Basis of Design

Power Distribution

- Provide a grounding conductor in all raceways for the primary grounding path. Raceways shall serve as the secondary ground path.
- Segregate motor, equipment and lighting loads from power quality sensitive equipment and loads. Provide dedicated circuits for medical and research equipment that are sensitive to power quality.
- Evaluate and specify the appropriate K-ratings for distribution transformers.
- Many power quality problems in laboratories and similar facilities are related to equipment on receptacles that are on the same circuit. The Consultant shall take this into consideration when determining the number of circuits, the layout of receptacles on the same circuit and equipment requiring dedicated circuits.
- Research Laboratories: Design shall meet the requirements of a research institution. At minimum provide a UFER ground system. An isolated ground system may also be required.
- Provide easy accessible points of attachment to the building grounding system in the building main equipment room.
- Evaluate and provide the following for laboratory bench circuits, computer circuits, sensitive equipment and panelboards as required:
  1) Dedicated circuits
  2) Isolated grounds and isolated ground receptacles
  3) Transient surge suppressors
  4) Power conditioning
  5) Uninterruptible power supplies for critical loads

Surge and Transient Protection

- Provide distribution class surge arrestors on the building main transformer primary terminals to protect from surges and transients on the primary distribution system.
- In some cases, transient surge protection in the branch circuit panelboards might be required. The focus should be on panels with dedicated circuits that have isolated grounding provisions.
- Transient Voltage Surge Suppression – apply as needed. These devices are not a substitute for good wiring practices by the designer.

Lightning Protection

- Lightning protection is to be installed where equipment or liability value is high. Consult with Engineering Services in determining if a lightning protection system is required. Lightning protection is typically required for the Medical Center, Health Sciences and high-tech science lab facilities.
- Lightning protection systems shall conform to UL Code 96A (Lightning Protection Bulletin) and NFPA Code #78. The system shall be designed as a master label system.
Design Evaluation

The following information is required to evaluate the design:

- **Programming Phase**: Statement of design intent including the anticipated power quality challenges and the mitigation provisions anticipated.
- **Schematic Design Phase**: Identify areas of the building and equipment where a high degree of power quality is required. Describe the overall design concept for maintaining power quality in these areas and for this equipment. Outline specifications.
- **Design Development Phase**: Provide design details on the power quality provisions. Draft specifications.
- **Construction Document Phase**: Fully implement power quality provisions into the design. Complete specifications.

**Submittals**

- Develop submittal requirements for the appropriate specification sections.

**Products, Material and Equipment**

- Develop requirements in the appropriate specification sections.

**Installation, Fabrication and Construction**

- Develop requirements in the appropriate specification sections.

END OF DESIGN GUIDE SECTION