SECTION 01 78 25 - FACILITIES VISUAL AIDS DOCUMENTATION

1. GENERAL:

A. The intent of this section is to provide Brown with a reliable, consistent and concise set of Mechanical, Electrical, Plumbing and Fire Protection (MEPFP) system reference information and documentation. Brown will use this as a set of "master documents" for each facility over the long term to identify the key MEPFP equipment, their system characteristics, sequences of Operation and the areas served by each system within in each building.

This information generally is comprised of four types of documentation, as described below.

- Operating Systems Manual
- MEPFP System Flow and Riser Diagrams
- Floor Plans
- Major Equipment tags

B. Where a project is new construction or a "gut" renovation to an existing building, Visual Aids documentation shall be provided new under the project. For renovations to existing buildings that already have Visual Aids documentation, the existing documentation shall be updated to incorporate the project scope of work as necessary.

C. Review the format for the Systems manuals, riser and flow diagrams and major equipment tags with FM-Operations staff during development.

2. Building MEPFP Operating Systems Manual:

A. Building Operating Systems Manual shall include the following as applicable:

1. Key factoids of the building, including date of construction/ major renovation, building use, size and relevant operational features.
2. Summary of all installed building MEPFP systems, including but not limited to:

- Heating Ventilation & Air Conditioning (HVAC)
- Smoke Control
- Chilled Water
- Process Cooling
- High Temperature Hot Water
- Medium Temperature Hot Water
- Dual-Temperature / Seasonal heating and cooling
- Steam
- Humidification
- Electrical
- Emergency/Standby Power
- Lighting Controls
- Fire Alarm
- Fire Protection (Wet and Dry)
- Plumbing – Domestic Water, non-Potable Water, Hot Water
- Natural Gas

- Sewage, Lab Waste & Waste Neutralization
- Storm Water
- Specialty Systems (i.e.: Nitrogen, Helium, High Purity lab water, RO/DI, etc.).

3. System Overview: Provide a description of each building MEPFP system and how it works, including the major system equipment, normal operating characteristics, ratings and limiting conditions. For large or complex systems that are comprised of multiple, individual subsystems for normal operation, (ie. building-wide smoke control systems with Standby Power sources, fire alarm and Building Automation System interfaces), also include a description of each subsystem and its major components.
4. System Sequence of Operations: Provide a description of each MEPFP system's normal mode operating sequences and system operation in all various alternative and failure modes. Examples of alternative modes include summer/ winter seasonal changeover, warm-up and cool-down sequences, wintertime humidification/ summer dehumidification. Examples of failure modes include Lead/Lag fan or air handler operation (for redundant equipment), fire alarm reduced-speed exhaust fan operation or smoke control operation; or reduced-capacity system operation when operating from Standby Power during a power failure.

B. Submit the Building Operating Systems Manuals in two electronic formats – Word documents and PDF's. The PDF's shall be organized by building, then by system, and include all system descriptions, sequences of operation and riser diagrams.

C. Each PDF file created shall be "OCR" keyword searchable and have bookmarks for each section, equipment manual/brochure, and other inserts.

D. Maximum file size of the manual shall be limited to 60 MB. The completed manual shall include links between the relevant Riser diagrams and the manual descriptive information.

4. MEPFP System Flow and Riser Diagrams:

A. Provide flow and riser diagrams for each building MEPFP system. Deliverable information shall include the following for each MEP system flow and riser diagram as applicable:

1. Drawings shall be generally geographic in nature. For example, a building with chillers in the basement, and air handlers throughout the building: the chillers would be at the bottom of the riser diagram, each of the major chilled water and condenser water lines would be shown diagrammatically correct to the general piping configuration throughout the building, and inclusive of the room numbers where it is located.
2. The diagrams shall indicate all the major terminal loads and equipment served, as well as critical flow rates and design ratings of key components in each system.
3. Flow and riser diagrams shall indicate all major equipment. Equipment shall be referenced by its specific common name identification, and include its nominal equipment ratings (or capacities), relevant line sizes and interrelationships with other building systems and utilities.
4. Riser diagrams shall include room numbers for the location of the equipment as well as room number of the spaces being served by the specific system.

5. Indicate relevant incoming utility capacities (i.e.: HTHW design temperature / flowrates or campus utility system source voltage / KVA ratings).
6. For mechanical systems, show all major system isolation and control valves and isolation dampers. Include valve tag information where it is available.
7. For electrical systems, show all major distribution equipment and panel ratings, and feeder circuit breaker trip settings.
8. Brown drawing nomenclature is building/equipment tag information is shown as black; normal-source electrical equipment is shown as blue and emergency/ standby power equipment is shown as red.

B. Drawings shall be standard 30" x 42" (E size), produced in AutoCAD. Provide deliverables in both AutoCAD and PDF electronic files.

C. It is anticipated that portions of the flow diagrams developed under this task can be utilized for the development of graphic equipment tags.

5. Building Floor Plans:

A. Common Building Floor Plan Requirements:

1. Floor plans shall be developed using University-provided floor plans as a base.
2. Floor plans shall be 11x17" size.
3. Provide framed, full-size drawings suitable to be mounted within each of the building mechanical and electric rooms.
4. Provide deliverables in both AutoCAD and PDF electronic files.

B. Building Incoming Utilities Floor Plans:

1. Floor plans shall denote the locations of all incoming and exiting utilities (water, sewer, electric, steam, hot water, chilled water, telecom, etc.) and the utility shut-off locations.
2. Incoming and exiting utilities and shut-offs shall be noted in red; all other equipment shall be black text.

C. Building Major Equipment Floor Plans:

1. Floor plans shall denote the locations of all major MEPFP equipment in the building. Equipment shall be referenced by its specific common name (i.e.: Chiller-1). Note that it is not the intent to denote all HVAC terminal units or motor starters and VFD's on these particular floor plans; only the major MEPFP equipment such as air handlers, boilers, pumps, electrical distribution panels, BAS cabinets, etc.
2. Brown drawing nomenclature is that building and major room location information is shown as black; HVAC equipment and tags are shown as blue; Normal-source electrical equipment and tags are shown as green and Emergency/ Standby Power equipment and tags are shown as red.
3. Show the electrical distribution panels and major equipment on a separate set of floor plan drawings from the mechanical systems.

D. HVAC (Heating Ventilation and Air Conditioning) Colorized Zone Floor Plans:

1. Building floor plans, with room numbers, and HVAC system ductwork.
2. Color-code and shade all rooms and spaces on the floor plans to clearly identify the respective air handlers and exhaust fans that serve each area, to facilitate a ready understanding of the HVAC systems serving each area throughout the building.
3. Clearly indicate and tag all fume hoods and ventilated research equipment on the floor plans, along with their associated exhaust fans.

E. HVAC (Heating Ventilation and Air Conditioning) Colorized Ductwork Floor Plans:

1. Building floor plans, with room numbers, and HVAC system ductwork.
2. Color-code and shade all supply, return and exhaust ducts on the floor plans to identify the respective air handlers and exhaust fans they are associated with, to facilitate a ready understanding of the function and routing of all ductwork throughout the building.
3. Ductwork drawings shall clearly indicate locations of major terminal equipment, vertical risers and chases. Where readily available, include locations of balancing dampers, smoke and fire dampers, and supply and exhaust valves. Include nominal supply and exhaust airflow values at each major item of equipment and area supply/ exhaust terminals.

6. Equipment Tags:

A. The project team shall develop, provide and install customized identification tags for all of the major MEPFP equipment. A review meeting with FM Operations will be required to finalize the specific major MEP equipment to be tagged and labeled, along with their associated graphical riser diagrams.
B. The MEPFP equipment identification tags shall identify the specific equipment nomenclature and the building areas served by it (i.e.: Med-Ed AHU-1, serves Med-Ed Floors 1& 2).
C. Deliverable information shall generally include the following for each Equipment tag as applicable:

1. The MEP equipment tags shall be white background, with black text and information references. Tags shall include color-coded isometric (or graphical) riser info to denote the building floors and rooms served. Color-coding shall as follows:

    a. Animal Care Areas: Blue text or background

    b. Research Labs: Green text or background

    c. Non-Research labs/General spaces: Black text.

2. Equipment tags shall identify the source and circuit no. of its electrical power supply, and if it is on Normal or Emergency power.
3. Tags shall be made of flexible, 1/8" white Sintra panel, with 1" radius corners and 3/8" dia. hole, sizes: 8.5 x 11" and 9 x 11".
4. Information on the tags shall be effected by direct –print silk-screen.
5. Tags shall be securely mechanically attached with screws or equal.

6. Letters and numbers shall be at least 3/16" high, or larger, if required to read clearly from a normal viewing distance.
7. Tags shall be made to withstand the temperatures and atmosphere in the area they are to be mounted.
8. Tags mounted outdoors shall be treated to prevent degradation from sunlight.
9. Provide electronic files for each tag, in both Visio and PDF electronic files, for future use and updates.

7. Interactive PDF:

A. The Visual Aids documentation shall be integrated into a single overall interactive PDF. Adobe "InDesign" is the preferred software to create the interactive PDF.

B. The Visual Aids interactive PDF documentation shall be organized by building, then by system. It shall include all system files, including interactive system descriptions, system Sequences of Operation and relevant system Riser Diagrams. Each PDF file created shall be "OCR" keyword searchable and have bookmarks for each section, equipment manual/brochure, and other inserts. Maximum file size of the manual shall be limited to 100 MB. The completed manual shall include links between the relevant Riser diagrams, Floor Plans and the manual descriptive information.

End of Section