**PART D: PROJECT DOCUMENTATION AND EXECUTION**

**OWNER’S (SFU) ROLE AND CONSULTANT TEAM**

Facilities Development will only engage qualified Designers and Engineers for structural, architectural, mechanical (heating ventilation air-conditioning), fire protection and electrical designs for work on the Burnaby Campus. The Consultant’s services includes inspection of construction and consultation on problems arising during construction. Changes to the Contract must be approved by the various Consultants before submitting the proposed Change Order to SFU’s Owner’s Representative/Project Representative.

Only SFU can approve an equivalent or alternate product or approve a Change Order. On Projects where an Architect is the Prime Consultant, they are required to be the Payment Certifier. The Consultants and Contractors may not make changes without the above approvals.

Designers and Consultants shall prepare drawings for acceptance and written approval and sign-off by the Facilities Services Project Representative. Design Consultants shall familiarize themselves with all relevant regulations applicable to the design, construction, use of material, and operations of the Premises, including the B.C. Building Code, the amended National Building Code and Occupational Environmental Regulations. The design of the improvements must comply with these and other relevant regulations.

**SOURCES OF INFORMATION**

Further information can be obtained from Facilities Services’ Project Representative, Facilities Services’ Record Services and web site (www.sfu.ca/fs), Information Technology (IT) Services, Campus Security and Environmental Health and Safety.

It is the responsibility of the Consultants to verify site conditions and to obtain the relevant building code information required.

**DESIGN INTERFACE WITH BASE BUILDING (for Renovation Projects)**

Advise Facilities Services as soon as possible, and in writing, of any changes contemplated changes affecting the base building systems. These changes may impact...
air distribution and balancing, lighting controls, exiting, etc. of the building systems.

Drilling of holes in the aluminum window frames is not permitted.

Maintain safety clearances to comply with building codes and city regulations, with respect to access to Fire Department valve cabinets.

**PUBLIC REGULATORY REQUIREMENTS**

Drawings and specifications must comply with applicable building codes, City of Burnaby by-laws, and statutes.

**COMMENCEMENT OF RENOVATION WORK**

All drawings for renovation work on campus must be reviewed and approved by Facilities Services.

Facilities Services Owner’s Representatives will provide guidance or advice to Designers, Contractors and Users. Approval to proceed with construction will not be given until all information and engineering drawings and necessary permits are obtained. The steps to be followed prior to construction start include:

- Site visit and verification of design information
- Concept Plan Approval to confirm Building Code compliance
- The User’s final working drawings shall have been approved by the Facilities Services.
- The Consultants shall have obtained all necessary approvals and permits from all regulatory bodies having jurisdiction over Improvement work and evidence of all such approval and permits shall be provided to the Facilities Services.
- Contractor and sub-contractors working on Projects under $120,000 shall be fully qualified and union members in good standing.
- The Contractor shall furnish proof of insurance as required by Facilities Services in the format approved by Facilities Services and SFU Risk Manager.

**DOCUMENTING THE PROJECT: DRAWING AND SPECIFICATIONS**

**Architects/Designers**

As/if required, Facilities will engage a Registered Professional to prepare drawings which are necessary for the construction of the Improvements.

Consultants shall inform themselves regarding By-law and code requirements before...
preparing drawings.

By giving approval to such plans, Facilities Services does not waive the Consultants responsibility to ensure that any and all Improvements meet building standards with respect to design and/or construction.

**Preparing documents to meet Departmental standards**

The detailed requirements below are primarily listed for minor projects such as departmental renovations. Major projects have extensive documentation requirements that will be reviewed with the Owner’s Representative.

**Standard Drawing Requirements**

- Standard sheet size: ARCH D 24” x 36” (in major projects, drawing size as req’d.)
- Standard Title Block Information
- Building Name, floor and room numbers as applicable
- Project Name and Number
- Sheet Number
- Drawing File Number
- Revision History – revision number and date
- Drawing Phase (IFT, IFC, Records, etc.)
- Consultant Information

Drawings and specifications are required to be sufficient in scope and detail to fully depict the proposed Improvements and their relationship to the Base Building construction.

**Drawing Information**

Drawings shall consist of at least the following (as a minimum):

- Floor Plan (1:100 scale minimum)
- Show the Premises in relation to the corridors, stairs, fire extinguisher cabinets, partition, doors, etc. as well as all built-in furniture and fixtures.
- Reflected Ceiling Plan  (1:100 scale minimum)
- Show partition layout, lights, sprinklers, etc., including modifications proposed to the Base Building systems.
- Sections at 1:50 to 1:20, indicate partition details, doors, etc.
- Room Finish, Door and Hardware Schedule, indicate all elements including keying which must be to building standard.
- Mechanical Plans
- Electrical Plans
- Telephone, Data and Power Outlet Plan at 1:100 scale (minimum), indicate with dimensions, location of all telephone, data and power outlets.

**Specifications**

Detailed specifications are required, naming the manufacturers, colours, dimensions, construction methods, schedules, etc.

Specifications should follow Master Format 2014.

Specification volumes double sided spiral bound.

**Room Finish, Door and Hardware Schedules**

**COMPLETE DETAILS**

SFU Locksmith will specify key locksets with reference to building’s master system. SFU will provide the room numbers for all the rooms on a set of drawings. This typically occurs during Design Development as soon as the wall locations are confirmed. No construction numbers are allowed on any drawings. SFU has very specific hardware standards (Attached in Appendix E-2A, E-2B). No deviation from these standards is allowed without permission in writing from both FS and Campus Security.

**Telephone, Communications and Security devices Plan**

(1:100 scale minimum) SFU requires the low voltage consultant to be a firm that specializes in data, voice and security. Ideally this firm is independent from the electrical consultant firm.

The electrical consultant provides the infrastructure (conduit and cabling) for all the low voltage wiring. The IT drawings indicate all the locations of all telephone, communications and security devises with dimensions and special computer and communications equipment noted.

**DOCUMENTING MECHANICAL PLANS AND CONTROLS**

For renovations, Indicate changes to the Base Building systems and include appropriate specifications.
**Final Control Diagrams**

Provide before acceptance in both hard and soft copy. Show:

- Changes to contract documents as well as addenda and contract extras
- Changes to interface wiring
- Major routing of conduit
- Signal levels, set-points, reset curves, schedules
- Where possible, bind with specified Operating and Maintenance Manuals
- Provide listing of alarm messages.
- Provide soft copy of updated drawings on system and soft copy back up.
- Provide 1 non fading “as built” copy showing control and/or adjustment procedures. Seal in plastic laminate in rigid metal bound loose leaf.

**OPERATIONS & MAINTENANCE MANUALS**

**General**

O&M Manuals (both hard and soft copy) to be custom designed and contain material pertinent to project only, and to provide full and complete coverage of subjects referred to in controls section.

- Provide 2 soft copies and 2 hard copies in hard back, 3-post hard covered binders.
- Binders to be 2/3 maximum full
- Provide index to full volume in each binder.
- Identify contents of each manual on cover and spine.
- Include names, addresses, telephone numbers of each sub contractor having installed equipment, local representative for each item of equipment, each system.
- Provide Table of Contents in each manual. Assemble each manual to conform to Table of Contents with tab sheets placed before instructions covering subject.
- Furnish 1 complete set of hard and soft copies prior to system or equipment tests. Furnish remainder upon acceptance.
- Include complete coverage in concise language readily understood by operating personnel using common terminology of functional and operational requirements of system. Do not presume knowledge of computers, electronics or in depth control theory include copies of all approved shop drawings.
**Functional description to include:**

- Functional description of theory of operation
- Design philosophy
- Specific functions of design philosophy and system
- Full details of data communications, including data types and formats, data processing and disposition data link components, interfaces and operator tests or self test of data link integrity
- Explicit description of hardware and software functions, interfaces, requirements for components in functions and operating modes
- Description of person machine interactions required to supplement system description, known or established constraints on system operation, operating procedures currently implemented or planned for implementation in automatic mode.

**Systems Operation:**

- Complete step by step procedures for operation of system including required actions at each OWS.
- Operation of computer peripherals, input and output formats.
- Emergency, alarm and failure recovery
- Step by step instructions for start-up, back up equipment operation, execution of all systems functions and operating modes, including key strokes for each command so that operator need only refer to these pages for keystroke entries required to call up display or to input command.

**SOFTWARE TO INCLUDE:**

- Documentation of theory, design, interface requirements, functions, including test and verification procedures.
- Detailed descriptions of program requirements and capabilities
- Data necessary to permit modification, relocation, reprogramming and to permit new and existing software modules to respond to changing system functional requirements without disrupting normal operation.
- Software modules, fully annotated source code listings, error free object code files ready for loading via peripheral device
- Complete program cross reference plus any linking requirements, data exchange requirements, necessary subroutine lists, data file requirements, other information necessary for proper loading, integration, interfacing, program execution.
• Software for each new controller and single section referencing all Controller common parameters and functions

MAINTENANCE:

Document maintenance procedures including inspection, periodic preventive maintenance, fault diagnosis, repair or replacement of defective components, including calibration, maintenance, repair of sensors, transmitters, transducers, Controller interface firmware’s, plus diagnostics and repair/replacement of system hardware.

Test procedures and reports: record implementation, description of test procedures. Provide for measurement or observation of results.

SYSTEM CONFIGURATION DOCUMENT

Basic system design and configuration

Provisions and procedures for planning, implementing, recording hardware and software modifications required during installation, test and operating lifetime of system.

Information to ensure co-ordination of hardware and software changes, data link or message format/content changes, sensor or control changes in event that system modifications are required.

Full documentation of new system configurations.

Identifications

• Submit for approval samples of nameplates, identification tags and list of proposed wording.

• Follow SFU labeling and identification system.

• Refer to Appendices D-1. SFU Mechanical & Electrical Equipment Identification and Labeling system. (Updated April 2016)

Electrical Plans

• In renovations, indicate changes to the Base Building systems and include appropriate specifications.

• Project Construction Schedule (preliminary and final)

The Consultant, in consultation with the Project representative from Facilities Services, will outline expected dates for the start and completion of drawing development, tendering and construction along with completion and occupancy dates. This schedule
should be submitted at the commencement of Schematic Design and any Changes must receive the approval of the Owner’s Representative.

**PREPARING CONTRACT DOCUMENTATION**

**Submitting Working Drawings for Approval**

Throughout the duration of the project, the Consultant and/or Contractor will be required to submit the following required documents:

The Consultant shall submit drawings for review and approval by Facilities Services and the User Group at approximately 30%, 60% complete and issued for tender sets. Outline specifications should be provided at 30%. At 60% complete, draft specs sections for all sub-consultants should be provided for coordination.

Some key areas for review are:

- **Universal Access**: the Burnaby Campus’ interconnected floor plates built on a mountain often provides unique challenges for persons with disabilities. Preliminary drawings will be checked from the standpoint of physical compatibility and any problems encountered shall be returned to the Consultant and/or his agent for solution.

- **Fire exiting**: Special consideration must be paid to occupancy load calculations and path to exits. The interconnected buildings require special consideration to ensure safe exiting is provided from suites.

- **Impact on existing systems**.

- **Long term maintenance and operations**.

Obtain approval from Facilities Services Owner’s Representative upon receipt of advice of corrections to any problems.

**Prior to Construction**

Provide Facilities Services Project representative with:

- **Building Permit Number and a copy of the Permit**.

- **Proof of Contractor’s Liability Insurance Policy**.

- **Copy of Contractor’s Worker’s Compensation Board, Letter of Certification**.

**Prior to Substantial completion**

- **Fire Alarm Verification**.

- The Contractor is also responsible for obtaining all the required inspections and sign-offs (i.e., building, electrical, plumbing, sprinkler, fire department, health, etc).

*Revised February 23, 2017*
As-Built drawings & Maintenance Manuals

- HVAC Balancing Report
- Final Building Inspection Permit
- Final Electrical Inspection Permit
- Final Plumbing Inspection Permit

COMMISSIONING

Commissioning Team

Commissioning to be carried out under general direction of the Commissioning Engineer (Contractor's staff) and where applicable, the Owner's Commissioning Authority, and in presence of the Consultant, Consultant team and the Owner as requested.

Approvals

Obtain approval to start commissioning from the Consultant at least 7 days prior to start.

Information to include:

- Systems to be commissioned
- Procedures, anticipated results
- Names of commissioning personnel
- Purpose
- Assurance that systems meet design criteria, design intents and requirements of specifications
- Design Requirements
- Commissioning Engineer to confirm with the Consultant that Design Criteria and Design Intents are still applicable
- Commissioning personnel to be fully aware of and qualified to interpret Design Criteria and Design Intents

Coordination

Coordinate commissioning procedures with other Divisions.
**Commissioning Plan**

Information to include:

- Systems to be commissioned
- Procedures, anticipated results
- Names of commissioning personnel
- Purpose
- Assurance that systems meet design criteria, design intents and requirements of specifications
- Design Requirements
- Commissioning Engineer to confirm with the Consultant that Design Criteria and Design Intents are still applicable
- Commissioning personnel to be fully aware of and qualified to interpret Design Criteria and Design Intents

**Timing**

- Commissioning to commence only after satisfactory completion of start up, verification of performance and specified test period
- Commissioning of occupancy, weather, and seasonal sensitive systems to take place during four (4) consecutive seasons, after facility has been accepted, taken over and fully occupied.
- Commission systems considered as life safety systems before affected parts of facility are occupied.

**Instrumentation**

- Provide sufficient permanent and temporary instrumentation. Verify locations, access, illumination for readings.
- Instrumentation accuracy tolerances: higher order of magnitude than equipment, or system, being tested.
- Locations to be approved, readily accessible and readable.
- Application: to conform to normal industry standards.

**Operations of Systems**

- Operate systems as long as necessary to commission entire project

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**Note:**

Facilities Services, at its discretion, will hold back funds until the Record Drawings are received in acceptable form. Refer to Appendix D-2: Printing Request Form & Appendix D-3: Records Submission Requirements.

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Revised February 23, 2017
• Supervision and Monitoring

• Commissioning to be supervised by qualified supervisory personnel

• Monitor progress

• Keep detailed records of activities and results.

**Documentation**

Documentation, O&M Manuals and training of O&M personnel to be complete to satisfaction of the Consultant before starting commissioning.

**Verification of Results**

Commissioning Engineer shall verify 30% of reported results.

**Demonstration**

Demonstrate to the Consultant and the Owner operation of systems including sequence of operations in regular and emergency modes, under normal and emergency conditions, start up, shut down, interlocks, lock outs.

**Final Settings**

Upon completion of commissioning to satisfaction of the Consultant, set and lock devices in final position, permanently mark settings.

**Final Report**

• Submit report to Consultant.

• Report to include: Measurements, final settings, certified test results.

• Bear signature of commissioning technician and supervisor.

**Use of O&M Personnel**

O&M personnel to assist in commissioning procedures as part of training.

**Equipment Demonstrations**

At the completion of the project, the General Contractor shall provide equipment demonstrations of all newly installed mechanical and/or electrical equipment to the Facilities Services staff as requested.
SUBMITTING FINAL RECORD DOCUMENTATION

Drawings

Prior to the application for substantial completion the Contractor should review the red-line site mark up set and stamp and sign to certify completeness and accuracy. The Prime Consultant shall obtain these site mark ups/ as built drawings from the Contractor and review them for their completeness. Once approved, the respective Disciplines will in turn convert these as built drawings into “Record Drawings”. The Designer and Mechanical and Electrical Consultants will submit to Facilities a complete set of Record drawings in print form as well as CAD files, with all deviations neatly indicated.

See Appendix D-3: Records Submission Requirements. (Updated May 30, 2016)

See Appendix D-3a: Records Submittal Checklist.

Specifications

Update Specification sets with approved change orders inserted in the front. Provide a soft copy of the specifications with Records submittals.

Operation and Maintenance Manuals

At completion of project, two maintenance manuals must be submitted in 3-post hard covered binders as well as in soft copy in a labelled CD. Each manual must include (as a minimum) the following information:

- Description of operation
- Shop drawings of all equipment
- Extended warranties
- Maintenance and operating instructions
- List of manufacturer and trade names
- List of supply sources for maintenance
- Paint formulas
- Hardware products supplied and installed
- Balance report
- Name of company, contact person and phone number and e-mail address of ALL sub trades that supplied and installed products to the site
- All Permits, licenses and final inspections
- Copy of Substantial Completion Certificate

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