Applicability:
The information expressed herein is unique to UMHHC owned, operated, and leased facilities, and are intended to supplement the University of Michigan's Architecture, Engineering, and Construction (UMAEC), design guidelines 16400. Those UMAEC design guidelines are located on website http://www.plantext.bf.umich.edu/for.archs/index.html. All information presented in the referenced UMAEC guideline applies to UMHHC facilities, unless explicitly stated otherwise below. Where differences and/or conflicts exist between the supplemental information noted below, and the information in the UMAEC guideline, this supplementary information shall take precedence.

The Design Professional (A/E) shall adhere to UMHHC Design Guidelines for all work at UMHHC facilities. Any requested deviations from these guidelines, shall be sent, in writing, to UMHHC’s Facilities Planning and Development (FP&D). Address the correspondence to the assigned FP&D engineer for the given project. The deviation shall not be incorporated into the construction documents until written approval of the deviation is received by the Design Professional.

The Design Professional is fully responsible for the professional quality, technical accuracy, code compliance, and overall coordination of the contract documents. Compliance with these guidelines shall not be construed so as to relieve the Design Professional of any of that responsibility.

Standards:
All service and secondary distribution equipment shall, in general, be located in electrical rooms. Panels in these rooms shall be surface mounted.

Mount distribution equipment in electrical rooms directly to masonry walls. If walls are not masonry, install steel channels to wall, to support panels. Use two or more channels per panel.

Distribution equipment for kitchens, shops, computer rooms, and other areas noted in program statement/design development may be mounted adjacent to or in these locations. In these cases, flush mounted panels may be installed. Mount panel to framework of at least two steel studs.

If panels are to be located in other finished areas, these shall be flush mounted.

Panels

General Panel Requirements
1. Doors shall have concealed hinge, flush handle, lock with 2 keys and panel directory frame. All panel locks in the building shall be keyed alike.
2. Color code panels and label them per Guidelines Section 16195-H.
3. All bus shall be copper. Neutrals shall be fully rated. Ground bus shall also be fully rated. Where noted in schedule, provide isolated ground buses

Safety Switches
1. Disconnect switches, junction box covers, etc., of emergency circuits shall be color coded for easy identification per Guidelines Section 16195-H.
2. Also see Section UMHHC 16480-H.

Fuses (Below 600 volts)
Where fuses are specified to protect electrical equipment, low-peak, dual-element current-limiting fuses shall be specified. Class L fuses shall be specified for 250-600 volt ranges. Class RK1 or RK5 fuses
shall be specified for 1-250 volt ranges. They shall have interrupt ratings of 200kA RMS symmetrical. Five second minimum time-delay at 500% rated current.

**Circuit Breakers (Below 600 volts)**

Circuit breakers shall be bolt-on, molded-case type, UL 489 tested and rated for the voltage specified. They shall be thermal over-current, thermal magnetic, magnetic or electronic as specified. Single, two or three pole as noted on plans. Breakers supplying motor loads shall be rated as Motor Circuit Protectors (MCP) and shall have adjustable trip parameters. Where specified, circuit breakers shall be supplied with shunt-trip option (RCCB) and/or auxiliary contacts. They shall have a visual positive trip indicator. Where ground-fault circuit breakers are required, specify solid-state trip units.

**Bus Duct**

Three-phase bus duct shall be totally enclosed, solid copper or copper-plated with integral 50% capacity ground bus. While an integral ground bus is preferred, an equivalent ground using the bus-duct housing is also acceptable. Each bus bar shall be insulated with Class B (130 degree) polyester film or epoxy powder coated material. Housing shall be code gauge steel and aluminum, with ANSI 49 grey epoxy painted exterior finish. It shall have the RMS symmetrical amperage rating and short circuit interrupt rating as specified on the plans. It shall have openings every 24” on both sides to accommodate plug-in devices.

Plug-in safety devices shall be mechanically interlocked with the bus duct to prevent removal while the switch is energized. The units shall also have interlocks to prevent the cover from being open when the switch is energized.

Plug-in devices shall make positive ground connection with the ground bus before the jaws make contact with the phase bars.

Fused plugs are to be used whenever possible

Installation of the bus duct shall be per NEMA Publication BU 1.1, Guide for Proper Installation, Operation and Maintenance of Busway Products.

**Execution**

1. Label/Name equipment as indicated in Guidelines Section UMHHC 16195-H, and as necessary to be consistent in an existing building.
2. If bus duct supplies other than normal power, also color code (paint) doors of bus plugs as noted in Section 16195-H.
3. Bus duct shall be installed so all plug-in locations are accessible and will provide proper working clearances when plug is installed.
4. Firestopping, and expansion provisions for the bus ducts shall be provided for in the design