

## **6.0 MECHANICAL & ELECTRICAL**

### **6.1 Sampling of References**

- EM 1110-2-3102, General Principles of Pumping Station Design & Layout
- EM 1110-2-3105, Mechanical and Electrical Design of Pumping Stations
- UFGS 221000.0010, Vertical Pumps Axial Flow & Mixed Flow Impeller Type
- UFGS 334500.0010, Speed Reducer for Storm Water Pumps
- UFGS 416510.0010, Diesel & Natural Gas Fueled Engine Pump Drives
- NFPA 37, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines

### **6.2 Mechanical**

Mechanical systems should conform to established USACE criteria and standards with attention to the following suggested guidelines.

1. Wherever possible use vertical pumps, with form suction intakes (FSI).
2. Locate operating floor above maximum expected flood elevation.
3. Provide redundant flood protection by installing shut off gates at the pumps discharge.
4. Use aluminum pipe for combustion air intake ducts.
5. Design control room to be a “safe room” for continued operation during hurricane conditions. Safe rooms should have the capability to start, stop and monitor pump units, and control discharge gates and the trash rake. They also should have living accommodations for personnel during and after the storm. Redundant communication systems with backups should be provided also.
6. Provide diesel-driven generators for backup power supply. If pumping station is to be located in an area rich in underground natural gas distribution lines, specify natural gas engines in lieu of diesel engines for: (a) reliability (no storage tanks, transfer pumps, piping, level controls), (b) simplicity of design and (c) vandalism protection.
7. Other equipment or components should be elevated above the maximum expected flood elevation as much as practicable, including the fuel storage area, access roads to the pump station, the fuel distribution system. Attention shall be given to the elevation of combustion air filter/silencers, trash screen cleaners motors and controls.

8. When clean water is required for bearing lubrication, provide a local water well source as a backup for municipal water.

9. Provide event recorders which also record water levels. Recorders should be automated in both operation and reporting.

### **6.3 Electrical**

All Electrical Systems shall confirm to the established USACE criteria and standards with attention to the following suggested guidelines:

1. Locate all electrical equipment including back-up generators, electrical controls and external electrical connections above maximum expected flood elevation.

2. Back-up power should be sized and designed for operation during storms to provide adequate power for station ventilation, lights, HVAC, fuel transfer pumps, trash rake cleaners, automatic pump lubricators, air compressors and all other critical systems.