that connect these stacked electric rooms on each floor. There is one shaft in each of the rooms so that the conduit for the emergency system is separate from the normal system.

Major Equipment						
Name	Type	Floor	Room Name	Room #	Enlarged Plan	Emergency
MS1	SB	1	ELECTRICAL SERVICE ROOM	117		N
MS2	SB	1	ELECTRICAL SERVICE ROOM	117		N
SWBD-EM	SB	1	EMERGENCY POWER ROOM	123A		Y
1EDP-LS	DP	1	EMERGENCY POWER ROOM	123A		Y
1EDP-EQ	DP	1	EMERGENCY POWER ROOM	123A		Y
1DP-MER	DP	1	FIRE PUMP/PLUMBING/LAB SUPPORT	123		N
ATS	ATS	1	ELECTRICAL SERVICE ROOM	117		Y
ATS-EQ	ATS	1	EMERGENCY POWER ROOM	123A		Y
ATS-LS	ATS	1	EMERGENCY POWER ROOM	123A		Y
5DP-K1	DP	5	KITCHEN COMPLEX	534		N
MCC-MER	MCC	Roof	BOILER RM	603		N
SWBD-G	SB	Roof	EM GEN RM	604		Y
GEN	GEN	Roof	EM GEN RM	604		Y

ATS: Automatic Transfer Switch
DP: Distribution Panel
SB: Switchboard
GEN: Generator
MCC: Motor Control Center

Table 1 Information regarding the major electrical equipment in the building

Lighting and Appliance Panels									
Name	Voltage	Main Type	Main Size	Bus Size	Floor	Room Name	Room #	Enlarged Plan	Emergency
1LP-A	208/120				1	ELECTRICAL CLOSET	133A		N
1AP-A	208/120				1	ELECTRICAL CLOSET	133A		N
1AP-B	208/120				1	ELECTRICAL CLOSET	133A		N
1AP-MER	208/120				1	FIRE PUMP/PLUMBING/LAB SUPPORT	123		N
1ELP-LS	208/120				1	ELECTRICAL CLOSET	133B		Y
1ELP-ELEV	208/120				1	ELEVATOR MACHINE ROOM	114		Y
1EP-EQ-TEL	208/120				1	TELECOM ROOM	112		Y
2LP-A	208/120				2	ELECTRICAL CLOSET	233A		N
2AP-A	208/120				2	ELECTRICAL CLOSET	233A		N
2AP-B	208/120				2	ELECTRICAL CLOSET	233A		N
2EAP-EQ	208/120				2	ELECTRICAL CLOSET	233B		Y
3ELP-DIM	208/120				3	AUDITORIUM STORAGE	354A		Y
3LP-DIM-1	208/120				3	AUDITORIUM STORAGE	354A		N
3LP-DIM-2	208/120				3	AUDITORIUM STORAGE	354A		N
3LP-A	208/120				3	ELECTRICAL CLOSET	333A		N
3AP-A	208/120				3	ELECTRICAL CLOSET	333A		N
3AP-B	208/120				3	SCIENCE PREP	321		N
3AP-B1	208/120				3	SCIENCE LAB	319		N
3AP-B2	208/120				3	SCIENCE LAB	323		N
3ELP-LS	208/120				3	ELECTRICAL CLOSET	333B		Y
4LP-A	208/120				4	ELECTRICAL CLOSET	433A		N
4AP-A	208/120				4	ELECTRICAL CLOSET	433A		N
4AP-A1	208/120				4	HS PROJECT ROOM	417/419		N
4AP-B	208/120				4	ELECTRICAL CLOSET	433A		N
4EAP-EQ	208/120				4	ELECTRICAL CLOSET	433B		Y
5PP	208/120				5	ELECTRICAL CLOSET	533A		N
5LP-A	208/120				5	ELECTRICAL CLOSET	533A		N
5AP-A	208/120				5	ELECTRICAL CLOSET	533A		N
5AP-A1	208/120				5	HS SCIENCE LAB	519		N
5AP-A2	208/120				5	HS SCIENCE DEMO	523		N
5AP-A3	208/120				5	HS SCIENCE DEMO	525		N
5AP-K1	208/120				5	KITCHEN COMPLEX	534		N
5AP-K2	208/120				5	KITCHEN COMPLEX	534		N
5AP-K3	208/120				5	KITCHEN COMPLEX	534		N
5ELP-LS	208/120				5	ELECTRICAL CLOSET	533B		Y
RAP-MER	208/120				Roof	BOILER RM	603		N
SUP-RAP	208/120				Roof	BOILER RM	603		N
REAP-EQ	208/120				Roof	BOILER RM	603		Y

Table 2 Information regarding the Lighting and appliance panels in the building.

h. OVER-CURRENT DEVICES

The main service switchboards, MS1 and MS2, utilize fused switches as their over-current protection devices. MS2 (fed from MS1) is protected by a 2000A fused switch. MS2 (the main service switchboard) is protected by a 4000A fused switch. All fused switches are UL listed class "L" which is time-delay and current limiting.

Other distribution panels (SWBD-G, 1EDP-EQ, 1EDP-LS, 1EDP-MER, and SWBD-EM) have no main over-current protection, but utilize thermal-magnetic circuit breakers to protect the equipment they distribute power to. Lighting and equipment panels also utilize thermal-magnetic circuit breakers for both main over-current protection as well as branch circuit protection.

i. TRANSFORMERS

There are no transformers in this building. The only transformer in this system is the transformer at the main service entrance which is owned by the utility company CON-EDISON. The building utilization voltage is 208Y/120V, and all of the loads in the building are at this voltage.

j. GROUNDING

Grounding is not shown very extensively for this building. There is a drawing (E003.00) showing the lightning protection system located on the room, and another drawing (E004.00) showing a few grouding rods on the first floor. There are a few grounding details located in this drawing set and are as follows:

DWG E601.00

- Terminal Base
- Swivel Adapter
- Offset Air Terminal Base
- Lighting Protection at Roof Top Unit
- Alum. Air Terminal at Exhaust Fans
- Downlead to Lower Roof
- Downlead to Ground

DWG E602.00

- Grounding: Grounding with Ground Bus and Neutral Bus
- Grounding: Raceway Equipment Grounding system

DWG E603.00

- Grounding: Water Pipe Ground Connections and Ground Bus

k. SPECIAL EQUIPMENT

Some panelboards in this building are equipped with a transient voltage surge suppression (TVSS) system. The panels that have this feature are as follows:

- MS1
- 1EP-EQ-TEL
- 2EAP-EQ
- 4EAP-EQ
- 1AP-A (2 section)
- 1AP-B
- 2AP-A (2 section)
- 2AP-B (2 section)
- 3AP-A (2 section)
- 3AP-B (2 section)
- 4AP-A (2 sections)
- 4AP-B (2 sections)
- 5AP-A (2 sections)

The 400kW generator locater in the emergency generator room on the roof is a purely diesel generator. The generator contains the following items:

- Day tank:
  - Diesel fuel only
  - 10 gauge steel minimum
  - 75 gallons
- Voltage Regulator
- Starting Battery
- Battery Charger
- Remote Stop Switch
- Muffler
- Remote Annunciator
- Vibration Isolators
- Automatic Transfer Switches

In addition, the generator is resistant to seismic forces. It has supports for internal and external components, fastening for batteries, and wiring and piping are designed and constructed to withstand static or anticipated seismic forces.

l. LIGHTING LOADS

This section is to be included in the 60% submission report.

m. LIGHTING CONTROL

This section is to be included in the 60% submission report.

n. MECHANICAL AND OTHER LOADS

This section is to be included in the 60% submission report.

o. SERVICE ENTRANCE SIZE

This section is to be included in the 60% submission report.

p. ENVIRONMENTAL STEWARDSHIP DESIGN

- Occupancy Sensors
- Daylighting Controls
- High Efficiency Lighting

q. DESIGN ISSUES

I do not know of any specific design problems encountered in the design of the electrical system. One thing I am curious about is the voltage that this system utilizes. I know it has something to do with the power company, but I will further investigate it for the next submission.

For the investigation of the electrical system next semester, I would like to do a cost analysis of stepping up the voltage in part of the building for the mechanical equipment. The goal would be to see if a single transformer could be put into the building to serve the mechanical loads with the goal of reducing the size of the equipment.

1B. DRAWINGS

a. SINGLE-LINE DIAGRAM DRAWING LIST

E401.00: POWER SINGLE LINE AND RISER DIAGRAM

b. SINGLE-LINE DIAGRAM DRAWING

This section is to be included in the 60% submission report.

II. COMMUNICATIONS SYSTEMS

a. TELEPHONE/DATA

b. VIDEO SURVEILLANCE

c. AUXILIARY ALARM

d. INTRUSION ALARM

e. FIRE RESCUE INTERCOM

f. AUDIOVISUAL