

Existing Conditions at East Liberty Presbyterian Church

There are two existing services that come into the building at East Liberty Presbyterian Church from Duquesne Light Company Vault No. 40646. Both services enter through the exterior wall and run directly into disconnect switches. These switches are relatively new and appear to be in good condition. These switches then feed old switches in the adjacent electrical room. The old switches in the electrical room have had their internal components removed and were just used as junction boxes to bring the new service in. In the main electrical room, there are two switchboards side by side with group mounted distribution circuit breakers.

The first switchboard is rated at 240 Volt, 400 Amp and is a 3 Phase, 3 Wire type switchboard configuration. This distribution originating from this switchboard has one (1) 300A circuit breaker, one (1) 200A circuit breaker, one (1) 125A circuit breaker, two (2) 100A circuit breakers, and one (1) 70A circuit breaker. All of these circuit breakers are 3 pole circuit breakers. There are also three (3) blank 3 pole circuit breaker provisions. The second switchboard is rated at 120/208V, 800A and is a 3PH, 4W type switchboard configuration. This switchboard has distribution breakers including two (2) 400A, one (1) 225A, one (1) 200A, two (2) 150A, two (2) 125A, three (3) 100A, and one (1) 70A. Each of these breakers is a 3 pole circuit breaker. The switchboard also contains two (2) 70A - 2 pole, one (1) 50A - 2 pole, and one (1) 40A - 2 pole distribution circuit breakers. There are also two (2) blank 3 pole circuit breaker provisions.

The approximate load of the new HVAC system to be installed is 150kW. This is approximately 415 Amps at 208V, 3PH. The second switchboard rated at 120/208V would be the switchboard from which we would want to power the equipment. The 3 phase, 3 wire switchboard is problematic in a number of ways. First of all, 240V is not the typical 3 phase voltage used today. It is most often seen in residential areas where 120/208V power isn't readily available. Secondly, the fact that it is 3 phase, 3 wire means that there is no neutral wire. A neutral wire is necessary to utilize single phase circuits. For the new HVAC system, large three phase circuits will handle the equipment, but small single phase circuits will be necessary for controls. Taking power from the second switchboard with the 3 phase, 4 wire configuration will enable the project to pull motor power and controls power from the new HVAC panel.

A call has been placed to Duquesne Light Company to determine if the existing 800A, 120/208V, 3PH, 4W service will be adequate to handle the additional load. Based upon the size of the building and the loads connected to this switchboard, it is unlikely that the full HVAC load will be able to be supported from the existing switchboard. As such, until additional information is provided by Duquesne Light Company, the preliminary design will include a new 400A service being brought in from the transformer vault consisting of (4) #500 and (1) #3 ground in (1) 4" conduit. This service will terminate in a 400A, 120/208V, 3PH, 4W service entrance rated panelboard located beside the existing service switches. This panelboard will be an 84 circuit panelboard with a 400A main circuit breaker. The short circuit withstand rating of the panelboard shall match the worst case of the existing service entrance switchboards and switches. This panel shall be used to provide power to all components of the new HVAC system in accordance with the circuit breakers to match the "Maximum Overcurrent Protection" of the HVAC equipment manufacturer.