

## Critical Mechanical Infrastructure Upgrade for Primary Data Center, Metro Nashville Public Schools Nashville, TN

Due to increased growth, Metro Schools' needed to expand their data center's critical mechanical infrastructure. Puckett Engineering's solution began with an initial study to evaluate the electrical system and emergency generator to accommodate upgrading of the data center's UPS and mechanical systems. Puckett Engineering's solution for upgrading their critical infrastructure with limited funding included the following steps (electrical upgrades were postponed until a later project):

- Due to limited funding, the emergency generator could not be upgraded at this time. Therefore, load-shed and other control interfaces were incorporated as described below.
- The main distribution panel required replacement to accommodate additional circuit breaker space.
- Replaced one of two UPS systems with a larger system in order to provide a 2N redundant UPS configuration.
- Surge protection for the power system.
- Replaced the data center CRAC units with larger units to accommodate for the existing demand and future growth.
- Replaced the backup air conditioning unit with a larger unit. Due to capacity limitations on the electrical service and generator, control interface was incorporated to prevent more than two of the three air conditioning units from operating at the same time.
- Due to capacity constraints on the existing emergency generator, control interfaces were designed for load-shedding when loads were supplied from the emergency generator. For example, the reheat and humidification on the CRACs were disabled and the UPS battery charging was reduced.
- The design incorporated distribution equipment and wiring for control and mitigation of power system harmonics caused by the UPS systems and nonlinear electronic loads.
- Fault and coordination studies.
- Identification of all electrical and mechanical equipment and devices in order to readily identify equipment and devices and know where they feed from. In addition, color coding of nameplates were utilized to quickly identify whether a circuit is supplied from emergency, UPS, or normal power.
- Network interface with the UPS and A/C systems was incorporated for monitoring alarms and status conditions via the local area network.
- The data center's emergency-power-off controls were upgraded to incorporate the new UPS and A/C systems.
- The design was implemented in phases on a fast-track basis.
- Special considerations and coordination during design and installation were included for maintaining daily operations and minimizing power interruptions during the construction work.
- Construction administration services were also provided, including commissioning and closeout documentation.

### PROBLEM OR NEED

Data Center's critical infrastructure inadequate to handle future needs. School system strapped with limited funding.

### PUCKETT SOLUTIONS

Devised cost-effective solutions to enhance reliability and redundancy.

Replaced main distribution panel.

Replaced one UPS system with larger system to provide 2N redundant level.

Increased size of data center CRAC units.

Replaced backup A/C unit with larger unit and installed control interface to prevent overload of system.

Incorporated load-shedding to allow reliable and redundant operations without overloads at critical times.

Fast-track construction with minimal interruptions.

Included construction administration and commissioning.

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Year Completed: 2007

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