

## **2.4 University Design Review & Approval**

### **2.4.1 Introduction**

The design and construction of new buildings is typically considered as comprising of several distinct phases. In Alberta, the design professions (including the Alberta Association of Architects, The Association of Professional Engineers, Geologists and Geophysicists of Alberta and the Consulting Engineers of Alberta) support a seven phase process comprising:

- Pre-design
- Schematic Design
- Design Development
- Contract Documents
- Tender
- Construction
- Post-Construction

Dividing a project into specific phases offers the advantage of establishing a set of distinct checkpoints or milestones for the work. While activities in each phase will vary somewhat depending on the size and complexity of the project, all projects require consideration of specific questions and issues at each phase.

Prior to contract document production the two key project design milestones are completion of schematic design and design development. Recommended design practice requires the submission of formal reports documenting project progress at each of these milestones. Both these submittals are important checkpoints in the design process for the University of Calgary for several reasons. These reports define the building design, the building systems and building envelope so that the University can evaluate the effectiveness, efficiency and acceptability of the proposed design with respect to the Campus Master Plan, the campus sustainability goals, operations, maintenance and energy consumption requirements. Because the University of Calgary expects a fully integrated approach to building design the architectural, structural, mechanical and electrical reports should be submitted together by the prime consulting team.

Schematic and Design Development Reports seek to standardize the minimum submittal requirements across the disciplines for these two key phases of a building project. These reports have specific requirements. See 2.4.3 and 2.4.4.

The contract document submittals required are taken to be the ongoing progressive completion of the design documents based on the approved design development report. Contract documents will be reviewed by the University at 66% and 95% (pre-tender) completion. No explicit requirements are specified for these submissions though they are expected to accurately reflect the respective percentages noted. In addition, the 95% submission must include full specifications.

A response to each submission will be provided by the University within 10 working days of receipt. It is the responsibility of the Project Manager to furnish Campus Architecture and Campus Engineering with the appropriate documents for review and to facilitate the documents return to the consulting team. Within a further 10 working days the consultants will respond that

all review comments have been incorporated into the documents or they will provide written explanations for the comments not having been incorporated.

## **2.4.2 Schematic Design**

### **2.4.2.1 Architectural Requirements**

The architectural schematic design report should illustrate the functional relationships of the project elements while describing the project's scale and character—informed by the functional program, the project schedule and the construction budget. The architectural schematic design report shall include, as a minimum:

- A description of the design approach or philosophy
- Illustrative sketches or perspectives
- A site plan and site data making reference to the Campus Master Plan
- Preliminary floor plans
- Vertical sections
- Building elevations
- Summary of how the design will achieve the requirements of the Sustainable Design Brief
- A massing model, real or digital
- Indicative Estimate or Class D Estimate of construction cost with qualifications
- Summary of status of design with respect to authorities having jurisdiction
- Preliminary schedule for design and construction start
- Basic area calculations and analysis
- Anticipated product and material descriptions
- Coordinated structural, mechanical and electrical reports

### **2.4.2.2 Structural**

The structural schematic design submission shall include, as a minimum:

#### **Design criteria**

Define the criteria that will be used in analyzing and designing the structural systems.

#### **Description of system options**

A narrative description of potential structural systems including:

- design loads for all load cases
- implications of soils report on which the design is based

- identification of special requirements

The advantages and disadvantages, where appropriate, of options presented should be discussed and any preferred options noted.

### **Codes and standards**

List the codes and standards to which the engineering systems will be designed.

### **Drawings**

Provide preliminary single line drawings of the preferred structural system showing;

- foundations
- column locations
- bay sizes
- location of expansion or seismic joints
- lateral support system
- typical member sizes
- sections and details sufficient to illustrate design intent.

#### **2.4.2.3 Mechanical**

The mechanical schematic design submission shall include, as a minimum:

#### **Design criteria**

- define the external design conditions that will be used in analyzing and designing the mechanical systems.
- provide, in a tabular format, a listing of all major space types proposed with the corresponding interior design criteria, for:
  - temperature
  - relative humidity
  - noise level
  - population density
  - minimum outside air ventilation rate
  - maximum total air change rate
  - filter efficiency.

**Description of system options**

A narrative description of mechanical/energy/environmental systems and solutions being considered for the building. Address all systems including:

- site servicing strategy, including:
  - sanitary sewer
  - storm sewer
  - potable water
  - gas
  - heating
  - cooling
  - fire department access, including siamese connection location
  - any other miscellaneous services;
- heating
- cooling
- building automation
- fire protection and life safety, including assessment of need for fire booster pump
- plumbing, including;
  - sanitary sewer
  - storm sewer
  - domestic water
  - any other miscellaneous or special services.

The advantages and disadvantages of options presented should be discussed and preferred options noted.

**Codes and standards**

List the codes and standards to which the engineering systems will be designed.

**Sustainable design goals**

A brief discussion of the overall sustainable design goals for the project and the options available through the mechanical design which will contribute to supporting these goals. Address the issues of:

- energy conservation
- storm water management
- water conservation

- alternative energy
- indoor environmental quality
- thermal comfort
- measurement and verification approach
- commissioning strategy.

Provide explanatory sketches and/or cartoons clearly illustrating concepts proposed .

### **Preliminary loads**

Provide a preliminary estimate of the peak simultaneous loads for:

- heating
- cooling
- outside air ventilation
- total air flow.

### **Energy model**

Provide a preliminary energy model in support of the building orientation, massing and envelope design. Provide input summary of key envelope parameters and resulting energy use.

### **Drawings**

Provide preliminary drawings comprising:

- site servicing concept
- heating system schematic
- cooling system schematic.

#### **2.4.2.4 Electrical**

The electrical schematic design submission shall include, as a minimum:

#### **General**

Address the purpose of the schematic design report, outline the general scope of the electrical systems and describe the general approach, objectives and goals of the design.

#### **Codes and standards**

List the codes and standards to which the engineering systems will be designed.

**Description of system options**

A narrative description of electrical systems, alternate options and solutions being considered for the building.

Provide, in a tabular format, a listing of all major space types proposed with the corresponding design criteria for the electrical systems.

Address all systems including:

- site servicing strategy, including:
  - power
  - communication systems
  - site lighting
- normal Power Distribution
- emergency Power Distribution
- uninterruptible Power Supply
- grounding system
- lightning protection system
- lighting and lighting control (LPD targets and illumination requirements)
- life safety systems, including:
  - fire alarm
  - emergency lighting
  - exit lighting
- communication systems, including:
  - Telephone
  - Data
  - Public address
  - TV/CCTV
  - Security
  - Audio visual
- any other miscellaneous or special systems.

The advantages and disadvantages of options presented should be discussed and preferred options noted.

**Sustainable design goals**

A brief discussion of the overall sustainable design goals for the project and the options available through the electrical design which will contribute to supporting these goals. Address the issues of:

- daylighting
- lighting control
- light pollution
- renewable energy
- building commissioning
- measurement and verification.

**Preliminary loads**

Provide a preliminary load estimate for:

- normal power
- emergency power
- lighting
- mechanical motor load
- user loads.

**Drawings**

Provide preliminary drawings of the proposed electrical systems showing:

- Site servicing concept including;
  - incoming feeds
  - entrance locations
  - transformer locations
- Single line power schematic
- Communication systems schematics.

### **2.4.3 Design Development**

#### **2.4.3.1 Architectural Requirements**

The architectural design development phase represents the refinement and detailed development of the approved schematic design. The architectural design development report shall include, as a minimum:

- Background to the Project
- List of Drawings appended to the report
- Design Objectives
- Architectural Design including:
  - Site orientation, landscaping, parking and driveways
  - Floor plans
  - Vertical sections
  - Building elevations
  - Sustainable design goals described
  - Interior and exterior circulation
  - Finishes
- Describe the specific measures proposed architecturally in support of the project sustainable goals for each area identified in the Schematic Design Report.
- Substantive Estimate or Class B Estimate of construction cost with qualifications
- Zoning and Building Code analysis
- Summary of revisions to schedule for design and construction start
- Summary of the building area calculations
- Outline specification
- Coordinated structural, mechanical and electrical reports

#### **2.4.3.2 Structural**

The structural design development submission shall include, as a minimum:

##### **Design criteria**

Update design criteria previously submitted

##### **System description**

A narrative description of the recommended structural systems including:

- proposed foundation design



- choice of framing system, including lateral load resisting elements
- verification of adequacy of all assumed dead and live loads
- consideration of maximum depths of members and critical sizes of members
- size and location of major openings through the structure for work by other disciplines
- provision for special equipment like rooftop mechanical units and window washing
- required fire resistance rating of structural elements
- proposed methods of corrosion protection where required.

**Outline specification**

Provide a short form outline specification indicating the materials and methods of construction proposed.

**Drawings**

Provide preliminary drawings comprising:

- foundation plan including interior and exterior perimeter foundation sizes
- framing plans for all floors and roof including;
  - member sizes noted or scheduled
  - typical and maximum column sizes
  - typical reinforcing for concrete

**2.4.3.3 Mechanical**

The mechanical design development submission shall include, as a minimum:

**Design criteria**

Update design criteria previously submitted.

**System description**

A narrative description of the mechanical/energy/environmental systems and solutions proposed for the building. Address all systems as listed for the schematic design submission and detail specific systems and solutions proposed from the options previously identified.

**Sustainable design goals**

Describe the specific measures proposed mechanically in support of the project sustainable goals for each area identified in the schematic design report.

**Building loads**

Update estimated peak simultaneous heating, cooling, ventilation and total airflow loads for the building.

**Energy model**

Provide energy model update for the specific building design proposed and the selected mechanical and electrical systems. Provide summary of key input parameters and energy use results.

**Major equipment list**

Provide a narrative listing of both major equipment proposed or any smaller, multiple use equipment such as individual washroom exhaust fans in a residency building.

**Outline specification**

Provide a short form outline specification indication the materials and methods of construction proposed. Specifically, include:

- piping material and fittings;
- valve types and applications;
- insulation thicknesses; and
- sheet metal gauges.

**Motor list**

Provide a design development motor schedule listing all major equipment and estimated motor sizes.

**Plumbing fixture cuts**

Provide plumbing fixture cut brochure with illustrations and specifications of all fixtures proposed including:

- water closets;
- urinals;
- lavatories and trim;
- sinks and trim;
- floor drains; and
- backflow preventers.

**Drawings**

Provide updates to schematic design drawings for:

- site servicing;
- heating system schematic; and
- cooling system schematic;

*plus:*

- ventilation riser diagram and schematic including air handling unit configuration;
- typical area/floor plans illustrating all system components including:
  - control zones;
  - balancing dampers;
  - drywall access panels;
  - isolation valves;
- mechanical room preliminary layouts with section(s); and
- typical ceiling space section(s), reflecting proposed structure and ceiling height(s) at areas of largest duct sizes.

**Controls**

Provide a preliminary sequence of operation for all major heating and cooling and ventilation system equipment.

**Preliminary commissioning plan**

Provide a preliminary commissions plan indicating the means by which the LEED fundamental and best practices commissioning work will be completed

**Measurement and verification**

Provide a narrative description of how the energy and water systems will be metered to both meet the requirements of the associated LEED credit and provide a means of on going verification of energy/water performance.

#### **2.4.3.4 Electrical**

The electrical design development submission shall include, as a minimum:

##### **General**

Update section previously submitted at schematic design.

##### **System description**

A narrative description of the electrical systems and solutions proposed for the building. Address all systems as listed for the schematic design submission and detail specific systems and solutions proposed from the options previously identified.

##### **Sustainable design goals**

Describe the specific measures proposed electrically in support of the project sustainable goals for each area identified in the schematic design report.

##### **Building loads**

Provide an update of the load estimates as provided in the schematic design report.

##### **Major equipment list**

Provide a narrative listing of major equipment proposed including power distribution equipment and lighting equipment.

##### **Outline specification**

Provide a short form outline specification indicating the materials and methods of construction proposed.

##### **Lighting Fixture cuts**

Provide fixture cut brochure with illustrations and specifications of all lighting fixtures proposed.

##### **Drawings**

Provide drawings comprising:

- site drawings indicating;
  - proposed site distribution for power and communications with proposed service entrance, location of transformers, generators, vaults, pull boxes, etc.
  - proposed site lighting and security concepts
- floor plans indicating;

- power system plans showing panel board locations, major equipment locations, main distribution panels and locations of electrical closets
- proposed major routing of communications system and communications equipment rooms
- plan layouts of electrical rooms showing locations and approximate sizes of major equipment
- plan of typical area lighting layout indicating fixture types and location of special controls
- typical receptacle and device layout plans
- typical layout of fire alarm, security and communications system devices
- proposed locations for access controls, intrusion detection devices, CCTV and local control panels for security system
- single line diagram of the building power distribution system
- fire alarm system riser
- voice/data systems riser
- security system riser
- public address system riser

**Preliminary commissioning plan**

Provide a preliminary commissions plan indicating the means by which the LEED fundamental and best practices commissioning work will be completed.

**Measurement and verification**

Provide a narrative description of how the power and lighting systems will be metered to both meet the requirements of the associated LEED credit and provide a means of ongoing verification of energy performance.

**Revision History**

<b>Revision Date</b>	<b>Version</b>	<b>Description</b>
December 2014	1.0	Baseline version
July 5, 2023	1.0	Added Revision History table to end of document and reset to Version 1.0.