

Engineering Consultant Design Deliverables

Indiana University engineering Services has developed standards for mechanical and electrical systems that can be found at this website: http://www.indiana.edu/~uao/html/contracts_standards.html. Adherence to these standards is required on all university projects. In order to verify compliance with those standards, the following guidelines have been developed which are intended to document our expectations during each segment of the design process.

Schematic Design

Prior to releasing the Consultant to the Design Development phase of the project, IU Engineering Services expects to see the following information submitted, reviewed, and approved.

The Consultant shall submit a preliminary Design Intent Document using the IU program statement as a guide, and stating criteria upon which the design will be based, including outside conditions, inside conditions (temperatures, humidity levels, ventilation air required, lighting levels). This document should include the outline of the entire design intent document to be finalized during the construction document phase and used for project commissioning.

The 100% Schematic Design must include, but not be limited to, **detailed narratives** on the following:

- 1) a statement of review of IU mechanical and electrical standards and a list of any potential non-compliance issues.
- 2) a site investigation/survey following the IU Landscape Standards for Site Survey, including all utilities to serve the project.
- 3) heating, cooling, and electrical block load calculations.
- 4) proposed mechanical systems (HVAC, plumbing, fire protection including need for new fire pump, temperature control) and system design options.
- 5) proposed locations of all utility connections required to serve the building.
- 6) proposed electrical systems (power distribution, standby generation, lighting, fire alarms, telecommunications, security, technology classrooms, computer labs) and system design options.
- 7) lightning protection risk assessment and recommendations.
- 8) preliminary project cost estimate based on schematic design.
- 9) preliminary estimate of annual energy consumption; include a list of potential energy savings options.
- 10) a completed project checklist of potential energy and environmental design features using the LEED Green Building Rating System, including a range of cost estimates for achieving LEED certification.
- 11) a statement of which energy code will be met and which methodology will be used for verification.
- 12) Additional deliverable requirements for Building Information Modeling (BIM)/Integrated Project Delivery (IPD) for the Schematic Design Phase may be found in [The Indiana University Building Information Modeling \(BIM\) Guidelines for Architects, Engineers, and Contractors](#). This document and other IU BIM templates and forms can be downloaded at: <http://www.indiana.edu/~uao/iubim.html>

All owner comments should be resolved before moving into the next design phase. Resolution to owner's comments should be marked on the comment set: "Agreed" or "Disagreed with written resolution".

Design Development

Prior to releasing the Consultant to prepare Construction Documents, IU Engineering Services expects to see the following information submitted, reviewed, and approved. At the 100% Design Development phase, the Consultant shall submit updated narratives, preliminary drawings, and engineering calculations including, but not limited to:

- 1) updated Design Intent Document.
- 2) schematics of major systems (air side including AHU zoning, water, steam, fire protection, controls, utility connections, power distribution, standby generation, lighting, fire alarms, telecommunications, security, technology classrooms, computer labs).
- 3) basic block layouts of mechanical rooms and electrical rooms, including transformer vaults, power distribution rooms, telecommunications rooms, generator rooms.
- 4) lighting calculations for typical rooms and special areas.
- 5) preliminary light fixture schedule and legible light fixture catalog cut sheets.
- 6) preliminary heating and cooling load calculations (room by room).
- 7) preliminary outline of mechanical and electrical specifications in CSI format with equipment basis of design.
- 8) list of drawings.

Appendix A

- 9) updated energy use and demand calculations; additional analysis of potential energy savings options and LEED certification possibilities.
- 10) preliminary analysis of noise and vibration impact from building systems.
- 11) updated project cost estimate and project schedule based on design development.
- 12) a statement of review of IU mechanical and electrical standards and a list of any potential non-compliance issues.
- 13) Additional deliverable requirements for Building Information Modeling (BIM)/Integrated Project Delivery (IPD) for the Design Development Phase may be found in The Indiana University Building Information Modeling (BIM) Guidelines for Architects, Engineers, and Contractors. This document and other IU BIM templates and forms can be downloaded at: <http://www.indiana.edu/~uao/iubim.html>

Consultant shall return all owner comments from Schematic Design. All owner comments should be resolved before moving into the Construction Document phase. Resolution to owner's comments should be marked on the comment set: "Agreed" or "Disagreed with written resolution".

Construction Documents

IU Engineering Services requires 2 design reviews during the Construction Documents phase. Prior to releasing the Consultant to complete the Construction documents, IU Engineering Services expects to see the following information submitted, reviewed, and approved.

50% Completion Submittal:

- 1) updated mechanical and electrical specifications outline in CSI format with equipment specifications completed.
- 2) final heating and cooling load calculations (room by room)
- 3) mechanical and electrical equipment schedule sheets showing all equipment listed individually, including terminal devices. AHU and VAV schedules shall identify rooms served by number.
- 4) detailed mechanical room layouts including air handlers, pumps, and energy source equipment.
- 5) detailed electrical room layouts including transformer vaults, power distribution rooms, telecommunication rooms, generator rooms.
- 6) ductwork and piping routing throughout the building.
- 7) routing of major raceways including power feeders, system raceways, and cable tray routing.
- 8) preliminary fault study and arc flash hazard assessment, noting the requirements for maximum allowable arc flash hazard Class as noted in the Engineering Standards.
- 9) fire alarm control sequences.
- 10) generator loading calculations.
- 11) temperature control system points list and outline of control sequence; initial coordination meeting required with Temperature Controls Preferred Vendor.
- 12) updated project cost estimate based on 50% construction documents and updated project schedule.
- 13) a statement of review of IU mechanical and electrical standards and a list of any potential non-compliance issues.
- 14) updated energy use and demand calculations, including projected monthly and annual requirements for electricity, steam, chilled water, and natural gas (if applicable). Level of LEED certification achieved, if applicable.
- 15) verification of energy code design compliance, including documentation of system analysis or component performance values.
- 16) final analysis of noise and vibration impact from building systems.
- 17) a statement of coordination verifying that all ductwork, piping, conduit, lighting, raceways, and other above-ceiling facilities will fit at the stated height above the finished floor.
- 18) completed Design Intent Document.
- 19) Additional deliverable requirements for Building Information Modeling (BIM)/Integrated Project Delivery (IPD) for the Construction Document Phase may be found in The Indiana University Building Information Modeling (BIM) Guidelines for Architects, Engineers, and Contractors. This document and other IU BIM templates and forms can be downloaded at: <http://www.indiana.edu/~uao/iubim.html>

Consultant shall return all owner comments from design development. All owner comments should be resolved before completion of the Construction Document phase. Resolution to owner's comments should be marked on the comment set: "Agreed" or "Disagreed with written resolution".

Appendix A

95% Completion Submittal:

Drawings and specifications should be **complete** for this submittal, and the last 5% of work should be reserved for IU comment resolution. Failure to provide a complete submittal at this stage will delay the release of the project for bidding. A Statement of Coordination is required from the Consultant verifying that all ductwork, piping, conduit, lighting, raceways, and other above-ceiling facilities for all building systems will fit at the stated height above the finished floor, and that these building systems have been coordinated with the architectural and structural design documents.