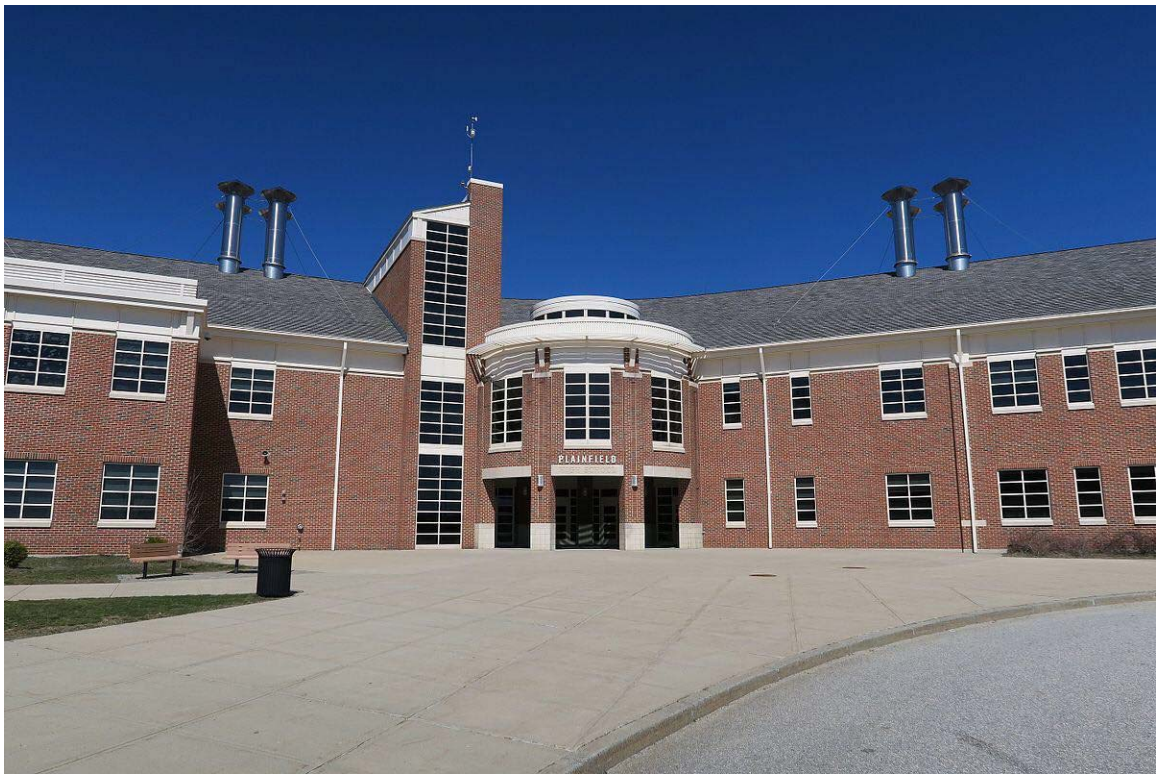
SALAMONE & ASSOCIATES, P.C.
Consulting Engineers

ASSESSMENT OF THE EXISTING STANDBY GENERATOR SYSTEM AT

PLAINFIELD HIGH SCHOOL
105 Putnam Road, Central Village, CT



For
Plainfield Public Schools
651 Norwich Road
Plainfield, CT

February 1, 2024

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INTRODUCTION

SECTION I - INTRODUCTION

Salamone & Associates, P.C. has been retained by Plainfield Public Schools to provide an assessment of the existing standby emergency generator system at Plainfield High School located at 105 Putnam Road in Central Village, Connecticut.

The purpose of this assessment was to review the feasibility of incorporating the existing kitchen refrigeration systems (i.e. walk-in cooler and walk-in freezer) onto the existing standby emergency generator system of the high school and to propose recommendations based upon findings for providing standby power during an outage for these kitchen refrigeration systems.

The findings within this assessment were based upon field observations, construction documents, feasibility and construction costs. This assessment is not intended to serve as a specification for remedial and/or construction purposes for the standby generator system.

SECTION II:
EXECUTIVE SUMMARY

SECTION II – EXECUTIVE SUMMARY

A field visit was conducted by Salamone & Associates, P.C. on December 6, 2023 in the presence of Plainfield High School Lead Custodian to ascertain the loads connected to the standby emergency generator system for the building and determine if any spare capacity is available.

Standby emergency power is provided to the facility by a diesel generator within a weatherproof enclosure. The generator sits atop a diesel sub-base fuel tank and is located in the paved drive area at the rear of the building which is accessed from the field parking lot to the South of the school.

Standby power is provided from the generator to a main emergency power distribution switchboard via an automatic transfer switch. This switchboard in turn provides power to respective emergency power panelboards located throughout the school as well as certain air handling units and the automatic transfer switch to the electric fire pump.

SECTION III:
EXISTING STANDBY
EMERGENCY GENERATOR SYSTEM

SECTION III – EXISTING STANDBY EMERGENCY GENERATOR SYSTEM

Generator:

A Cummins Power model 'DFCE' 400 KW / 500 KVA, 480/277V, 3 Phase, 4 Wire diesel generator currently provides standby power to the facility. The generator is enclosed within a weatherproof enclosure and is mounted above a diesel sub-base fuel tank manufactured by Tramont. Based upon documentation, the sub-base tank has been sized to provide approximately 72 hours of run time.

Within the enclosure is an electrical sub-panel which provided power for the generator block heater, receptacle and lighting.

Standby power wiring and conduit is routed underground from the generator to an automatic transfer switch.

The generator and associated diesel sub-base fuel tank appear to have been in service for approximately 20 years.

Automatic transfer switches:

The automatic transfer switch (ATS) for the school normal loads is a Cummins PowerCommand ATS and is rated at 800A, 480/277V, 3 Phase, 4 Wire within a NEMA 1 enclosure. It is located within the main electrical room and seems to have been in service approximately 20 years. It is located adjacent to and feeds the main standby emergency power switchboard 'SWBD-EMDP'. Normal power to the ATS is provided from the school's main switchboard via an 800A, 3 Pole (P) circuit breaker.

The ATS for the electric fire pump is incorporated as part of the fire pump controller. Normal power is provided to fire pump ATS by a separate dedicated electric service via a service-entrance cabinet rated at 800A, 480/277V, 3 Phase, 4 Wire within a NEMA 1 enclosure with 800A/3P main circuit breaker. Emergency power feed to the fire pump ATS is provided from the main emergency power switchboard via a 250A/3P circuit breaker. The service-entrance cabinet and combination electric fire pump controller are located in the mechanical room.

Main Standby Emergency Power Switchboard 'SWBD-EMDP':

Main standby emergency power switchboard is designated as 'SWBD-EMDP' is located in the main electrical room. It is rated at 800A, 480/277V, 3 Phase, 4 Wire with a NEMA 1 enclosure and is fed from the Cummins ATS located adjacent to it. It is manufactured by Siemens and seems to have been in service approximately 20 years.

In addition to supplying the standby emergency power for the electric fire pump as noted above, switchboard 'SWBD-EMDP' also provides power to standby emergency power panelboards designated as 'EBRPP', 'EMDP1', 'EMDP2', 'EMDP3, 'EMDP4', 'EMDP5' and 'EMDP6' which

are located within electrical closets throughout the school with exception of 'EBRPP' which is located in the boiler room. 'SWBD-EMDP' also provides power to air handling units AHU-1A, AHU-1B, AHU-5, AHU-8, AHU-11, AHU-12 and AHU-13 as well as the standby emergency power panel designated as 'EMFP' located in the fire service valve pit via a 15 KVA step-down transformer.

Standby Emergency Power Distribution Panelboards (480/227V, 3 Phase , 4 Wire:

Standby emergency power distribution panelboards 'EBRPP', 'EMDP1', 'EMDP2', 'EMDP3, 'EMDP4', 'EMDP5' and 'EMDP6' are all rated at 400A, 480/277V, 3 Phase, 4 Wire. Although they are rated at 400A, they are each fed from a 225A/3P circuit breaker in 'SWBD-EMDP' thereby limiting their capacity. All the panels are within NEMA 1 enclosures and have been in service approximately 20 years and were manufactured by Siemens.

These panelboards feed corresponding 100A, 208Y/120V, 3 Phase, 4 Wire rated standby emergency power panelboards via 30 KVA step-down transformers. In addition to the 208Y/120V panelboards these 480V/277 panelboards also provide power to boilers, pumps, air handling units, VAV boxes and lighting.

Standby Emergency Power Distribution Panelboards (208Y/120V, 3 Phase , 4 Wire:

These standby emergency power distribution panelboards are designated as 'EBRRP', 'EM1', 'EM2', 'EM3', 'EM4', 'EM5, and 'EM6' and serve fire alarm panels and dampers, Area of Refuge panels, HVAC and security control panels, data equipment, as well as certain air conditioning condensing units with corresponding indoor AC units, certain fan coil units, cabinet unit heaters and exhaust fans as well as limited receptacle loads throughout the school.

Although these panelboards are rated for 250A they are limited to 100A as they are fed from a respective 30 KVA step-down transformer. As such, each panelboard contains a 100A/3P main circuit breaker as required by Code.

The panelboards are fed from their respective 480/277V panelboard via the transformer as follows. Panelboard 'EBRPP' supplies power to 'EBRRP', 'EMDP1' supplies 'EM1', 'EMDP2' supplies 'EM2', 'EMDP3' supplies 'EM3'and so on.

All the panels are within NEMA 1 enclosures and have been in service approximately 20 years and were manufactured by Siemens.

Kitchen panelboards:

The kitchen equipment is powered from three (3) 400A, 280Y/120V, 3 Phase, 4 Wire panelboards located in the kitchen office and are not connected to the standby emergency power system. These panelboards are designated 'KP1' which contains a 400A/3P main circuit breaker, 'KP2' and 'KP3'. Panelboards 'KP2' and 'KP3' appear to be fed from panelboard 'KP1' via feed thru lugs. As such the total capacity for all three panelboards combined is 400A.

The circuits for the walk-in cooler and the walk-in freezer compressors, evaporators, lighting, heat trace, alarms originate out of panelboard ‘KP1’.

SECTION IV:
FINDINGS

SECTION IV – FINDINGS

Information gathered during our field observations as well as information noted on the design drawings for the school where utilized in determining if any generator spare capacity is available to accommodate the addition of the existing walk-in cooler and walk-in freezer systems on the existing generator.

Reasonable diversification (i.e. equipment not all running at the same time) and stepping of the generator loads was also incorporated in the calculations. Please note that nameplate data for the vast majority of the HVAC equipment on the roof was illegible. As such, the amperages noted on the design drawings were utilized in the calculations.

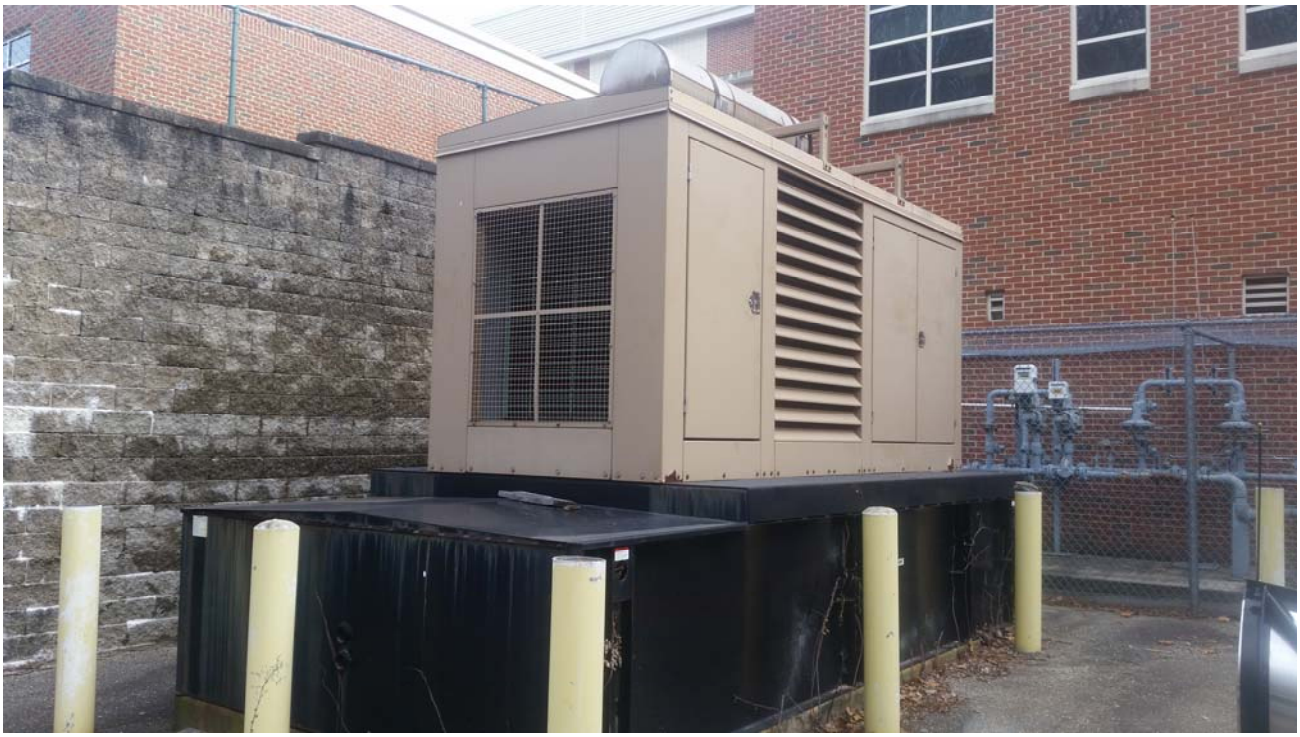
Based upon the findings, it appears that the generator would not have sufficient capacity to handle any further loads as it currently stands.

There are a couple of options to provide standby power for the kitchen refrigeration systems without upsizing of the existing generator or eliminating current loads already on the generator.

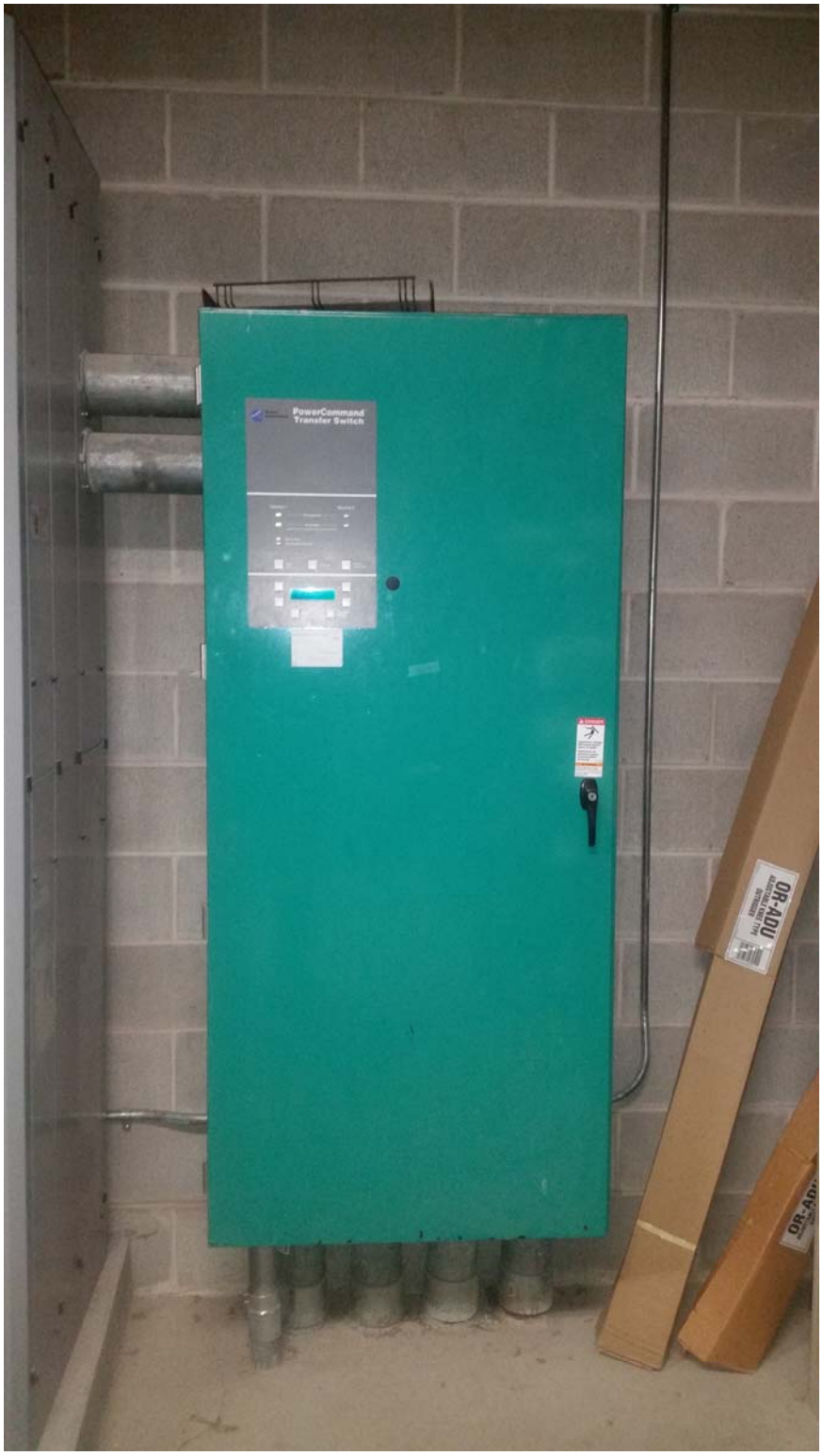
One would be to provide a second standby generator and associated automatic transfer switch and panelboard to supply the kitchen refrigeration loads. The other would be to install an exterior generator docking station, manual transfer switch and panelboard. This approach eliminates the cost and real estate of a permanent generator and allows for the simple connection of a temporary generator during power outages.

SECTION V:
PHOTOGRAPHS-
EXISTING CONDITIONS

SECTION V - PHOTOGRAPHS-EXISTING CONDITIONS



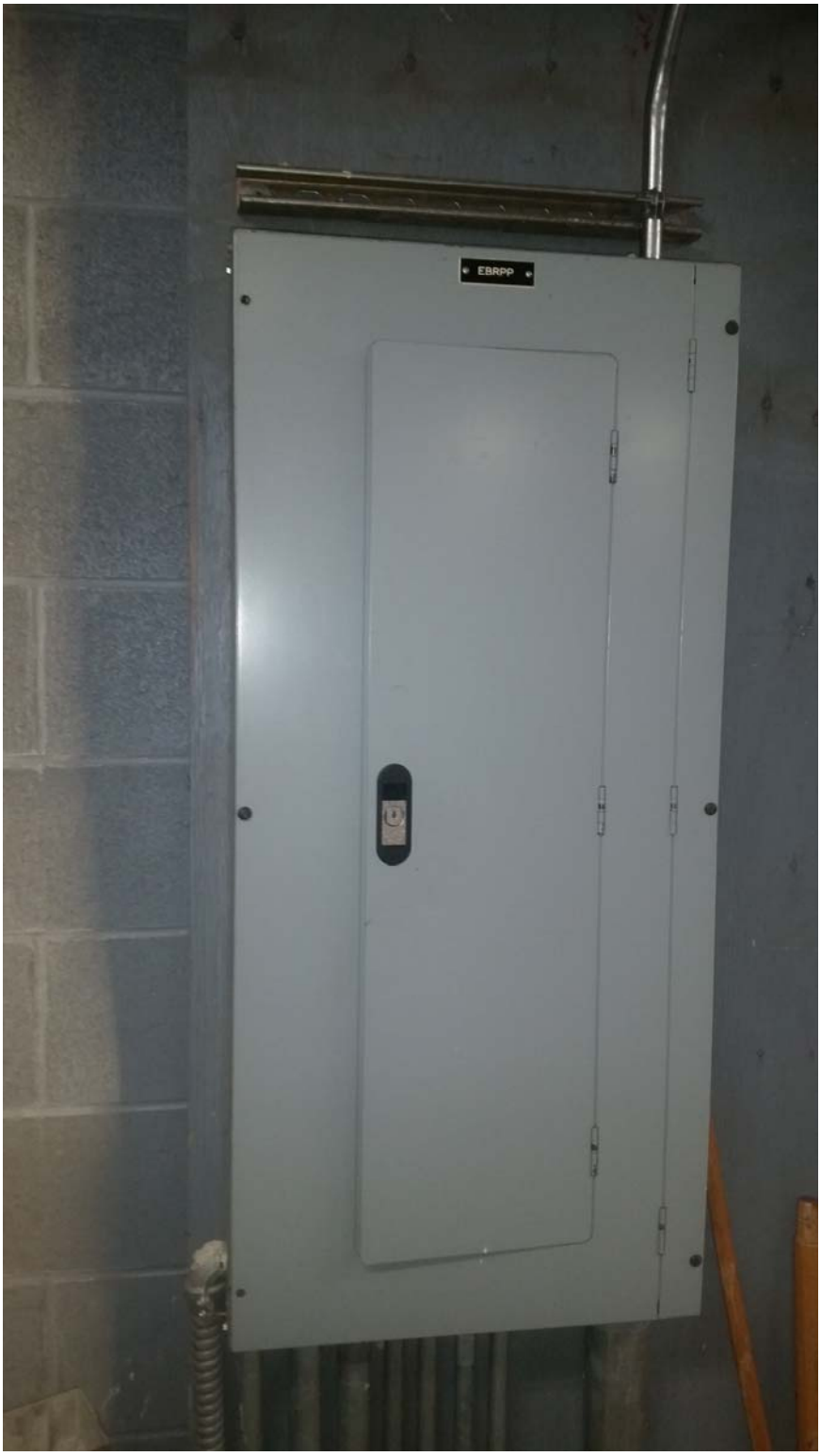
1) Existing Cummins Power 400 KW / 500 KVA, 480/277V, 3 Phase, 4 Wire diesel generator with Tramont sub-base fuel tank.



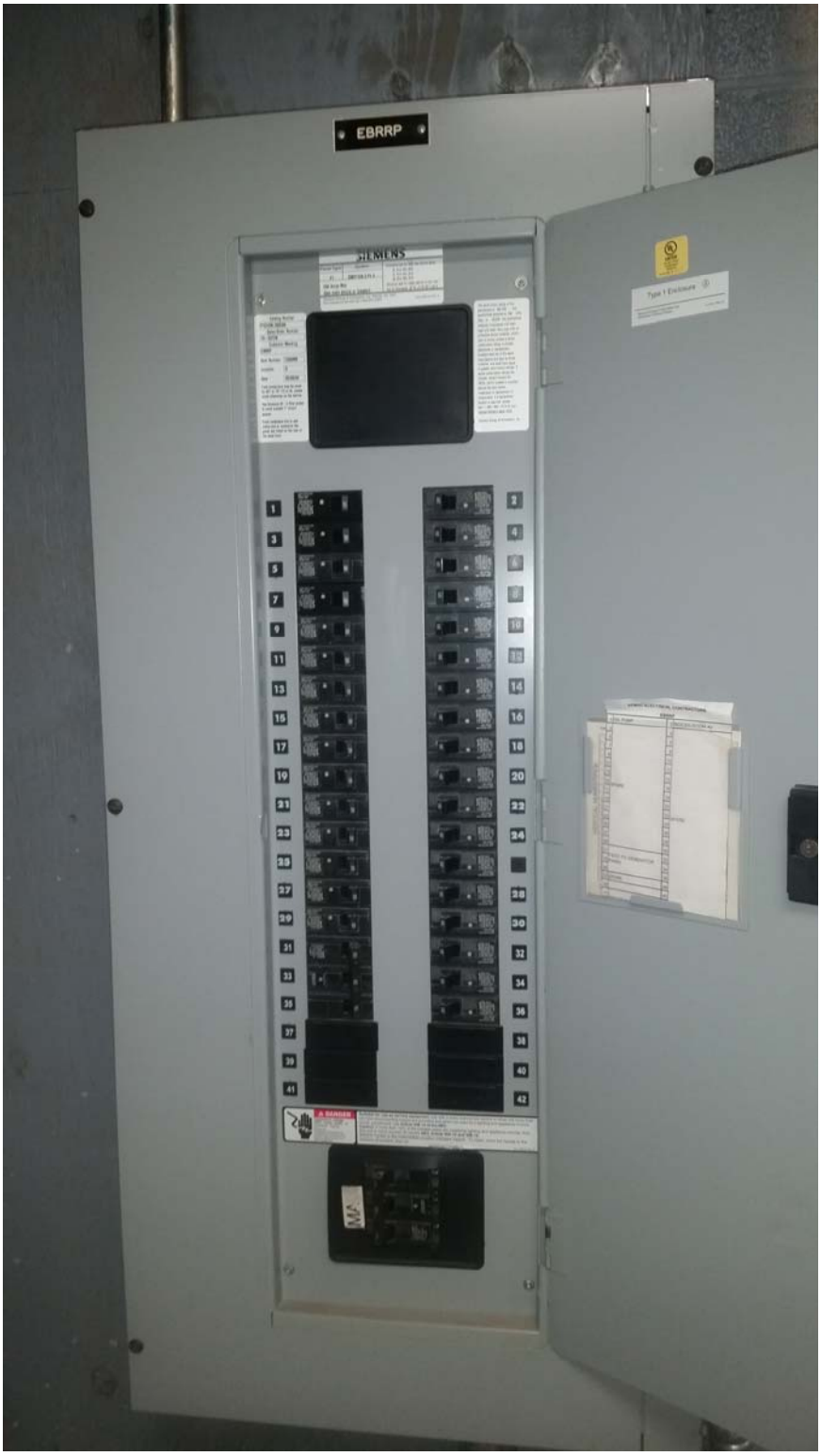
2) Existing Cummins 800A, 480/277V, 3 Phase, 4 Wire Automatic Transfer Switch.

3) Combination electric fire pump controller / Automatic Transfer Switch.

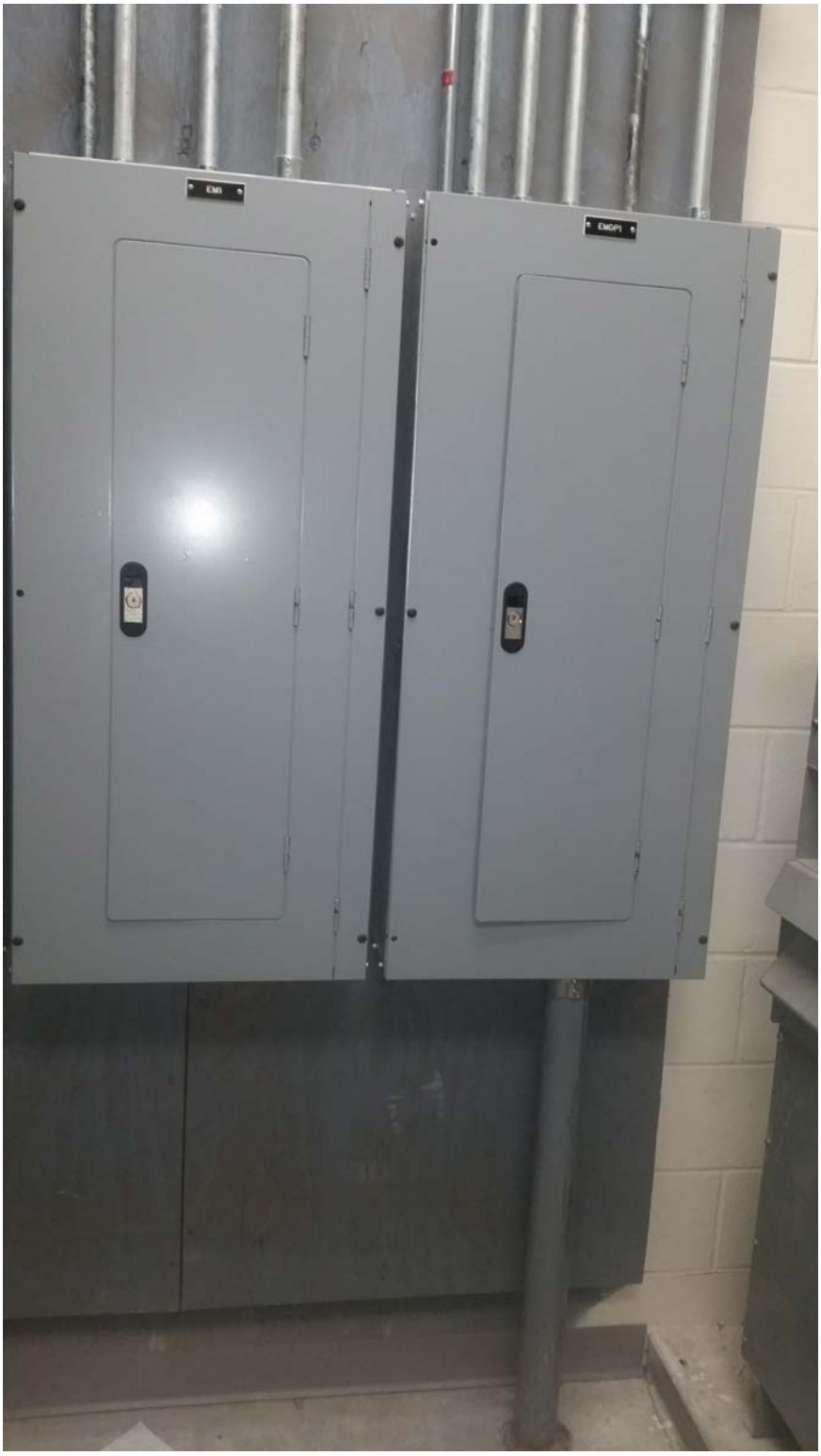
4) Existing standby emergency power switchboard ‘SWBD-EMDP’.



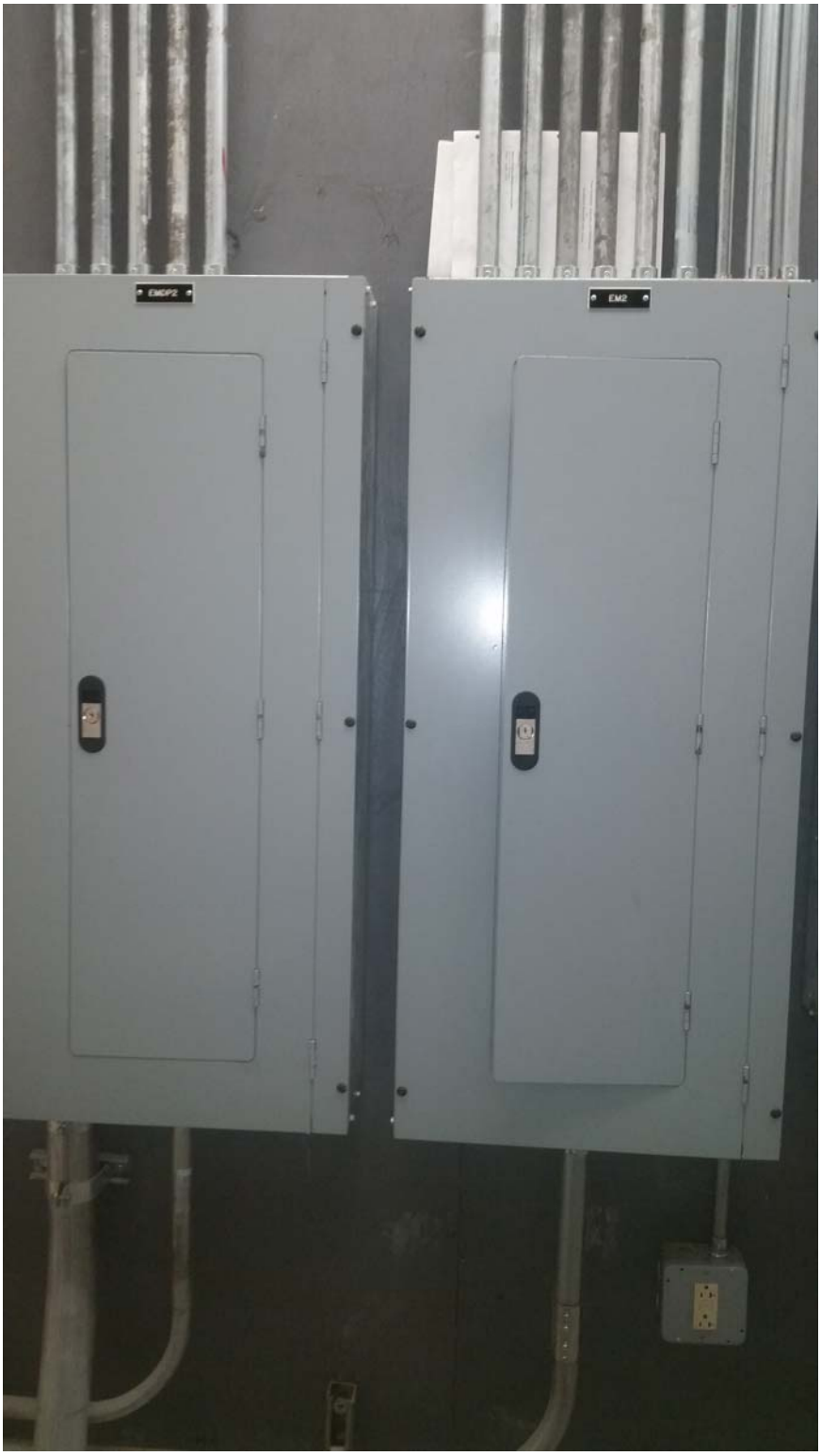
5) Panelboard ‘EBRPP’.



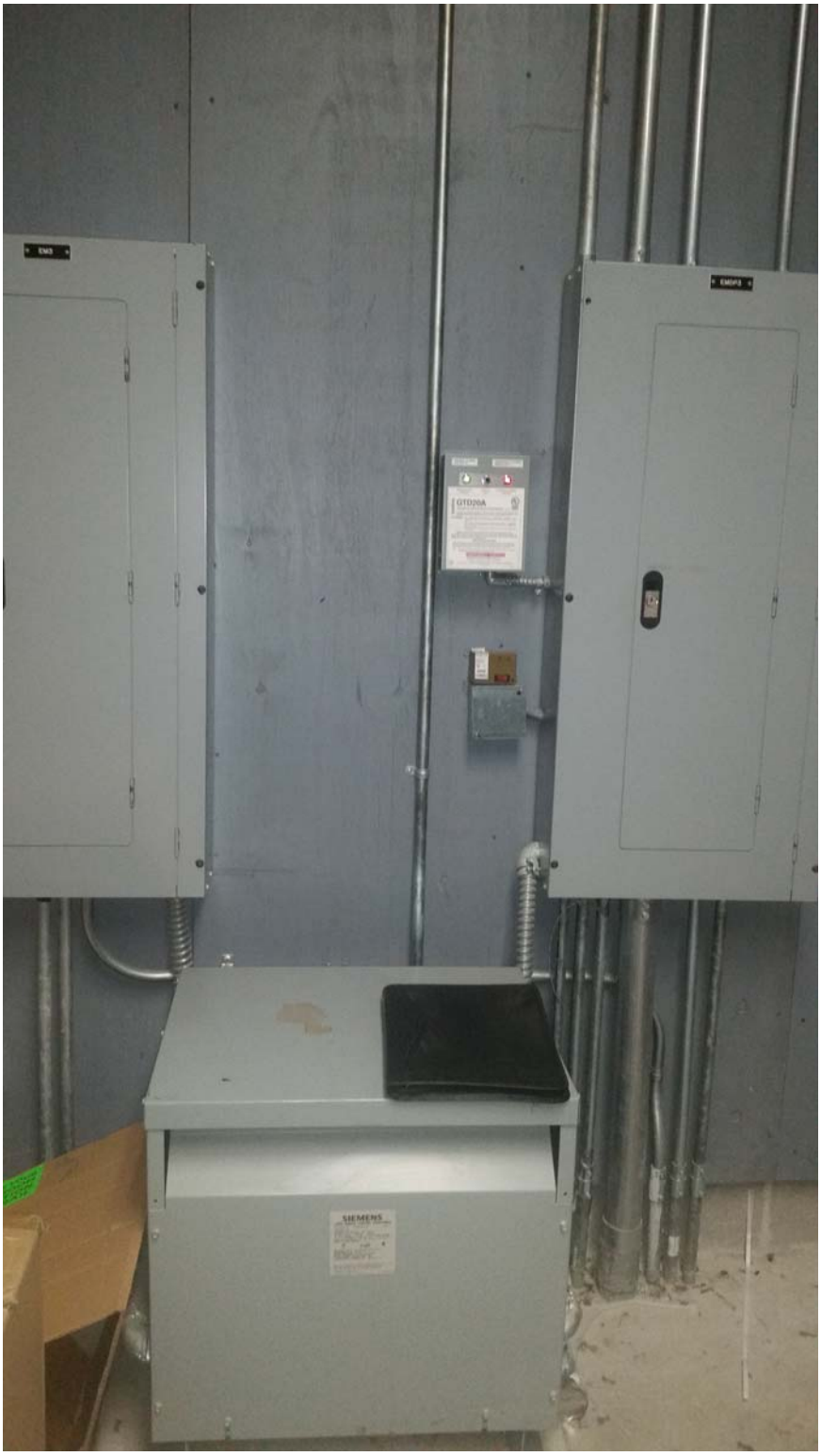
6) Panelboard ‘EBRRP’.



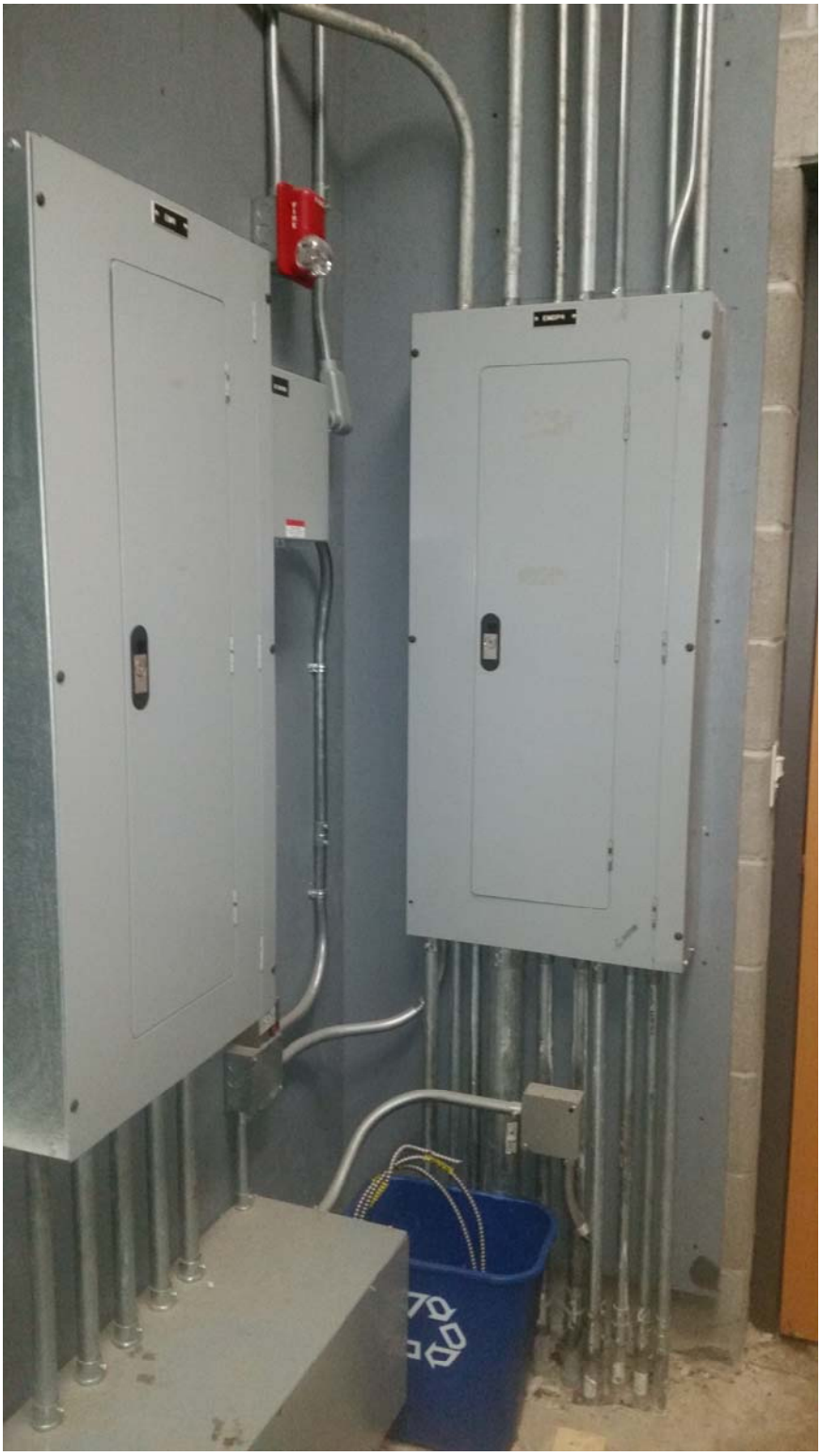
7) Panelboards ‘EMDP1’ (Right) & ‘EM1 (Left).



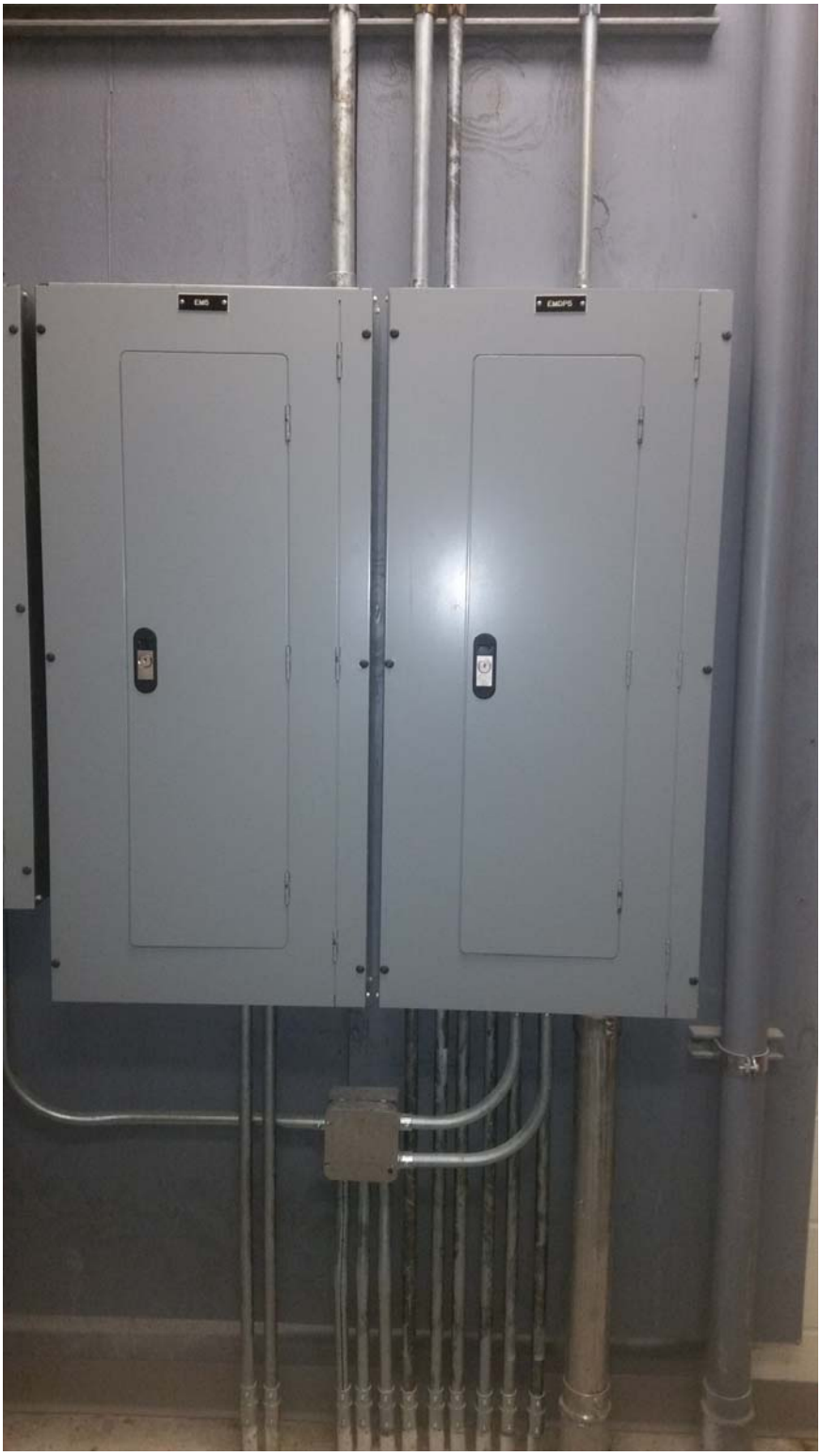
8) Panelboards ‘EMDP2’ (Left) & ‘EM2 (Right).



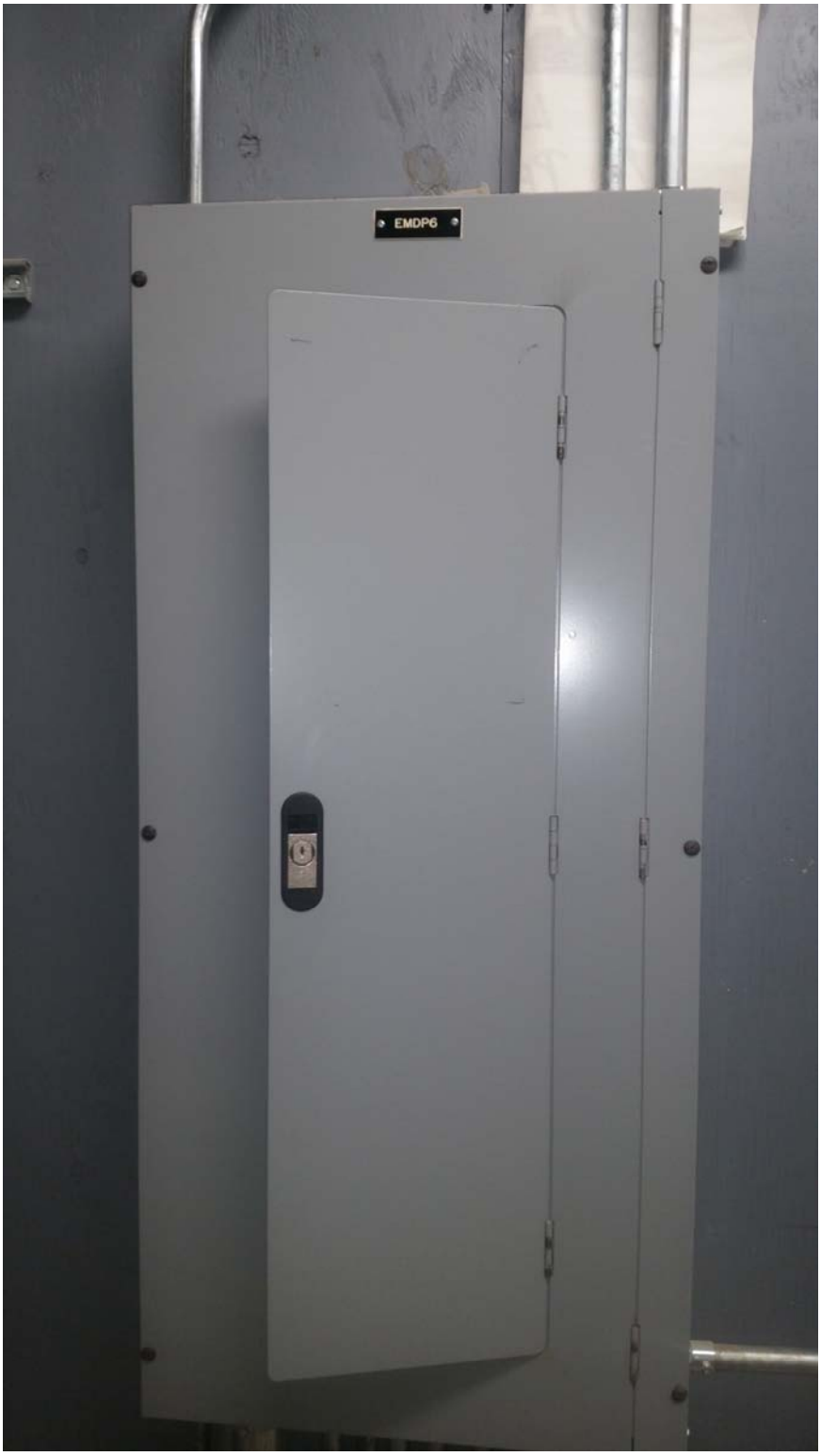
9) Panelboards ‘EMDP3’ (Right) & ‘EM3 (Left) with 30KVA step-down transformer between.



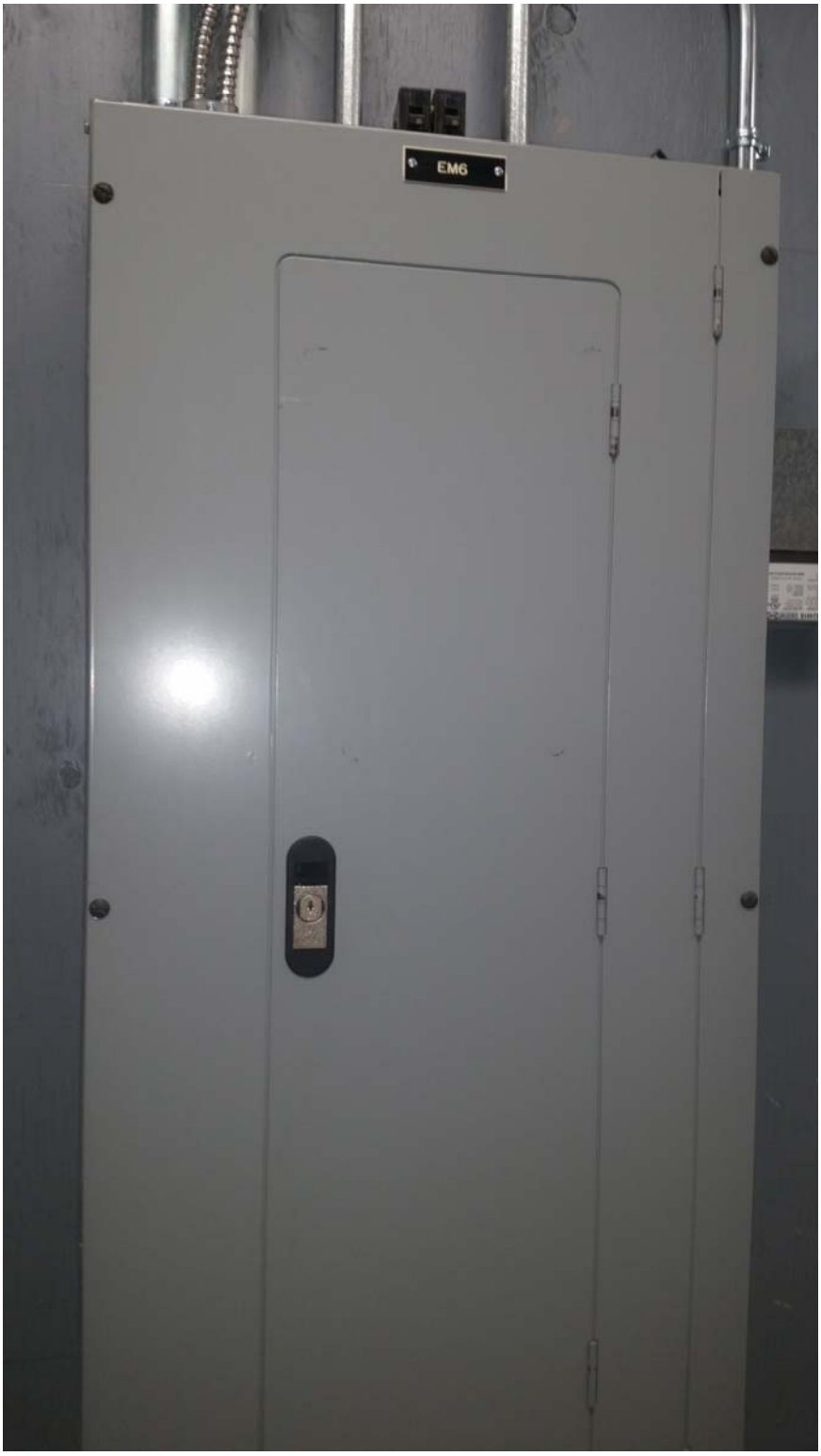
10) Panelboards ‘EMDP4’ (Right) & ‘EM4 (Left).



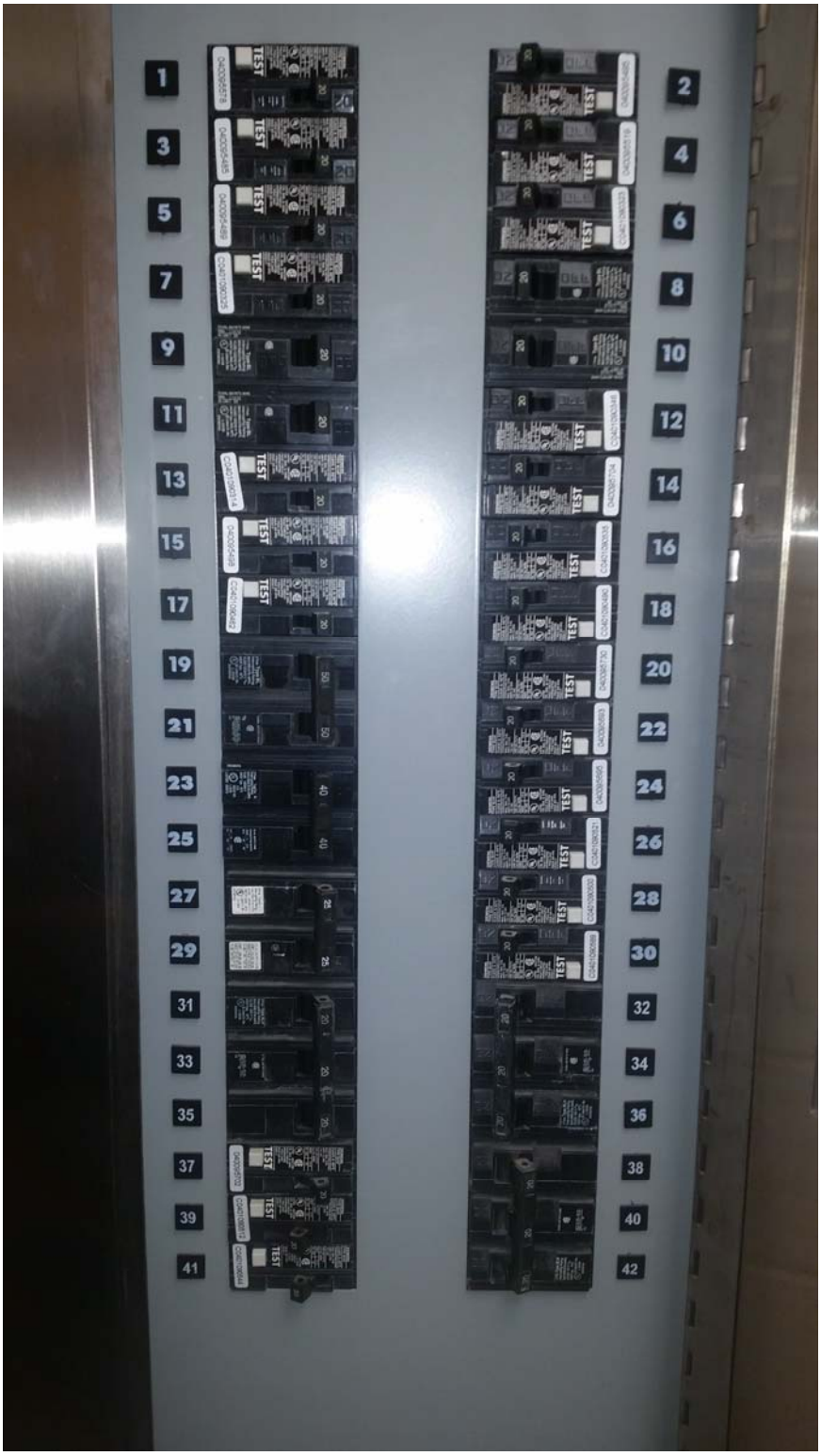
11) Panelboards ‘EMDP5’ (Right) & ‘EM5 (Left).



12) Panelboard ‘EMDP6’.



13) Panelboard ‘EM6’.



14) Kitchen panelboard ‘KP1’.

SECTION VI:
CAPITAL PLANNING

SECTION VI – CAPITAL PLANNING

For capital budget planning purposes the construction cost estimate for providing a second standby generator, automatic transfer switch, panelboard and associated wiring, conduit to provide power for the kitchen refrigeration systems is approximately $300,000 based upon current construction costs.

The construction cost estimate for providing an exterior temporary generator cam-lock docking station, manual transfer switch, panelboard and associated wiring, conduit to provide power for the kitchen refrigeration systems is approximately $150,000 based upon current construction costs.