

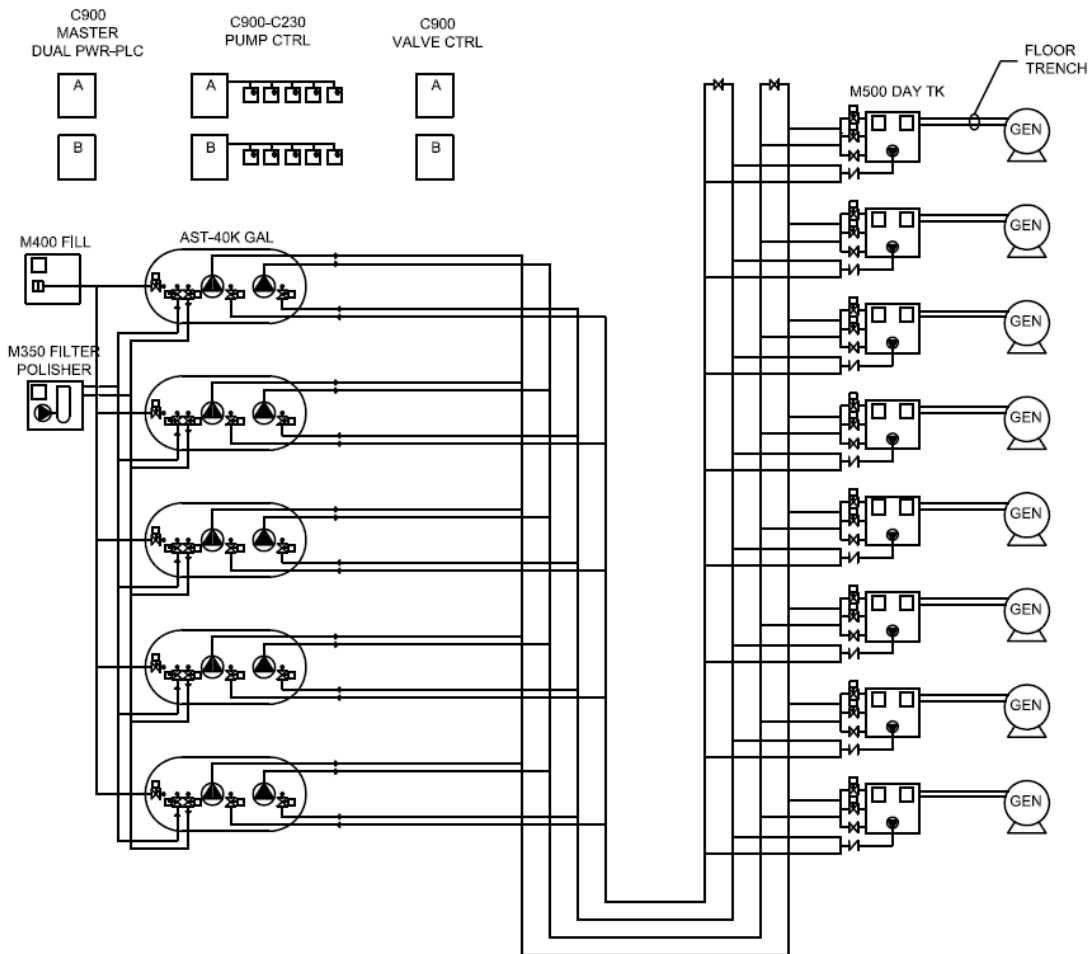
# Data Center Fuel System Design

## Type 5: Dual Path + Ethernet Control

### General Description:

The data center operator required fast construction of a fuel system to support 8 generators of 2MW capacity each. The generators were located inside the building with 2 generators per room. (5) Bulk storage tanks are located outside aboveground and remote from the building.

The system is designed to allow a complete dual path fuel feed from the bulk storage tanks to the generators. The control system is a redundant ethernet system between controllers allowing for a minimum of control signal wiring.



**Challenges:**

**Speed:** The primary challenge is the speed at which the system was required to be delivered, installed, tested, and ready for use. Earthsafe C900 Master Controllers, C800 Day Tank Controllers, and C230 Pump controllers are standard build units that flexible and adaptable for the specific operating sequences required by the engineering consultant.

**Integration:** The secondary challenge was the testing and integration of all status points into the facility wide PMS system using Ethernet connectivity. The Earthsafe standard integration protocol includes sets of standard monitoring points for each system element, allowing for quick building and testing of points lists.

**Operating Sequence Summary:**

The system consists of 8 generator day tanks, each serviced by 5 bulk storage tanks with dual FOR actuated valves, 2 sets of submersible fuel pumps – one for system A and one for system B, 1 each 5-Tank fill station, and 1 each 5-Tank tank filter - polisher. There are independent A and B piping paths, both FOS and FOR from the bulk tanks to the day tanks. The day tanks have dual inlet actuated valves. A return flow pump on each day tank provides overfill protection and a method for periodic testing. The system is designed to allow full manual control for day tank refill as a contingency.

**Special Operating Features:**

1. **Day Tank Dual Inlet Valves with Fail Safe Close.** Each day tank has dual actuated inlet valves with a manual bypass valve. The inlet actuated valves are fail safe close either with spring return or battery backup.
2. **Day Tank Analog Redundancy:** The day tanks are equipped with Earthsafe level transmitters to provide an analog signal to the day tank controller for tank level and volume information. The system displays level, volume, and % full on the day tank controller, master controller, and the PMS. The analog signal provides high and low alarm points that serve as redundant signals to the float level sensors.
3. **Veeder Root Level – Leak Integration:** The C900 Master Controllers integrate tank level and leak detection information from the Veeder Root TLS-350 tank monitor. The level and leak information is displayed on the C900 touch screen, and is also communicated to the facility BMS system.
4. **Redundant Ethernet – Double Star:** The redundant Ethernet design was setup as a double star configuration to provide fast reliable communication.

# Redundant Ethernet – Double Star

