Basis of Design

This section applies to the design and installation of raceway systems.

Design Criteria

- **PVC** (Rigid Non-Metallic Conduit): Direct burial and concrete encased
- **EMT** (Electrical Metallic Tubing): Interior locations where not subject to physical damage; homeruns where additional future circuits are anticipated
- **IMC** (Intermediate Metal Conduit): Not for use in earth or embedded in concrete
- **RGS** (Rigid Metallic Conduit): All raceways in the Power Plant, utility tunnels, and in areas subject to physical damage
- **FMC** (Flexible Metal Conduit): Final connections to devices and equipment; use liquid-tight type for damp locations.
- **IAC** (Interlock Armored Cable): Medium voltage cable rated for use in cable trays. Low voltage service conductors to buildings.
- **MC** (Metal Clad) and **AC** (Armored Cable): Only for power and lighting branch circuits.
  - Circuits shall be concealed and run from junction boxes to light fixtures and devices within the same room.
  - Circuits shall not run horizontally around wall corners.
- **SMR** (Surface Metal Raceway): Laboratory areas and similar applications
- **Wireways and Cabletrays**: Medium voltage and other special applications and special low voltage applications approved by UW Engineering Services. Design information for cable tray used for medium voltage systems and communications systems shall be provided separately for each system.
- Other systems may be used with coordination and approval by Engineering Services.
- Supplement all raceways with equipment grounding conductors.
- Provide a raceway system for connection to campus distribution systems in the utility tunnels. This system may utilize either cable tray or conduit with large radius bends. If conduit is used, provide a 3-inch conduit for signal systems. For telephone, computers, and cable television systems, (refer to UW Technology Design Guide).
- Refer to section 03-16B for additional criteria when designing raceways for the primary distribution system.

Design Evaluation

The following information is required to evaluate the design:

- **Schematic Design Phase**: Description of raceway systems required. Outline specifications.
- **Design Development Phase**: Location of exterior duct banks, cable trays, SMR, and other special requirements. Draft specifications for each type of raceway. Cable tray specification for medium voltage systems shall be distinct from communications systems.
- **Construction Document Phase**: Completed site plans showing exterior conduit layout. Drawings showing cable tray and wireway locations. Section cuts for underground conduit
and duct banks. Section cuts above corridors, hallways, and congested areas showing coordination with equipment from other trades. Details for special applications, when required. Completed specifications for each type of raceway. Cable tray specification for medium voltage systems shall be distinct from communications systems.

Submittals

- Provide standard industry submittal requirements.
- Provide support information for cable trays and wireways.

Products, Materials and Equipment

- Use industry standards for raceway systems specified and comply with the following additional requirements:
  - Use PVC schedule 80 for surface-mounted installations especially when exposed to physical damage. Schedule 40 may be used in concrete ductbanks.
  - All 45 degree bends and greater for PVC conduit in MV applications shall be rigid metallic conduit.
  - Rigid metallic conduit shall be hot-dipped galvanized inside and outside.
  - EMT, indenter fittings are not acceptable.
  - SMR shall be dual channel type. Recommended SMR shall be formed steel type. Extruded aluminum and plastic type may be considered for some applications with coordination and approval from Engineering Services. Connections to SMR shall be through manufactured fittings only.
  - Cable trays for medium voltage applications shall be ventilated, trough, type. Side rails shall be rolled, non-cutting edges.
  - T.V. monitors and cameras use stiff coaxial cable, so outlets shall be 4" x 6 ¾" boxes, 2 ½ inches deep, with a two gang plaster ring raised ¾ inch. (Steel City #H2-BD-3/4 1 and #2-GC or equal). Extend a 1 inch conduit from the end of the box to the communications tray.

Installation, Fabrication and Construction

- For raceways that penetrate building exterior, the section of the raceway within the wall shall be sealed inside and around raceway exterior using approved sealant. Where portions of an interior raceway system are exposed to widely different temperatures, as in cold rooms, circulation of air from a warmer to a colder section through raceway shall be prohibited. This sealing is also to be done at penetrations between normal and controlled temperature laboratories.
- Conduits placed in concrete slabs are not allowed except in special cases where no other means of routing is available. With prior approval from UW Engineering Services, it may be installed in parking garages, storage facilities, and similar facilities.
- Use of extension rings for junction boxes, splice boxes, and outlet boxes, in new construction, is not allowed.
- RGS and IMC connections shall be watertight.
• Generally, conceal raceway systems. Exposed conduits are permitted only in unfinished areas, SMR systems in laboratory areas, and where approved by the Architect.

• Raceways through roof shall be coordinated with the Architect. Architect to provide roof penetration details.

• Provide expansion fittings for conduits passing through building construction expansion joints.

• Ceiling suspension systems and mechanical ductwork or equipment shall not be used for raceway system support.

Cable Trays

• For medium voltage systems, cable trays shall hold only one cable circuit each. Exceptions are allowed on a case-by-case basis and only with the approval of UW Engineering Services. Tray-dividing barriers shall be provided when more than one cable circuit is installed in the same tray. This barrier shall be at least as tall as the medium voltage cable diameter and securely fastened to the tray.

• Cable tray shall be mounted bottom of tray approximately 6 inches above suspended ceilings. Maintain 10 inches minimum vertical spacing between multiple cable trays.

• Coordinate installation of cable tray with mechanical ductwork, piping, structural members, fireproofing and sprinkler system piping so that tray remains accessible after installation.

• Cable trays shall not penetrate smoke and fire rated walls and floors. Use conduit sleeves for penetrations. Seal all openings in walls and floors around raceways with an approved product to maintain smoke and fire integrity and watertightness.

• Provide an appropriately sized ground cable the length of the tray. Bond to every tray section.

• Provide low voltage cable tray distribution system for use by all low voltage systems except fire alarm and nurse call on each floor. In general, cable tray shall be installed in building corridors above suspended ceilings except in cases where the plenum space is used for air handling. In the latter case, consider installation of cable tray below finished ceiling.

END OF DESIGN GUIDE SECTION