

Operations Maintenance & Engineering Design & Construction Requirements

Project: _____

Categories:

1. **Roof access:** Access that allows for transporting personnel, equipment, tools and parts to the area where equipment is located that is maintained by FESS personnel or under their supervision. Fall restraint and engineered tie offs...guarded skylights, equipment requiring service should be built greater than 6' from edge of roof. Ladder access alone is not adequate to meet these requirements as three point contact is required for personnel and precludes moving materials, tools, etc by way of the ladders to the work area.

2. **Lighting:** Illumination adequate for safe access to work and inspection areas.

3. **Convenience outlets:** 120 volt outlets within fifty (50) feet of equipment.

4. **Equipment access:** Doors, panels or other access to equipment and equipment components requiring inspection, maintenance, repair or replacement during the useful lifetime of the equipment. Service disconnects at equipment. Consider mobile crane access as required for servicing outside pieces of equipment.

5. **Lighting access:** Access to lighting for relamping, ballast replacement and other maintenance required during the useful life of the system and components when all program and process equipment is in place.

6. **Building Automation:** Monitoring and control via Metasys and/or PowerLogic
 - a. HVAC
 - b. Sump Pumps
 - c. Cold weather monitoring
 - d. Utility metering (domestic water, ICW, natural gas, power)
 - e. Monitoring of customer defined critical systems (Metapaging)

7. **Fire systems monitoring:** FIRUS connection.

8. **Critical spares:** Spares and spare parts as required to ensure purpose of construction is maintained.

9. **HVAC:**

- a. HVAC equipment maintenance access that does not require program shutdown because of interlocks or radiological area access.
 - b. HVAC: no adjustable sheaves to remain after commissioning.
 - c. All VDF equipment to have grounding rings put on the motors
 - d. Removable screens to be installed on condenser air intakes to trap debris that may go into condenser coils.
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10. **Underground Utilities:**

- a. Non metallic for domestic water, industrial cooling and sanitary systems.
 - b. Cathodic protection (passive w/anodes)for all metallic piping, valves and hardware....stainless steel bolts and fasteners
 - c. Tracer wire integral to piping or mechanically fastened to the piping terminated in communications hand hold style, surface level containers. Tracer wire and associated connection / termination shall also be provided for ALL non metallic underground utilities and tiles/culverts, including fiber optic conduits.
 - d. GPS coordinates for all valves and piping.
 - e. Laying conditions: sand backfilled (level 5 laying condition)
 - f. Valves on all three sides (branches) of Tees
 - g. Concrete encased duct banks for electrical feeders; access doors and hatches shall be of light weight construction.
 - h. Do not install utilities under and immediately next to structures. Do not build structures over existing "live" utilities.
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11. **Documentation:**

- a. Electronic, PDF format files of all as-built drawings, operating and maintenance manuals, etc.
- b. Three hard copies of all as-built drawings, operating and maintenance manual, etc.
- c. Documentation to be specific to the equipment supplied. Generic catalogue cut sheets not acceptable.
- d. If application-specific electronic files were used for programming controllers or other devices, copies of the active, fully-commissioned electronic file shall be provided. Example: programming file for a PLC device.

- e. A Sequence of Operations shall be provided for all interfacing equipment whose function and operation would not be covered in the standard Operations Manual that comes “out of the box” with the equipment.
 - f. Electrical panels shall be labeled with arc fault warning and arc fault PPE levels determined from arc fault calculations.
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12. **Orientation/Training** for equipment that is substantially different that equipment currently operated and maintained. Vendor training acceptable

13. **Light Fixtures:** prefer T-5 lighting vs. metal halide. Remote ballasting is required for radiological areas using electronic ballasts. For larger buildings, a lighting control system that tracks lamp hours which will aid in scheduling the group relamping.

14. **ICW building accommodations:** Provisions for flushing sprinkler main and ICW main into the building during zebra mussel treatment program

15. **Chillers:** ICW chillers shall have coated condensers.

16. **Water treatment** for boilers, chillers, cooling tower using established consultant and water treatment provider(s).

17. **DWS systems:** shall be VSD-based should auxiliary pumping be required at building.

18. **Maintenance Vehicle Parking:** Designated parking spot close to building for maintenance vehicle.

19. **Generator compatibility:** If emergency generator power may be required, a connection shall be provided to the building exterior for plug-in of portable generator.

20. **Reliability:**

- a. Lifetime-sealed bearings preferred or if not available, grease fittings extended to accessible location must be provided
 - b. Embedded vibration analysis sensors for motors over 25HP
 - c. Industrial-rated equipment required (not commercial or residential)
 - d. HVAC – condenser screens; Filtrite 3M filters or equivalent in pressure drop and dirt load capacity.
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21. **Blacklist equipment:**

- a. Stultz air handling/blower equipment
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22. **Building Utilities:** Must not build over existing utilities. If building cannot be relocated, then utilities must be relocated around the new structure. **15** feet vertical clearance and **twice the buried depth of the utility** (in feet) of lateral clearance is required from building structures for service of underground utilities.

23. **High Voltage Equipment:** If new project interfaces with power that originates from end of life electrical distribution equipment, the project shall replace end of life equipment. Examples of such are oil switches (replace with air switches) and Allis-Chalmers switchgear

24. **High Voltage**

- a. When tapping into the high voltage feeder system, high voltage engineering must be contacted and made aware of the intent
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25. **EDM Mitigation for VSD Motors**

26. **Rodent Control:** Provide the location and number of all outside electrical switches and transformers in order that they may be added to our exterior rodent control program.
