Delete the following current section in its entirety (deletions are shown struck through).

23 00 01 Owner General Requirements and Design Intent

~~.01 Summary of Design Intent~~

~~A. DESIGN FOR COMPLETENESS: All projects are expected to be complete at their conclusion, meaning that the project generates no need for additional efforts beyond the planned scope. Any expansion or renovation of conditioned space must include an assessment of the adequacy of the utilities infrastructure. Above all, the campus maintenance staff is not available to complete projects or provide remedies to problems caused by the project.~~

~~B. ENERGY CONSERVATION:~~

~~1. GENERAL: The University is extremely interested in initiatives in energy management such as sustainable building designs that effect lower operation costs and good stewardship of state funds and natural resources.~~

~~2. SPACE LAYOUT: The simplest and most effective method of energy conservation is to turn things off when not in use. To this end, spaces with similar occupancy schedules should be grouped together, to the extent possible, on the same HVAC system, to accommodate unoccupied shutdown.~~

~~C. SUSTAINABILITY: The following general design objectives shall be considered and utilized where feasible when designing or planning the construction of new buildings or renovation of existing buildings~~

~~1. Reduce environmental impact through respect for natural systems and the ecology of the site by considering building orientation, natural solar shading, incorporating renewable resource use and other innovative environmental impact reduction designs.~~

~~2. Ensure energy efficiency by incorporating the use of sustainable energy sources, reduce energy costs reduction strategies through integrated systems building design, maximizing the use of natural day light, daylighting, the use of energy efficient artificial lighting, passive heating/cooling and other cost effective energy conservation designs.~~

~~3. Ensuring resource conservation when considering the use of land, materials & building in the most efficient & effective manner through the use of pre-used construction materials, use of construction materials made from recycled materials, the minimizing construction waste, the use of water minimizing fixtures and other cost effective source conservation designs and activities.~~

~~4. Ensure the health & well-being of the building occupants & visitors through the use of low VOC materials (paint, cleaners etc.), efficient HVAC design with fresh air to maintain the recommended CO2 levels and other indoor air quality and indoor environmental enhancing designs and activities.~~

~~5. Strive to incorporate all the above sustainable approaches to achieve a comprehensive and holistic environmentally sustainable facility.~~

~~D. UTILITIES IMPACT POLICY: Each project is responsible for funding all utility infrastructure upgrades made necessary by that project.~~

~~E. UTILITY DESIGN:~~

~~1. Designer shall consult with current drawings, planning connections, and upgrades.~~

~~2. University is in the process of developing master plans. Contact Project Manager.~~

~~A. Utilities: (Refer to Division 33)~~
~~B. Systems Serving Classroom Areas: (Refer to Division 13).~~

Replace with following text.

.01 HVAC Design General Requirements:

A. General: HVAC Design Professional services and documentation shall include the following:
   1. Comply with Design Phase Submittal Requirements (Design Deliverables) in 00 51 00 MISCELLANEOUS FORMS.
   2. Develop the HVAC component of the Basis of Design document to meet Owner's Project Requirements and update at each design phase submission.
   3. Perform all necessary design analysis and calculations.
      a. Submit load summaries. Provide breakdowns for zones, major areas, subsystems and equipment loads. Include common engineering check figure ratios such as cfm/sq. ft., heating BTUH/sq.ft, and cooling sq. ft./ton.
      b. Sound and Vibration control analysis: Perform calculations and selection of attenuation provisions for HVAC systems to maintain sound and vibration within acceptable levels for each application.
      c. Economic / Life Cycle Cost Analysis: Perform and submit as required to confirm selection of base systems and potential options for alternate bids.
   4. Performance Requirements Compliance Documentation: Coordinate with lead Design Professional to submit application portions. Comply with requirements in 01 80 00 PERFORMANCE REQUIREMENTS.
   5. All drawing sets shall include:
      a. Coordinated single line diagrams shall include both existing and new work as applicable.
         i. Overall building airflow diagram(s) showing interrelationships of air handling units, exhaust fans, duct risers and mains, primary dampers and air balance / pressure relationships.
         ii. Overall building hydronic and steam system diagrams showing interrelationships of main heating/cooling plant equipment or central utility source, heat exchangers, pumps, pipe risers and mains and primary isolation and control valves.
         iii. Diagrams shall include connected and cumulative design capacities and flow rates which can be toggled on during design phase for review purposes and off if desired for final construction documents.
      b. Clear delineation between demolition, existing to remain, and new work on plans and riser diagrams.
   6. DESIGN FOR COMPLETENESS: All projects are expected to be complete at their conclusion, meaning that the project generates no need for additional efforts beyond the planned scope. Any expansion or renovation of conditioned space must include an assessment of the adequacy of the utilities infrastructure. Above all, the campus maintenance staff is not available to complete projects or provide remedies to problems caused by the project.

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B. Architectural Coordination:
   1. Space Planning: Comply with requirements in 01 05 05 Space Planning, .01 Planning for Engineered Building Systems
      a. Coordinate generous space programming allowance for equipment and shaft space for M/P/E distribution systems, including future flexibility for future expansion.
      b. Plan for and clearly label any future equipment space needs on drawings.
      c. Drawings shall include equipment sizes and locations, showing locations of all required service areas to be kept clear, including coil and tube pull and adequate space for major component replacement,
      d. Coordinate locations of supplementary structural steel above and/or clear space above and around equipment for portable gantry crane for rigging of large component replacement.
   2. Thermal Comfort: Comply with ASHRAE 55 Thermal Environmental Conditions for Human Occupancy. Coordinate with Architect to integrate thermal envelope design and HVAC design iteratively such that thermal comfort criteria is met in the section 5.2 Method for Determining Acceptable Thermal Conditions in Occupied Spaces-. Perform calculations and analysis for representative spaces.
      a. Criteria to be evaluated with respect to thermal envelope design includes:
         i. Operative Temperature (average air temperature and Mean Radiant Temperature)
         ii. Allowable Radiant Temperature Asymmetry
         iii. Allowable Vertical Air Temperature Difference
         iv. Allowable Range of Floor Temperature
      b. Notify the Project Manager if comfort criteria is jeopardized due to impact of thermal envelope and/or if HVAC systems are being expected to overcompensate for lack of high-performance of the thermal envelope.
   3. Coordinate outdoor and rooftop HVAC equipment locations and screening requirements per 01 05 01 Site Requirements
   4. Inform and help guide space planning when applicable with respect to efficient equipment zoning for efficient operation and accommodating unoccupied shutdown.

C. High-Performance Energy-Efficiency: Professional shall design each HVAC system and equipment application for optimal operating efficiency, and flexibility with the lowest life cycle cost.
   1. General: Comply with requirements in 01 80 00 PERFORMANCE REQUIREMENTS
      a. 01 81 13 Sustainable Design Requirements
      b. 01 83 00 Facility Shell Performance Requirements
   2. Equipment Selection: Design Professional shall carefully evaluate and properly select the most effective equipment type and to best suit the needs of the application with emphasis on minimizing operating and life cycle cost, rather than minimizing size and first cost.
   3. Part Load Operation: Carefully evaluate system turndown requirements. Consider modular, multiple unit configurations where effective and practical for proper and efficient low part load operation and to help prevent complete system or building shutdown upon failure of a single primary HVAC system component.

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4. Primary and Terminal Equipment Zoning: The simplest and most effective method of energy conservation is to turn things off when not in use. To this end, zones with similar uses, environmental conditions, fresh air ventilation rates and occupancy schedules should be grouped together, to the extent possible, on the same HVAC system, to accommodate unoccupied shutdown.
    a. In general, general offices should be grouped together, but separate from classrooms and both should be separate from lab/research zones requiring 24/7 operation and/or 100% outside air.
    b. Define and keep separate special use zones with continuous process cooling loads such as main TNS and College Server rooms or audio-visual closets with high load densities that require independent cooling systems to accommodate unoccupied shutdown of central systems.

D. Reliability and Redundancy: Professional shall determine the adequate amount of redundancy for each application of mechanical equipment to meet the Owner's Project Requirements.
    1. Confirm Owner requirements for redundancy are clearly defined.
    2. Install fully redundant (N+1) stand-by chillers for extremely critical applications (such as critical research laboratories and computer centers) and/or as otherwise defined specifically in the Owner's Project Requirements.
    3. For non-critical applications (such as general office spaces, general purpose classrooms, general commercial type spaces) full redundancy/complete standby is typically not required.
    4. Determine and specify applicable emergency power requirements. (research, process or other specific critical application).
    5. Check with Failure analysis to determine weak links in system and revise as necessary.

E. Flexibility: Consider potential future expansion. Extent of expansion will be determined on a case-by-case basis. Consult with the University Project Leader and Engineering Services.

F. Utilities / Infrastructure Coordination:
    1. General: Comply with requirements in 33 00 00 UTILITIES
    2. Perform analysis of existing utilities and/or existing HVAC infrastructure and submit summary of required upgrades to support new work.
    3. Utility Demand and Consumption Form: Submit and update throughout design phase.
    4. UTILITIES IMPACT POLICY: Each project is responsible for funding all utility infrastructure upgrades made necessary by that project.
    5. UTILITY DESIGN:
        a. Designer shall consult with current drawings, planning connections, and upgrades.
        b. University is in the process of developing master plans. Contact Project Manager.

G. Mechanical Identification: Coordinate identification nomenclature with University Standards per 23 05 01.06 Mechanical Identification.

H. HVAC Controls / Building Automation Systems:

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1. Comply with requirements in 25 00 00 INTEGRATED AUTOMATION.
2. Coordinate control design with OPP, Environmental Systems, Building Automation System (BAS) Application Engineering.
3. 25 90 00 GUIDE SEQUENCES OF OPERATION: Designers shall use guide sequences of operation, whenever available. These "master" guide sequences have been developed and implemented at University Park in conjunction with existing BAS vendors and shall form the basis of the main sequences to maintain overall uniformity. Guide sequences shall be edited as necessary to meet project specific requirements. Fundamental modifications shall be reviewed and approved by the manager of the OPP BAS group. Do not cut and paste portions into designer's "office standard" sequences.

I. Variable Frequency Drives for HVAC Motors: Designers shall use guide specification in 26 29 23 Variable-Frequency Motor Controllers. Guide specification shall be edited only as required to meet project specific requirements. Proposed modifications shall be reviewed with OPP Engineering Services.

J. Miscellaneous OPP Additional Resources and Links:

1. Engineering Resources

a. Building Mechanical & Electrical Systems

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.02 Related Documents

A. The general requirements of the Penn State Office of Physical Plant Design and Construction Standards, including the Introduction, General Notes to the Professional and Contract Administration Division and General Conduct of the Work and Special Requirements apply to the work specified in this Division.

B. For convenience, other sections with additional University-specific associated requirements related to HVAC work, include, but are not necessarily limited to, the following:

1. 01 00 00 GENERAL REQUIREMENTS
2. 01 56 10 Temporary Protection of Outdoor Air Intakes
3. 02 00 00 EXISTING CONDITIONS
4. 13 00 00 SPECIAL CONSTRUCTION: HVAC requirements for special purpose spaces such as Classrooms, Bookstores, Labs, etc.
5. 14 00 00 CONVEYING EQUIPMENT: ventilation and environmental requirements for elevator machine rooms
6. 27 00 00 COMMUNICATIONS: Minimum Standards for Telecommunications Facilities, **5.1.2 Environmental requirements**

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END of revision

Update Commentary:

Section was updated primarily for the following reasons:

1) Deleted “SUSTAINABILITY” requirements, which will be covered more comprehensively in Div 1, 01 81 13 Sustainable Design Requirements.
2) Expanded general HVAC design and coordination requirements.
3) Reorganized existing text to remain into body of new text where it applies.